

# PRELIMINARY RESULTS OF 1980 DECENNIAL CENSUS TELEPHONE FOLLOWUP NONRESPONSE EXPERIMENT

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## 1. Introduction and Background

The 1980 Decennial Census Telephone Followup of Nonresponse Experiment (TFE) was conducted as part of an experimental program designed to explore and ultimately improve census-taking procedures. Bailar and Miskura (1979) provide summaries for each of the experiments. The major objectives of the TFE included: (1) evaluating the efficacy of using a telephone followup procedure for nonrespondents to the mailout census in terms of operational complexity and cost efficiency, (2) measuring the impact of both personal visit and telephone data collection techniques on various nonsampling errors, (3) contributing further knowledge to the expanding field of telephone interviewing, and (4) contributing to the continuous research effort to improve census-taking procedures. However, the criteria by which initial assessments of the utility of the TFE will be made include the relative costs of the two data collection techniques, overall data quality, frame coverage, response rates, and the complexity of the survey operations.

A followup procedure similar in nature to the TFE was undertaken during the 1970 decennial census for short form nonresponse cases only. However, several problems associated with the commercial telephone directories and the implementation of the experimental procedures forced the cancellation of the operation prior to its scheduled termination. Only 7.4 percent of the short form nonresponse cases were successfully followed up by telephone (U.S. Bureau of the Census, 1976). The design of the 1980 TFE therefore attempted to circumvent the flaws in the 1970 telephone followup procedure.

## 2. Design and Methodology

Address telephone directories (ATD's) commonly referred to as crisscross directories, were provided by the American Telephone and Telegraph Company (AT&T) and used to facilitate the implementation of the telephone procedure for the census follow-up operation.

The selection of sample units was accomplished by means of a stratified systematic sample design. The sampling frame was composed of single unit nonresponse households (i.e., housing units from which questionnaires had not been returned by mail within the prescribed period) that were listed in the ATD's. This necessitated the exclusion of the southern and most of the northeastern sections of the country for which ATD's were not available through AT&T. The remaining areas were then grouped by type of district office - either centralized or decentralized  $\frac{1}{2}$ . Within the two groups, a total of seven strata were defined based on the expected response or mail-return rates and the anticipated ATD coverage rates from which one district office (or PSU) per stratum was randomly selected. Refer to Table I for the district

offices selected and their respective nonresponse and ATD coverage rates.

The ATD's contained listings of only the basic street address, which did not include the apartment designation. It was therefore virtually impossible to pinpoint a particular apartment in the larger multi-unit structures when only a list of names and telephone numbers appeared under the building's basic street address. In view of this format, it was thought to be more advantageous to restrict the emphasis of the experiment to single unit households where the telephone numbers could be more readily identified. Consequently, in six of the seven district offices, only samples of single unit households were selected. The assumption here is that (1) future ATD's would contain apartment designations and as a result, multi-units could be treated as single units, or (2) sources other than ATD's, such as billing lists or municipal directories, which already contain apartment designations, could be used. However, one of the decentralized offices (South St. Louis) was chosen to apply modified experimental procedures to multi-unit structures as well.

Within each of the seven district offices, separate systematic samples of long and short form single unit nonresponse households were selected directly from the census address registers three days before the end of the designated mail-return period. Projections based on previous census data had indicated that approximately 90 percent of all questionnaires that eventually would be returned by mail should have been received by this time.

The overall sample size which was desired in each TFE district office was roughly 4,000 households, approximately distributed as follows:

1000 short forms for telephone interviews

1000 short forms for personal visit interviews

1000 long forms for telephone interviews

1000 long forms for personal visit interviews.

The actual sample sizes were somewhat smaller due to the unexpectedly large number of questionnaires returned by mail prior to the cut-off date. This high mail-return rate caused the office questionnaire check-in procedure to fall behind schedule before the TFE sample selection began. Thus, many selected units were actually mail returns that had not reached the check-in operation. In addition, a large number of late mail returns were received after the mail-back period. Consequently, a significant proportion (as much as 56 percent) of the TFE sample units were eventually classified as out-of-scope mail-return cases.

The final sample selection began on April 8, 1980 and continued through April 14. For each sampled housing unit, both for telephone and personal visit, an enumerator reporting form was filled in with identifying information for that unit. The information included the date and time of the interview or attempt, the result of the interview (codes were provided), the number of supplemental calls made (such as busy signals),

and remarks. The data extracted from these reporting forms will comprise the integral components of the initial analysis.

Another component of the analysis involved the identification of questions that were not answered but should have been (N/A's). The N/A counts were made for a designated subset of the census items for both telephone and personal visit sample units for which a completed interview was obtained. The N/A's were compiled by the evaluation clerks before the questionnaires had been formally edited. The N/A's, together with refusal rates, should assist in providing measures of data quality.

To the extent as was possible, no regular census procedures were altered with respect to the final objective of complete enumeration for the telephone enumerators. However, apart from the obvious differences in the two interviewing techniques, a small number of other differences existed. Personal visit enumerators were allowed only four attempts to complete an interview, while telephone enumerators were allowed five. However, the personal visit enumerators could leave an appointment record form at a household where no one was at home so the respondent could call and set up a mutually convenient time for the interview. Also, it was much easier for the personal visit enumerator to obtain proxy information from a neighbor, even though some telephone enumerators were able to contact neighbors after consulting the ATD's for the supplemental number. This same situation was true in the case of vacant housing units. Many times, the telephone enumerator only encountered repeated no-answers or disconnect recordings and could not determine the occupancy status, whereas a personal visit enumerator could readily obtain information about a vacant unit by either a proxy interview or observation.

One of the major differences was in the handling of respondents who claimed they had mailed in the questionnaires. Personal visit enumerators were instructed to try to conduct an interview in case the questionnaire had been misplaced. This practice led to a large number of duplicate questionnaires, since the process by which enumerators were informed of late mail returns was rather slow. The telephone enumerators, on the other hand, were in close proximity to the questionnaire check-in operation. They told respondents they would check on the status of the questionnaires, but if such questionnaires did not appear within three days, a telephone interview would be required. Most respondents were quite agreeable and this procedure did cut down on the number of duplicate enumerations for the telephone sample.

Another difference was in the manner of supervision. With the centralization of the telephone operation, supervisors were available to immediately resolve problems or spot and correct improper procedures. When enumerators were in the field, they had to make a special call to their supervisor or wait until the next scheduled meeting in order to clear up any questions. The delay could have entailed making an additional visit to obtain the complete interview.

### 3. Proposed Analysis

The basic analysis of the TFE results will occur in two phases in which the personal visit and telephone interviewing techniques will be compared on the basis of (a) survey costs and (b) distributional properties of key survey statistics based on a selected group of census items. Such distributions and statistics will be provided at the aggregate level, as well as for a number of subpopulations within the study areas.

In addition to the analysis of the data obtained from the preliminary ATD content evaluation and the enumerator report forms, a detailed analysis of the effects of data collection mode, district office type, and type of census form on census data collected during the TFE will occur.

### 4. Preliminary Results and Discussion

At this point, only preliminary results are available. Due to severe budgetary concerns, the Census Bureau has deferred the allocation of additional funds for this project until 1984. A reinterview study had been planned in order to assess data quality, coverage, response error, noninterview bias and interviewer variance, but the funding for this was also canceled. Summary results based on data collected from the enumerator report forms are available for each of the seven district offices, as well as at an aggregate level. Where differences were cited or alluded to, the level of significance can be assumed to be .10, although the majority of these one tailed tests detected differences at the .05 level.

Refusal rates (see Table IV) were not statistically different for the two interviewing methods. The percentage of complete interviews that were classified as last resort interviews (minimally acceptable questionnaires) for the telephone method was approximately half of that for the personal visit method. They were statistically different. It was found that, for the TFE samples, less duplicate enumerations occurred with the telephone method when a respondent claimed he/she had returned the census questionnaire by mail, but that it had not be accounted for at the time of the followup interview.

Two types of nonresponse rates have been computed for the four data collection technique/form type combinations. The first, or upper bound, represents the number of noninterviews divided by the number of in-scope sample cases. In all cases either the telephone group produced higher upper bound nonresponse rates than the personal visit group or else there were no significant differences. Examining the lower bound rate, which also excluded no-contacts (no answer, wrong number, cannot locate address), is more ambiguous. However, in all cases except for long forms in Central Chicago, the telephone group had significantly smaller lower bound rates or else there were no significant differences. Perhaps in reality, the true nonresponse rate is somewhere between the upper and lower bounds since there will always be some no-contacts.

Therefore, until formal tests are made, there will be questions concerning the nonresponse rate comparisons.

In assessing the cost-effectiveness of the telephone interviews, it was found that they would average approximately \$3.50 less than personal visit interviews if they were implemented on a full-scale basis. It is suspected that the larger proportion of travel costs for personal visit enumerators can be ascribed to between enumeration district travel. Therefore, instead of having a few scattered cases after the initial followup operation (and increasing the between enumeration district travel), those cases that could not be contacted by telephone would be added to the second followup operation (personal visit) and subsequently reduce the travel costs over a procedure using personal visit interviews for the initial followup operation. This point will require further investigation before a definitive statement can be made.

The average time to complete a short form interview by telephone was approximately 11 minutes as compared to 14 minutes for the sample cases in the personal visit interview treatment (not including travel time). The long form interviews averaged about 27.5 minutes for the telephone method and 30.5 minutes for the personal visit interview (not including travel time). It had been estimated from several pretests that the short form would take 15 minutes to administer and the long form 45 minutes, exclusive of travel time. Refer to Table II for a complete breakdown.

The average number of calls or visits required to complete an interview was also computed. For the telephone sample, an average of 2.6 calls was required to complete a short form and an average of 2.8 calls was required for the long forms. The personal visit sample averaged about one less visit than the telephone calls, or 1.5 visits for the short forms and 1.6 visits for the long forms. Refer to Table III. Even though it appears to take more telephone calls than visits to yield a completed interview, there is no travel time and total interviewing time is still expected to be less (allowing as much as two minutes for calls which do not result in a complete interview) for the telephone interviewing method.

Another interesting result is related to the distribution by time of day of completed interviews. It has been generally accepted that an interviewer is more likely to find a respondent home in the late afternoon or evening hours (U.S. Bureau of the Census, 1973). This point was emphasized in the personal visit enumerators' training. The telephone enumerators, who worked in two shifts from 8:30 a.m. to 9:30 p.m., did not make any special effort to interview at a particular time of day; they would try to call in the evening if morning calls were not successful and vice versa. In every TFE district office except South St. Louis, over 50 percent of the completed sample personal visit cases were interviewed between 3:00 p.m. and 9:00 p.m. In three of the centralized district offices, Brooklyn, Chicago and Los Angeles, over 50 percent of the completed

telephone interviews were accomplished between 9:00 a.m. and 3:00 p.m., while in the remaining four, at least 40 percent of the completed telephone cases were interviewed during that time period. It would therefore seem that the number of interviews which occurred during the morning and early afternoon hours is similar to that which occurred during the evening hours.

Generally, the N/A rates for short form questionnaires appear to be somewhat lower for the telephone sample than for the personal visit sample. Both groups had high N/A rates for the items asking for amount of rent (.058 for telephone and .076 for personal visit) and value of home (.076 versus .083). The question or item on age produced a much higher N/A rate (.016 versus .044) for the personal visit group (statistically significant). The long form questionnaires followed the same pattern. In addition, the telephone sample produced dramatically lower N/A rates for items pertaining to mortgages, taxes and insurance premiums for homeowners, and various utility costs (.121-.182 versus .167-.289). Differences were significant. Most of the population items (questions relating to demographic characteristics of the persons residing in a household) had reasonably comparable N/A rates, except for questions on labor force and commuting, for which the rates for the telephone sample were slightly lower (differences were statistically significant).

There are several problems that may have adversely affected the potential success of the telephone interviewing method. The most serious problems were the number of late mail returns and the delayed check-in procedure for mail returns. In order to maintain the schedule relating to the followup procedures, the TFE staff was unfortunately forced to select its sample at a time when only 30-40 percent of the eventual mail returns had been checked in. The sampling operation was required to be completed prior to the starting date for the followup period in order that the personal visit enumerators would know which cases would be part of the TFE sample. As was previously stated, indications from censuses and pretests prior to 1980 had shown that, at that time, approximately 90 percent of the mail returns would have been checked in. However, the 1980 census mail-return rate was higher than had been anticipated (approximately 86 percent of occupied housing units nationally (U.S. Bureau of the Census, April 1981) when only 80 percent had been expected). The large number of mail returns caused considerable congestion in the check-in procedure. Consequently, the TFE samples were reduced in size by at least 50 percent after all the mail returns were checked in.

Another factor was the accuracy and completeness of the ATD's. All of the ATD's were published annually, although some of the companies issued periodic updates. The South Cleveland ATD's, which were eleven months old at the time of the census, were the least current. The most recent ATD's (Madison) were published less than four weeks prior to the census. Because of the lapse of time between the publication of the ATD's and the experiment, many sample units were either not listed or

TABLE I

## MAIL-RETURN AND ATD COVERAGE RATES

DISTRICT OFFICE (DO) NAME	PERCENT SINGLE UNITS (1970)	TOTAL HOUSING UNITS 1/	MAIL- RETURN RATES			ATD COVERAGE RATES	
			Est. by DO Progress Report as of 4-7-80 (all units)	Est. by Field Statistician As of 4-7-80 (single units)	"Corrected" Final by DO Progress Report 2/ (all units)	Overall for Households with Phones 3/	Est. by Field Statistician (single units) 4/
CENT. BROOKLYN, NY (C)	8.8	136,863	.220	.51	.548	.42	.40
DEARBORN, MI (D)	23.6	267,481	.834	.90	.867	.66	.64
S. CLEVELAND, OH (C)	38.0	121,973	.538	.65	.709	.82	.67
CENT. CHICAGO, IL (C)	65.1	101,137	.362	.60	.537	.60	.47
S. ST. LOUIS, MO (D)	69.6	271,440	.475	.71	.870	.79	.74*
MADISON, WI (D)	71.1	244,568	.830	.90	.928	.92	.79*
E. LOS ANGELES, CA (C)	60.1	101,358	.283	.75	.791	.34	.41*

C = Centralized

D = Decentralized

1/ Estimates supplied by Population Division after the 1980 Census counts were complete.

2/ Adjusted for vacant units, demolished units and new housing units.

3/ Overall ATD Coverage Rate equals 1 - (Rate for Nonlisted/Nonpublished Households with Telephones), as supplied by the telephone companies.

4/ The denominator of the ATD Coverage Rate Estimated by Field Statisticians is a sample of single unit addresses listed in the 1980 Decennial Census address registers. The numerator is comprised of those sample cases which were listed in the ATD, which will not include 1)households with unlisted or non-published numbers, 2)households with no telephone, 3)housing units constructed after the ATD was published. Neither factor adjusts for vacant units, demolished units or movers that are listed in the ATD at the original address. Three of the rates reflect computations for nonrespondents to the census, while the other four were computed without regard to the response status (indicated by \*).

TABLE II

## AVERAGE LENGTH (IN MINUTES) OF COMPLETED INTERVIEW

District Office	Telephone		Personal Visit	
	Short	Long	Short	Long
Central Brooklyn	14.55	26.00	20.89	39.68
Dearborn	9.79	24.32	14.25	28.85
South Cleveland	11.19	32.75	11.92	28.48
Central Chicago	8.55	20.32	12.00	33.25
South St. Louis	10.16	31.11	11.02	24.32
Madison	8.46	24.68	12.71	22.08
East Los Angeles	14.71	34.44	14.22	37.40

TABLE III

## AVERAGE NUMBER OF CALLS/VISITS REQUIRED TO COMPLETE AN INTERVIEW

District Office	Telephone		Personal Visit	
	Short	Long	Short	Long
Central Brooklyn	3.02	3.32	1.45	1.64
Dearborn	2.67	2.52	1.54	1.82
South Cleveland	2.27	2.27	1.38	1.68
Central Chicago	2.25	2.32	1.32	1.14
South St. Louis	2.95	3.56	1.53	1.78
Madison	2.55	3.18	1.47	1.77
East Los Angeles	2.31	2.41	1.67	1.51

TABLE IV

Distribution of Result Codes

for

All Seven District Offices

## PRELIMINARY RESULTS OF THE 1980 CENSUS TELEPHONE FOLLOWUP OF NONRESPONSE EXPERIMENT

	TELEPHONE						PERSONAL VISIT					
	SHORT FORM			LONG FORM			SHORT FORM			LONG FORM		
	Actual Count	% Within Category	% of Total	Actual Count	% Within Category	% of Total	Actual Count	% Within Category	% of Total	Actual Count	% Within Category	% of Total
COMPLETE INTERVIEW	996	100.00	76.56	392	100.00	69.14	907	100.00	88.06	457	100.00	81.75
Questionnaire Complete	844	84.74	64.87	324	82.65	57.14	655	72.22	63.59	302	66.08	54.03
Questionnaire Complete Except for ICR	0	0.00	0.00	0	0.00	0.00	2	0.22	0.19	2	0.44	0.36
Only Last Resort Information Obtained	152	15.26	11.68	68	17.35	11.99	250	27.56	24.27	153	33.48	27.37
BREAKOFF OR PARTIAL INTERVIEW	11	100.00	0.85	11	100.00	1.94	5	100.00	0.49	9	100.00	1.61
Form Too Long, No Further Time Available	1	9.09	0.08	2	18.18	0.35	0	0.00	0.00	0	0.00	0.00
Invasion of Privacy	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	2	22.22	0.36
Requested to Call Back Later	3	27.27	0.23	7	63.64	1.23	0	0.00	0.00	2	22.22	0.36
Other Reason or No Reason Given	7	63.64	0.54	2	18.18	0.35	5	100.00	0.49	5	55.56	0.89
TOTAL REFUSALS	60	100.00	4.61	42	100.00	7.41	55	100.00	5.34	43	100.00	7.69
No Time for Interview or Form Too Long	2	3.33	0.15	8	19.05	1.41	2	3.64	0.19	1	2.33	0.18
Invasion of Privacy	5	8.33	0.38	2	4.76	0.35	2	3.64	0.19	3	6.98	0.54
Doubt Identity of Interviewer	1	1.67	0.08	2	4.76	0.35	0	0.00	0.00	0	0.00	0.00
Respondent Says Form Has Been Mailed In	26	43.33	2.00	14	33.33	2.47	43	78.18	4.17	34	79.07	6.08
Other Reason or No Reason Given	26	43.33	2.00	16	38.10	2.82	8	14.55	0.77	5	11.63	0.89
OTHER NONINTERVIEWS	234	100.00	17.99	122	100.00	21.52	63	100.00	6.12	50	100.00	8.94
Responsible Person Not at Home	1	0.43	0.08	3	2.46	0.53	2	3.17	0.19	1	2.00	0.18
Language Problem	3	1.28	0.23	7	5.74	1.23	0	0.00	0.00	1	2.00	0.18
No Answer/Not at Home	113	48.29	8.69	60	49.18	10.58	60	95.24	5.83	47	94.00	8.41
Wrong or Disconnected Number and Cannot Obtain One/Not Able to Locate Address	117	50.00	8.99	52	42.62	9.17	1	1.59	0.10	1	2.00	0.18
TOTAL	1301		100.00	567		100.00	1030		100.00	559		100.00

incorrectly listed (ATD coverage rates ranged from 40-70 percent). The telephone companies had estimated that, of households with telephones, 34 (Los Angeles) to 92 percent (Madison) were listed in the ATD's. In all of the seven cities except Los Angeles, the computed ATD coverage rates were slightly lower than the estimates provided by the telephone companies. Had a more current listing, such as billing lists for the month prior to the census, been available, more cases would have been eligible for telephone followup and the telephone success rate could have potentially been higher.

There may be problems associated with the disparity between the expected and actual sample sizes obtained in the experiment. In all seven district offices, it was expected that each of the four data collection technique/form type combinations would be assigned approximately 1000 sample cases. Even adding the out-of-scope cases, which accounted for at least 50-60 percent of each sample, would not achieve the desired sample sizes. One explanation can be found in examining Table I. If the number of housing units is multiplied by the percent of single units, the complement of the mail-return rate (1 minus mail-return rate), and the ATD coverage rate, in some cases (Chicago and Brooklyn, for example) there are not 4000 total cases eligible for the experiment. In addition, there is disparity between telephone and personal visit sample sizes, generally with the telephone sample being larger. It is possible that some of the late mail returns were not recorded for the personal visit group or that some cases were lost. An investigation is planned to determine the cause of this problem.

Based on preliminary assessments of operational complexity, cost-effectiveness, and response rates, it seems reasonable to suggest that nonresponse followup for a census (or sample survey) may be enhanced by a telephone operation. It is felt that most of the operational problems experienced (such as reduced sample sizes and personal visit enumerators not following prescribed procedures) can be attributed to the experimental status of the project, as opposed to it being considered as an integral part of the regular census operations. However, the problem of obtaining telephone listings with increased coverage must still be addressed. The actual telephone interviewing procedures (contacting respondents by telephone and obtaining a complete interview) posed no real problems. In fact, there are several advantages associated with a telephone procedure. More hours of actual interviewing time can be accomplished with the telephone procedure because interviewers can work in shifts covering from 12-14 hours per day. Discussions with field personnel indicate that it is difficult to obtain personal visit enumerators who are willing to work that many hours per day or just during certain periods of the day, such as the evening hours. Also, telephone

interviewers located within the district office are generally in a safer working environment than personal visit enumerators who may be assigned to work in areas with high crime rates. The actual interviewing time per case appears to be shorter for the telephone method. In addition, it is felt that more direct supervision and control over the interviewers, with possible enhancements of data quality, can be accomplished with the centralized environment of a telephone operation.

The only measures of data quality currently available are the N/A rates and the number of last resort interviews. Both of these seem to indicate that the telephone method may yield more desirable results. However, the areas of data fabrication, response errors and biases, and interviewer effects should be investigated. Other areas which warrant further investigation include the effects of the two data collection techniques on estimates for specific census and survey items, and the development of cost models designed to facilitate assessments of the relationship between response (or mail-return) rates and the overall cost of the followup operation. The effects of the data collection techniques may vary considerably among census or survey items, and before a followup method is established, careful thought must be given to the individual and combined impact of its application on the estimation procedure. Ideally, the use of the suggested cost models could lead to an improved set of "objective" criteria for determining the cost-effectiveness of the data collection procedures.

Note: A more comprehensive version of this paper, as well as the complete set of tables including standard errors, can be obtained by contacting the authors.

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1/ Centralized offices are those district offices in large cities, where most of the census operations are performed from within the office. Decentralized offices generally have jurisdiction over some portion of a city and the surrounding area, where several of the census operations are carried out from the field.

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