THE ACCURACY OF THE 1960 CENSUS COUNT

I. Introduction

The single most important set of statistics obtained from the 1960 Decennial Census is the count of the total population of the United States and each of its subdivisions. One of the major objectives of a Census is to obtain a complete and unduplicated count of the population. Achieving this objective is difficult -- the high degree of population mobility, the length of the period of enumeration, the difficulty of locating some housing units, the multiple residences of some families, the problems of finding people at home in large cities and the problems of carrying out a large scale enumeration with a relatively inexperienced crew of enumerators, all cause a departure from the basic objective. With these many different sources of error possible, it is important to determine the degree to which we have achieved a complete and unduplicated count.

The purpose of this paper is to discuss some available information regarding the accuracy of the 1960 Census count. The data represent only some of the results that will be available and are considered here without the full and total examination which is called for in the final evaluation of the accuracy of the 1960 Census count. As separate components, these results will play a role in the final estimates. As yet they represent only part of the story which <u>must be reviewed</u> in order to determine the final estimates of the accuracy of the 1960 Census.

The test for completeness of enumeration of the 1950 Census rested both on the results of a Post Enumeration Survey and on the evidence of demographic analysis. 1/

The Evaluation Program of the 1960 Censuses 2/ was designed to take account of what we learned from the 1950 PES. After discussion with a panel of expert consultants, a number of interrelated studies were developed to evaluate the accuracy of the count. It was decided that the studies should comprise:

- U.S. Bureau of the Census, Post Enumeration Survey; 1950. Bureau of the Census, Technical Paper No. 4, Washington, D.C. 1960
- 2/ Hansen, Morris H., Pritzker, Leon, and Steinberg, Joseph, "The Evaluation and Research Program of the 1960 Censuses" American Statistical Association, Proceedings Social Statistics Section, Washington, D. C., December 1959, pp. 172-180.

- 1. Resurveys of samples of the population
- 2. A series of reverse record checks-that is, studies involving the determination of whether a sample of individuals selected from records could be found in the Census.
- and 3. Analytical techniques--such as setting up an accounting of population growth, using Census counts and reported births, deaths and international migrations.

The final estimates will coordinate and reconcile results from all of these. At present, not all of the component results are available. For this and other reasons the present paper gives only the authors' personal views and are not official estimates of the accuracy of the 1960 Census count.

II. Measurement of Missed and Overcounted Units and Persons: Reenumerative Surveys

> The reenumerative survey which dealt with under- and over-counts of housing units (and people in them) involved an area sample consisting of about 2,500 segments, with about 18,000 housing units. This sample was reinterviewed with an intensive procedure in the fall of 1960.

> According to preliminary tabulations from this study, the 1960 Census missed about 1.9 million housing units--both occupied and vacant--this was about 3.2 percent. There were about 2.9 million missed persons in these missed units (1.6 percent). We estimate that about 400,000 to 600,000 housing units containing about 250,000 persons (including some units enumerated in the wrong ED) were enumerated in error in the Census. Thus, we estimate a net underenumeration of about 2.4 percent of the housing units, and within these housing units 1.5 percent of the enumerated population.

The estimates just given resulted from the following steps:

- a. An intensive canvass of the area segments in 1959,
- An allocation of units covered in the Census to these land areas, by a field visit in the summer of 1960, and finally,
- c. An intensive canvass by specially trained enumerators in the fall of

1960. In this intensive canvass, the enumerators attempted to identify all units that had been enumerated in each structure in the previous enumerations as well as to determine what the "true" situation was at the time of these enumerations. Thus, available for analysis of coverage errors in the Census are records that describe the housing units that were enumerated at the time of the Census, and the housing units that should have been enumerated.

Another study also had provision for finding missed units in the physical neighborhood of units which were in sample. Estimates from this study are lower than the figures cited, but the number of persons per occupied-unit missed is of the same order.

Let us consider a comparison of coverage errors for occupied units for the 1960 Census with the corresponding data from the 1950 PES (Post Enumeration Survey). For net underenumeration of <u>occupied</u> housing units, the rate in 1960 is 2.0 percent, as compared with 2.3 percent in 1950. For net persons missed in missed units, the rate is 1.5 percent in 1960, as compared with 1.3 percent in 1950.

These comparisons are made for occupied units only, since the estimates of the number of missed (or overenumerated) vacant units in both the 1950 and the 1960 surveys are subject to greater error. Greater errors for vacant units occur because:

- 1. It is difficult to determine whether a vacant structure meets the housing unit criteria, particularly when it is in poor repair.
- Vacant housing units which are reached through other (occupied) units are easily missed.
- 3. It is virtually impossible to match vacant seasonal cottages, found in a sample segment, with listings in the Census.

The errors in the Census counts of housing units resulted from a number of causes: Among all missed housing units, vacant as well as occupied, about 60 percent or about 1.9 percent of the Census total, were in omitted structures. The remaining 40 percent (1.3 percent of the Census total) were missed units in enumerated structures.

Among the erroneously included housing units, about 13 percent were "nonexistent" units, resulting from misclassifications of units in the Census, fictitious enumerations, etc. The remaining 87 percent (less than one percent of the Census total) were divided into two classes:

- 1. Structures having all units erroneously included accounted for 52 percent of the overcounted units. This class includes single unit structures as well as multi-unit structures.
- 2. Multi-unit structures having one or more units correctly enumerated gave rise to the remaining 35 percent of the overcounted units.

Thus, for both under- and over-counted units, the preponderance of errors occurred when the whole structure was missed or counted in error.

III. Measurement of Missed and Overenumerated Persons in Enumerated Units

The net undercoverage in the 1950 Census was substantially underestimated by the Post Enumeration Survey taken in 1950. Further checking on the results indicated that little, if any, of this deficiency represented a failure in the PES to find living quarters that had been missed in the Census. Probably an important share of those left out of the Census consists of persons who have no regular place of residence or who have a very tenuous connection with what may be considered their residence. It is just this group that the 1950 PES also had difficulty in locating and counting.

Because of the deficiencies in the 1950 coverage estimates, the methods and procedures for evaluating coverage in the 1960 Census in <u>enumerated</u> units were strengthened in a number of respects. Probably the most important single improvement consisted in shortening the time gap between the evaluation and the Census. In 1950 the average interval between the original enumeration and the reenumeration was between four and five months. In 1960, this difference was more in the neighborhood of four or five weeks.

A second difference was the change from a dependent reenumeration in 1950 to a 1960 evaluation that was largely independent. A reenumerator in 1960 was given the address and the name of the head for each of the 15,000 sample units. This amount of information automatically told the reenumerators which units were considered vacant by the Census and which were considered occupied. Beyond this point, however, the reenumerator had no information as to who or how many persons had been counted by the 1960 enumerator. The independent interview produced many more differences as compared with the Census than would a dependent reinterview. Of course, when a reconciler returned at a later date to check the coverage differences some discrepancies turned out to be errors in the reenumeration rather than errors in the Census. It was the job of the reconciler to weed out the reenumeration errors so that the final estimates would reflect only coverage deficiencies in the Census.

A third respect in which the 1960 evaluation differed from the 1950 PES is that the effect of processing rules on coverage has been estimated in 1960. The evaluation of 1950 coverage stopped with what was recorded by the Census enumerator; no attempt was made to measure differences in coverage coming from punching and tabulating.

Evaluation procedures in 1960 have provided higher, and probably more reasonable, estimates of the numbers of missed persons in enumerated housing units than in 1950. Where the 1950 PES estimated less than a million missed persons in enumerated living quarters, the total corresponding estimate for 1960 is roughly two million persons; this, despite the fact that there is evidence that, at least in net effect, the 1960 Census did a better job in coverage than the 1950 Census.

The 1960 evaluation procedures showed that there was a field overcount of about 1.2 million persons in enumerated units. This leads to an estimated net undercount of about 800,000 in the field work. However, in the processing some rules were followed which had the effect of arbitrarily recording population for certain housing units that had been designated as occupied on the Census returns, but for which no data were readable to FOSDIC for individual household members. This was accomplished in each case by replicating information for another household. As a result of these rules, data for about 600,000 persons were replicated in the Census counts. Accordingly, we estimate a net undercount within enumerated units somewhere in the neighborhood of 200,000 persons, or about 0.1 percent. The 1950 PES on the other hand estimated a net field overcount of about 100,000 persons in enumerated living quarters.

IV. Reverse Record Checks

Having discussed some of the available information from our reenumerative surveys in the preceding paragraphs, let us turn to our reverse record checks. In brief, in order to establish an almost complete frame of the total population, we have drawn a sample from four basic sources:

- 1. The 1950 Census
- A sample of the people found, according to the 1950 PES, to have been missed in the 1950 Census
- 3. Births occurring since the 1950 Census, and
- 4. Aliens registered on January 1960 as being residents of the United States.

From each of these sources a small sample was selected designed to develop information on the accuracy of the count for the particular group. The final results are not yet available from these reverse record checks. However, we expect to find current addresses (or that sample people were deceased) for about 90 percent of the sample cases. No attempt was made prior to 1960 to test the degree of coverage of a Census by selecting a sample from other records. Therefore, these efforts represent a new approach and will be studied carefully in relation to the reenumerative surveys and demographic analysis.

V. Demographic Analysis

Trial calculations have been made by Donald Akers of the Bureau of the Census of the net Census undercount through the use of several analytic techniques. 2/ These trial calculations are labeled as experimental and not to be taken as official estimates of the Bureau of the Census. One of the analytic methods indicates that the absolute error of the count in the 1960 Census is about the same as that in the 1950 Census or that the net relative undercount dropped from 2.4 \pm to 2.1 percent. In analyzing the possible sources of error in each of the components used in the determination of the result, Akers indicates that the margin of error may be as much as 0.4 percent around the 2.1 percent.

In another method, using a battery of iterative techniques similar to those used by Ansley Coale in judging the 1950 Census 5/, Akers derived a result which estimates that the net relative undercount in the 1960 Census is about one-sixth less than in the 1950 Census.

VI. <u>Summary</u>, Conclusions, and Direction of Further Efforts

> This paper reflects our personal opinions based on partial results. The results seem to suggest that through resurvey methods a net undercount of population of about 1.6 percent may be estimated, and through analytical methods between 1.7 and 2.5 percent. Considering the evidence available to us, we conclude that the most likely level of net undercount in 1960 is in the range of 1.6 to

- <u>u</u>/"Minimum Reasonable" estimate, U.S. Bureau of the Census, Technical Paper No. 4, op cit, p. 6.
- ⁵/Coale, Ansley J. "The Population of the United States in 1950. A Revision of Census Figures." J. Amer. Stat. Assn., Vol. 50, pp. 16-54.

³ Akers, Donald S. "Estimating Net Census Undercount in 1960 Using Analytical Techniques", paper presented at the annual Population Association of America Meetings, May 5, 1962.

2.0 percent of the population as compared to the "minimum reasonable" estimate in the 1950 Census of 2.4 percent. In absolute terms, this amounts to a net undercount in 1960 between 3 and $3\frac{1}{2}$ million people.

For net underenumeration of <u>occupied</u> housing units our estimate is a rate of 2.0 percent in 1960 as compared with 2.3 percent in 1950:

	Net Undercount			
Subject	1960		1950	
	Percent	Number (millions)	Percent	Number (millions)
Population	1.6-2.0	3.0-3.5	2.4	3.7
Occupied housing units	2.0	1.1	2.3	1.1

We believe that the techniques used in the reenumerative surveys are close to a level of maximum intensity. It is possible that, through the development of more effective questions and more careful evaluation work in hotels and institutions, somewhat better results might be achieved in the next series of evaluations of a Decennial Census.

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