EVALUATION OF COVERAGE IN THE 1960 CENSUS OF POPULATION THROUGH CASE-BY-CASE CHECKING

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I. INTRODUCTION

The population count was the original purpose for taking the census and still remains by far its most important statistic. In addition to providing the basis for allocating Congressmen, population counts are important to public planning, the allocation of funds, and the projection and analysis of other statistics. Moreover, since the amount of error in the population count is likely to vary from group to group within the total population, any coverage loss can affect all census data.

Coverage thus occupies a unique position in census planning. Attempts to insure high coverage and evaluating the success of these attempts have become central considerations in developing the methods to be used in recent censuses. The resources used for these purposes are significant portions of the total resources available for a census.

There are essentially two methods of evaluating census data. One is by case-by-case analysis of a sample of census returns, using whatever means are available to uncover errors in the census. The other is by analysis of the statistics themselves, comparing them with other related information (on births, deaths, previous census counts, etc.) and examining problems of internal consistency. This report and the companion paper by Messrs. Siegel and Zelnik, describe the use of these methods in evaluating the coverage of the 1960 Population Census, and provide alternative estimates of undercounts. The present paper is restricted to the results of the case-by-case studies of 1960 coverage. This includes reinterviews and matching the census against samples selected from various independent lists. The Siegel-Zelnik paper describes methods used in analyzing the statistics and presents estimates of undercounts which combine the best features of both systems.

It should be noted that, for some purposes, what appear to be coverage errors are really the joint effect of coverage and content errors. For example, if one is analyzing the population counts by age and sex, the number of persons reported in a given category is affected not only by the degree to which they are missed in the census, but also errors in age reporting and even in reporting or tabulating sex. Because of the pervasive role of age, sex, and color as bases of cross-classifications in the census and because many of the evaluation methods are tied to analyses of the population by these items, we are likely to think of these items as virtually defining the population. Thus, analyses of coverage tend to involve age, sex and color distributions of the population.

Since this paper is concerned with techniques of evaluation that involve examining the census records to ascertain whether specific individuals have been correctly counted, it is possible to keep "pure" coverage errors separate from age-reporting differences. For reasons to be described later, only "pure" coverage errors will be discussed in this paper, although much of the statistical data distribute under-enumeration by age, sex and color. The Siegel-Zelnik paper will contain a discussion of the joint effect of coverage and other reporting errors on the population counts.

Our definition of coverage should be made clear, by pointing out an important distinction. In any census there is always a small proportion of households with no one ever at home when the enumerator calls, and such households are, therefore, not personally enumerated. In 1960, as in previous censuses, the enumerators were instructed to obtain and report counts of the people in these households from neighbors, and if possible, a minimal amount of other information, i.e., sex, age, color, relationship and marital status. These cases are not treated as undercoverage, although frequently no information other than the count of individuals could be obtained. They were treated as simply contributing to the persons for whom individual items of information were not reported. In general, computer methods were used to impute data for such not-reported cases and most census tables show the estimated distributions for the entire enumerated population. (Appendix tables show the amount of such imputations.) Undercoverage describes persons whose existence was not reported to census enumerators, and who are therefore not represented in any way in the census.

II. COVERAGE ANALYSES PRIOR TO 1960.

It might be useful to start off with a brief resume of estimates of undercoverage in the 1950 Census and various actions taken to improve coverage in the 1960 Census.

Estimates of undercoverage in the 1950 Census of Population and their uncertainties.--At least three estimates are available of net underenumeration of the total resident population of the United States:

1. Post-Enumeration Survey (PES) of the 1950 Census: 1/
   2.1 million persons (1.4 percent of the enumerated population).
2. The analytic method developed by Ansley J. Coale: 2/
   5.4 million persons (3.6 percent of the enumerated population).
3. The Bureau of the Census "minimum reasonable estimate." 1/
   3.7 million persons (2.5 percent of the enumerated population).

The PES estimate.--There are a number of reasons for believing that the PES estimates of omitted persons, and thus of the net underenumeration in the 1950 Census, are substantial understatements:

1. The PES check for missed persons did not cover transient hotels and motels, nor other "quasi" households where 35 or more persons lived. The enumerated population excluded from the scope of the PES missed-persons check is estimated at 4.1 million or a little less than 3 percent of the enumerated population. However, there is reason to believe that persons in such quarters are missed at a disproportionately high rate. This exclusion therefore probably resulted in an understatement of more than 3 percent for the missed population.

2. There was a time lag between the Census and PES of between 4 and 5 months. Thus, it was obviously difficult for the PES interviewer to obtain reliable information about persons living at specified sample locations at the time of the census who left before the time of the PES interview (almost 10 percent of the population of the United States).

3. The PES made use of substantially the same enumerative methods that were employed in the census and thus apparently had the same difficulties in identifying persons with tenuous or temporary attachments to households. Evidence for the soundness of this view comes from various demographic analyses performed after the 1950 Census that indicated that the PES estimates were just about as deficient as the census estimates for those groups of the population subject to the greatest risk of underenumeration, for example, males aged 15-39.

1/ U.S. Bureau of the Census. "The Post-Enumeration Survey: 1950," Technical Paper No. 4.

2/ Coale, Ansley J. "The Population of the United States in 1950 Classified by Age, Sex, and Color -- A Revision of Census Figures," Journal of the American Statistical Association, Vol. 50, March 1955, pp. 16-54.

The Coale estimate.--The procedure was based on the assumption that the rates of underenumeration in the 1930 Census by age, sex, and color were equal to the smaller of the error rates in 1940 and 1950. On the basis of this assumption an iterative process was applied that provided estimates for the population 15 years old and over in 1950. For children aged 0-14 in the 1950 Census, the estimate was derived from Birth Registration Tests of 1940 and 1950. Coale, himself, recognized that his procedure had some limitations, especially for the older ages. Indeed, for the age group 65 and over, he rejected the estimates based on the iterative procedure and accepted in their place the PES estimates.

The Census "minimum reasonable" estimate.--This method made use of data on births adjusted for underregistration on the basis of the 1940 and 1950 Birth Registration Tests to produce estimates of net undercounts of children under 15 years of age. The estimated net undercount turned out to be about 1.5 million, while the PES estimate for the same age group was about 0.7 million. There was an implicit assumption that the estimates of the population based on adjusted births had no errors. For the age group 15-39, the method employed sex ratios derived from the Coale analysis. These ratios were applied to the 1950 Census count of females as adjusted by the estimate of female underenumeration obtained from the PES. Although the sex ratios employed would appear much more reasonable to most demographers than the sex ratios of the PES, there was no external validation and indeed the ratios are subject to the limitations inherent in Coale's method. For the population 40 years old and over the PES estimates of underenumeration were used without further adjustment.

Studies of methods of improving coverage prior to 1960.--A variety of techniques and procedures were tested during the 1950's to determine their feasibility and effectiveness for improving coverage in the 1960 Census of Population. These included such devices as: matching of census rolls with names on lists of persons considered hard to enumerate (e.g., welfare records), missed persons forms distributed to all school children, use of local neighborhood and block leaders as enumerators, use of post office resources to improve coverage, improved quality control and enumerator training methods. The results of some of these tests are described in Census Working Paper No. 19. 3/

Some of the changes in methodology used in the 1960 Census were based on the results of these studies. The tests did not provide any encouragement for use of matching special lists as a coverage improvement program. In retrospect, we think that further investigation of this is warranted. The earlier tests were conducted on a small scale and it is possible that better methods of list construction and matching can be developed.

3/ U.S. Bureau of the Census. "Tests of Use of Post Office Resources to Improve Coverage of Censuses," Working Paper No. 19 (1965).

Methods used to improve coverage in the 1960 Census.--One major aim of the enumeration procedures for the 1960 Censuses was to reduce the number of functions performed by the enumerators at one time, because it appeared that the great complexity of their jobs in the earlier censuses had led to insufficient emphasis on some of the more important aspects of coverage and content of the censuses. By and large, there was more than one end in view for the adoption of each of the new enumerative procedures in 1960. Those procedures and devices that had as one of their objectives the improvement of coverage were the following: 4/

1. The Advance Census Report Form.--This was the form delivered by mail to each household in advance of the census. Each household was asked to list its members together with a minimum amount of demographic data. Enumerators were required to pick up the forms and check them for completeness. The belief was that, to the extent that the public filled out this form and listed the members of each household on or about April 1, the errors of coverage which arise from a protracted period of enumeration--i.e., the failure to count some persons who moved during the enumeration period and the double-counting of others--would be reduced.

2. Separation of collection of nonsample data (Stage I of the Census) from the collection of sample data (Stage II of the Census).--The first stage was designed to concentrate primarily on coverage, with the goal of providing improved counts of people and housing units.

3. Use of a separate listing book.--This was done to provide better control on the callbacks at households where no one was at home on the first visit, and to help insure that the enumerators would list households in the appropriate order of canvass, for purposes of improving coverage.

4. Quality control of field work.--It provided supervisory personnel with definite procedures for detecting and, when necessary, rejecting unacceptable work.

The problems of slum-area enumeration.--Some of the techniques and devices tested during the 1950's were designed especially to deal with coverage problems in slum areas. None of the new developments actually adopted in 1960, however, were especially focussed on slum areas; they were designed to improve the enumeration in all areas. In retrospect, it now seems that the scope and intensity of the procedures used in 1960 were not sufficient to deal with the extraordinary difficulties that were encountered in the slum areas.

III. METHODS OF EVALUATION.

Case-by-case evaluation through reinterview.--The process consists of obtaining in reinterviews a list of a probability sample of the population whose coverage in the census is to be checked. This list is then matched with the census list, name by name, to uncover cases of both underenumeration and overenumeration. The list is obtained in the first instance by specially selected and specially trained interviewers who are given more adequate compensation than census enumerators. Every effort is made to produce a "quality job." Also the matching operation is undertaken with great care.

There are two major advantages in the use of this method: First, the method identifies and provides estimates of the components of the net coverage error, i.e., the underenumeration and the overenumeration. Second, it provides an opportunity to learn about reasons for coverage error and factors associated with coverage error in individual cases.

There are, on the other hand, two limitations: First, the method is an enumerative method and thus is subject to the weakness inherent in the use of such a method to the extent to which people are not identified in a question and answer procedure and to the extent to which people are not reached by an enumerator. No matter how well trained or motivated a reinterviewer is, there will be deficiencies in the coverage of the reinterview method. The second limitation is that of matching. There are always uncertainties in a process where reliance has to be placed on two reports of the name of the individual.

Various techniques have been used to overcome the matching problem. The technique used in 1960 defines both over and underenumeration relative to a specified small area, say, an enumeration district, that contains the usual residence of the person being checked. This eases the matching problem considerably and produces in principle an unbiased estimate of the net underenumeration. As a result of this technique, an individual enumerated in the wrong place gets counted both as a missed person (where he should have been enumerated) and as an overenumerated person (in the wrong place). Relative to a larger area, say the United States as a whole - such individuals are counted once and only once, and therefore should not be included as part of coverage error. Thus, coverage evaluation on the basis of small areas can result, on a national basis, in substantial overestimates of both gross misses and gross overenumerations.

4/ U.S. Bureau of the Census. "Procedural Report on the 1960 Censuses of Population and Housing," Working Paper No. 16 (1963).

Case-by-case evaluation through record checks.--In broad terms, the method consists of defining a frame, e.g., a list of names of the entire population of the United States if that is the population to be checked. This frame is defined independently of the census enumeration to be evaluated. A sample is drawn from the frame and an attempt is made to determine the usual residence on the census date of the persons in the sample. The final step in the procedure is to match a sample of names on the frame against the names appearing in the census and thus to obtain an estimate of gross underenumeration in the census.

There are a number of limitations. First, the frame we have been able to develop is not quite complete. Second, there is the problem of determining the usual residence of a sample of persons whose names are shown on the frame, especially when the frame is several years old. Third, there is the matching problem. Fourth, there is the fact that the method does not produce an estimate of net underenumeration but only of omitted persons.

The principal advantage in the method lies in the fact that there is much greater "independence" between the frame and the census enumeration than is obtained by reinterview methods. In the United States, however, the principal component of the frame, in the absence of a population register, was the previous census of population together with missed persons detected in the 1950 PES. To the extent to which persons who were missed in the 1950 PES (possibly half of the total missed persons) are omitted in successive censuses there is a lack of independence. There is, however, considerable variation in the completeness of enumeration by age. Thus, there is reason to believe that the correlation between errors of omission in successive censuses is not very great.

IV. RESULTS OF 1960 EVALUATION THROUGH REINTERVIEWS.

The 1960 coverage evaluation through reinterviews involved two studies:

a. EP-8: This was a re-enumeration of housing units based on an area sample of 2,500 segments containing about 25,000 housing units. Each segment was re-enumerated in a search for housing units omitted from the census and for listings in the census that did not represent real housing units. The 2,500 segments were a subsample of segments previously canvassed for the Survey of Change and Residential Finance (SCARF), and the coverage check enumerators had available both the SCARF and 1960 Census information. This redundancy was presumed to improve the chance of identifying missed units.

   This study provided only an estimate of the number of missed or over enumerated housing units and the persons in such units. No information on their characteristics was obtained.

b. EP-9: The second study was a re-enumeration of persons and housing units based on a list sample of about 15,000 living quarters enumerated in the census. Its primary purpose was to check on the quality of census coverage of persons in enumerated units. A secondary purpose was to make an additional check for missed housing units and missed persons in them; this check was done by determining whether housing units adjacent to the sample enumerated unit were also enumerated. Some characteristics of persons missed in the census were obtained in this study.

   An analysis of the EP-9 data indicates that this study was apparently not successful in fulfilling its second purpose. According to the EP-9 survey, the census missed about 1,140,000 persons in 460,000 missed occupied housing units. The comparable figures from the area sample approach used in EP-8 were 2,850,000 persons in 1,290,000 occupied housing units. On the basis of other information available and earlier experience with area sampling devices, the Bureau's judgment is that the larger EP-8 figure is much closer to the truth.

   It is probable that the EP-9 estimate of missed and over-enumerated persons in partially enumerated households is also seriously deficient. However, it is not possible to construct any alternative estimates based on reinterview methods. We believe that most of the deficiencies occur for males. Females appear to have been covered reasonably well.

   In any case, we have prepared what we believe is the best estimate of coverage error from the reinterview surveys by combining the results of the EP-8 and EP-9 studies. For the most part EP-8 has been used for the components arising from missed and overenumerated living quarters and EP-9 for errors in partially enumerated households. However, a small part of the coverage errors arose because of processing errors rather than field enumeration. The evidence on this was mostly from EP-9 and these figures are reflected in our final estimates.

Table 1 contains the result of this combination of EP-8 and EP-9 results. It shows a gross undercount of 5,653,000 persons, a gross overenumeration of 2,325,000 and a net undercoverage of 3,328,000 persons or 1.9 percent of the census count. If one were concerned about the errors in enumeration alone, the net undercoverage would increase to about 3,700,000. The table also contains additional information on the sources of coverage errors.

Reasons for underenumeration.--In the 1950 Census, of the 3.4 million persons estimated by the PES to have been missed in the census, about 2.5 million lived in dwellings that were themselves missed. The judgment is that this heavy concentration of coverage error in missed dwellings is more of a reflection of the inadequacy of the 1950 PES rather than of the true pattern of coverage error in the census. And, indeed, the Evaluation Program of the 1960 Census indicates that of the 5.7 million people estimated to have been missed, 3.1 million lived in dwellings that were themselves missed. The 1960 Census Evaluation Program estimates that slightly more than one-half of the missed persons lived in dwellings that were missed, as compared to about three-fourths in the 1950 PES.

We believe this is a reflection of the fact that a reinterview technique is reasonably satisfactory in detecting living quarters (and their occupants) that the original enumerators missed but does not adequately measure missed individuals in partially enumerated living quarters. Estimates of undercoverage shown in these tables for females are quite close to those prepared independently (as will be indicated in the Siegel-Zelnik paper). However, they seem to be low for males, and are seriously low for nonwhite males. We suspect that to a great extent this arises from a failure of the reinterview to discover persons who have a loose attachment to existing households.

The 1960 evaluation program does not provide much information about reasons for coverage error. The 1950 PES, however, does provide a few clues as to why dwellings were missed. For example, about two-thirds of the missed dwellings were in buildings that were completely overlooked by census enumerators.

Age-Sex-Color Distributions.--A modification in this procedure, however, is necessary to produce age-sex-color distributions. Since the EP-8 study did not obtain any information on the characteristics of missed persons, age-sex-color distributions for missed persons in missed units have been prepared by using the EP-9 percentage distributions for these items and applying them to the EP-8 counts, within a number of subgroups of the population. This, of course, is a valid procedure only if one assumes that the missed units uncovered in EP-9 are similar to all units missed. It is unlikely that this is exactly the case, but no other alternative exists.

Resulting estimates of undercoverage by age, sex, and color are shown in table 2. As mentioned earlier, these take into account pure coverage error only. They are therefore not strictly comparable to the corresponding distributions arising from the demographic analyses described in the Siegel-Zelnik paper, which reflect the effect of both coverage and age-reporting error. A separate study of the census evaluation program focussed on the content of the information reported in the census, including age, and in theory it would be possible to combine the results of the two studies to produce the net effect of both coverage and content errors. Unfortunately, the measures of age misreporting are probably rather poor estimates of the bias in age reports. For this reason, in presenting estimates of error by age, sex, and color, we have used the reinterview studies as a measure of coverage errors only.

In comparing the reinterview results with those from demographic analyses, it can be seen that there is a moderately good correspondence for white females. We take this fact as evidence that these estimates are fairly reliable. There are very large discrepancies, however, for white males, nonwhite females and nonwhite males. With respect to the differences in age distributions, there are reasons to feel that the reinterview results are better in the upper ranges (65 and over). In the lower ranges (under age 15) the figures based on demographic analysis are undoubtedly superior. The reinterview results are also deficient for nonwhite adult males, and this group is probably the one most seriously understated in the reinterview approach. For the other population groups, there is considerable uncertainty as to which source is more accurate.

V. USE OF RECORD CHECKS FOR COVERAGE EVALUATION

Record checks are defined as studies in which samples of persons from independent lists or administrative records are checked for completeness of coverage in the census. The 1960 record check evaluation of coverage of the total population has been published in Series ER-60 No. 2. A brief summary of the study follows:

The record checks are based on sample studies of four population groups which together make up the total population, with some trivial omissions:

(a) persons enumerated in the 1950 Census;
(b) children born during the intercensal period;
(c) persons missed in the 1950 Census but detected by the 1950 PES; and
(d) aliens who registered with the Immigration and Naturalization Service in January 1960.

Their combined representation is believed to be 98 percent or more of the entire population.

The four population samples totalled 7,612 persons of whom 425 were found to be "out of scope" (persons deceased, outside the United States, or erroneously included in the sample), resulting in a working sample of 7,187. Definite information about enumeration status was available for 6,003 sample persons; of these 1.3 percent were identified as having been missed in the 1960 Census. Major limitations in the ability to arrive at precise estimates of omissions arise from a failure to account for 16.5 percent of the working sample because of "noninterviews," mostly caused by the inability to obtain 1960 addresses for 932 sample persons and because of a "probably missed" group for whom a precise determination about inclusion in the 1960 Census could not be made.

Because noninterview and probably missed cases were believed to involve more underenumeration than the 6,003 cases for whom definite enumeration information was obtained, it did not appear reasonable to apply to the problem group the 1.3 percent missed rate established for the 6,003 sample persons of known enumeration status. Hence various assumptions were made about the enumeration status of the problem groups leading to a range of estimates of underenumeration. For this reason, the record check results must be viewed as providing estimates of minimum and maximum estimates of underenumeration, arising from rather extreme assumptions about the noninterview cases.

Using the record checks in this way leads to a minimum estimate of underenumeration of 4.7 million persons, and a maximum of 8.5 million, or 2.6 to 4.7 percent of the 1960 enumerated population. Further details are shown in table 3. These studies yield measures of undercoverage only. Net error in coverage can be estimated by using estimates of erroneous inclusion in the census (overcoverage) from the reenumerative studies. Using these figures results in an estimate of net undercoverage ranging from 1.3 to 3.4 percent. This range encompasses both the reinterview estimate and the one arrived at by analytic means.

Actually, we suspect we were too conservative in arriving at estimates that could be reasonably considered as minimum and maximum. Table 3 reflects ranges of assumptions that looked so broad that there would be practically no disagreement that the true value would lie in the range. If one wishes to take a somewhat bolder attitude and some small risk of being wrong, it is possible to narrow the range considerably, but still produce a minimum and maximum that appear to encompass the true figure with a high degree of probability.

This kind of approach produces an estimate of missed persons somewhere in the interval of 3.8 percent to 4.4 percent, and a net coverage error of from 2.5 to 3.1 percent. As the Siegel-Zelnik paper will indicate, this appears to be a reasonable range for the net coverage error.

The small sample sizes and the uncertainties arising from the effect of the noninterviews prevent these studies from providing usable estimates of undercoverage by sex-age-color. An examination of the missed person rates for each of the four population groups separately shows the kind of results that would be expected. Although persons enumerated in the 1950 Census comprised about three-fourths of the population in 1960, they accounted for only two-thirds of the persons missed. Under-enumeration in the other three groups all accounted for more than their share of the population.

In addition to the study of coverage of the total population described above, there were two other record-check studies concentrated on population groups which were believed to represent special coverage problems arising from uncertainties in "usual place of residence" - the elderly and college students. For the elderly, a sample was selected from the list of Social Security recipients. For college students, a sample of colleges was designated and lists of students enrolled at these colleges obtained and sampled.

In the case of the elderly, only underenumeration rates were obtained. The college student study, however, included data on both under - and over enumeration. This was done by a preliminary questionnaire to the sample students inquiring about the location of all residences at which they might have been enumerated, e.g., dormitory, parent's home, whether on vacation during the census period, etc.

The fairly current addresses obtained for these two population groups resulted in a much higher rate of success in determining enumeration status than in the more general study--94.5 percent for the Social Security recipents and 92.9 percent for the college students. Again, with some risk of being wrong, we can state the sample estimate in terms of a fairly narrow range.

Exclusive of sampling error, the gross number of missed OASI beneficiaries appears to be between 512,000 and 573,000 persons, or 5.1 to 5.7 percent of the beneficiaries estimated as enumerated. Similarly, our evaluation sample places the net undercount of college students between 66,000 and 71,000 or around 2.5 to 2.7 percent of the correctly enumerated count.

Table 1.--REINTERVIEW ESTIMATES OF TOTAL COVERAGE ERROR IN THE 1960 CENSUS OF POPULATION, BY TYPE OF ERROR

Item	Estimate	
	Number	Percent
Census Count	179,323,000	100.0
Undercoverage in ED's [1/]	5,653,000	3.2
In Missed Living Quarters	3,143,000	1.8
In Partially Enumerated Living Quarters	2,510,000	1.4
Overenumeration in ED's [1/]	2,325,000	1.3
In Overenumerated Living Quarters	244,000	0.1
In Properly Included Living Quarters	2,081,000	1.2
Net Undercoverage	3,328,000	1.9
Gross Coverage Errors [1/]	7,978,000	4.4

Note: This table includes both enumeration and central office processing coverage errors. The data are based on the EP-8 and EP-9 studies. The estimates represent simple inflation of the sample data.

1/ A person counted only once, but in the wrong Enumeration District, is treated both as a missed person (where he should have been enumerated) and as an overenumerated person (in the wrong Enumeration District). Relative to the United States, this evaluation procedure can result in a substantial overestimate of gross coverage errors. In principle, this procedure does not affect the estimate of net undercoverage.

Table 2.--REINTERVIEW ESTIMATES OF NET COVERAGE ERROR IN THE 1960 CENSUS OF POPULATION, BY AGE, SEX AND COLOR

Color & Age	No. of Persons (in thousands)		Percent of Enumerated Population (including Armed Forces overseas)	
	Male	Female	Male	Female
White				
All Ages	1,219	1,332	1.5	1.7
Under 5	118	145	1.3	1.7
5-14	100	246	0.6	1.6
15-29	189	253	1.2	1.6
30-44	206	268	1.3	1.6
45-64	446	315	2.8	1.9
65 and over	160	105	2.3	1.3
Nonwhite				
All Ages	417	361	4.2	3.4
Under 5	39	27	2.6	1.8
5-14	109	76	4.6	3.3
15-29	3	55	0.1	2.5
30-44	105	87	5.7	4.2
45-64	121	103	7.3	5.9
65 and over	40	13	6.7	1.8

Table 3.--RECORD CHECK MAXIMUM AND MINIMUM ESTIMATES OF MISSED PERSONS AND STANDARD ERRORS OF THESE ESTIMATES, BY POPULATION GROUPS SAMPLED

(in thousands. Excludes estimates for persons not covered by record check studies.)

Item	Total	Population Group Sampled			
		Persons enumerated in 1950 Census	Birth registrations from April 1, 1950 to April 1, 1960	Persons estimated as missed in 1950 Census by PES	Aliens registered in Jan. 1960
Maximum Missed Rate					
Missed Persons	8,329	5,612	2,035	295	386
Standard error	816	691	185	69	79
Missed persons, percentage	4.8	4.3	5.5	10.5	15.4
Standard error	0.5	0.5	0.5	2.5	3.1
Minimum Missed Rate					
Missed Persons	4,737	3,193	1,180	167	197
Standard error	641	535	140	52	56
Missed persons, percentage	2.7	2.4	3.1	5.7	7.3
Standard error	0.4	0.4	0.4	1.8	2.1