TOTAL DIGIT DIALING FOR A SMALL AREA CENSUS BY PHONE

Jane A. Campbell and Charles D. Palit, University of Wisconsin-Extension
Jane A. Campbell, WSRL, 610 Langdon Street, #109, Madison, WI 53703

Introduction

Traditionally small area censuses have been done primarily by face-to-face methods. However, using the telephone as the main data collection procedure can substantially reduce the cost of the census. This is especially true if the telephone data collection is done using a CATI system, for then in addition to the obvious saving in travel costs we have a substantial saving in data entry costs. Of course, the use of the phone system cannot completely replace the face-to-face procedure, but it does reduce the amount of face-to-face work required. The effectiveness of this reduction is a function of the percent of households with telephones.

The basis of a census lies with its frame or frames. In this case the methodology mandated that two frames be used. One, the traditional field listing of addresses and the other, the set of all telephone numbers covering the census area; we call the latter the total digit dialing (TDD) frame. Both of these frames have coverage problems. In a field listing process, some housing units will inevitably be overlooked. On the other hand, the TDD frame will inevitably miss housing units without phones and housing units with a phone from a foreign exchange.[1] Presumably the use of two frames will improve the total coverage of the census because some of the housing units left out of the field listing will have telephones and so be caught in the enumeration net by the phone procedure. Certainly many of the housing units not in the TDD frame will be caught in the field listing.

PROCEDURES — The Dirty Details

Creating the address listing frame

A partial list of housing units in the area was obtained in a machine readable form from a directory firm. The list contained phone numbers for the housing units in the list. Though many of these phone numbers were out of date, this piece of information was of great help in the construction of a usable TDD frame. If we had not found this list we could, of course, have typed in the local phone directory into a computer. The addresses would not have been as complete, however, as the telephone books do not list apartment numbers.

This list was sorted by name of street. The list of streets was compared to current maps for the area to try to ensure that all streets and the entire street was covered. Obvious duplicates were removed from the list at this time.

The sorted address listing was then split into two parts, addresses for housing units in the incorporated area and addresses in the more rural parts of the census area. This was of necessity a rough sort.

Within each street listing the addresses were sorted into north and south, east and west, and then arrayed by even and odd numbers separately. For each street the even block faces were grouped together and a unique I. D. assigned to the group. A similar treatment was given to odd block faces for each street. For each block face group a listing of addresses was prepared with the addresses in numeric order. Each address was assigned a unique I. D. number. Blank listing sheets were made for all streets on the map which had not appeared on the original machine readable address listing.

The end result of these machinations and some other unmentioned activities was three piles of listing sheets: those with addresses in the city, those with addresses in the rural area, and those with addresses suspected of being outside the boundaries of the census area.

A sample listing sheet is shown in Figure 1. Armed with the listing sheets, enumerators sallied forth to verify, and augment the address listing. Interviewers were instructed:

> to draw a line through the address if the structure referred to no longer existed.

> to add additional housing unit addresses to the side of the listing form.

> When a specific address had more than one housing unit associated with it, the address was crossed out and more complete addresses were listed for each of the housing units associated with the crossed out listing.

> If an additional housing unit had no specific address, a description of the housing unit was written on the listing line.

During the listing process, the boundaries of the study area were marked as appropriate on the listing sheets.

On completion, the results of this field operation were used to edit and update the original list.

Creating the telephone frame

Two telephone exchanges covered the census area. Therefore, there were 20000 numbers which covered all the telephones in the area except for the occasional phone number from a foreign exchange.

Using the local telephone directory and the phone numbers given in the original machine readable listing, blocks of phone numbers without listed numbers could be eliminated, reducing the TDD frame to about 12000 numbers. Note that even if this reduction in phone numbers increased the number of working numbers not covered by the frame,

the housing units attached to these omitted phones presumably will be picked up in the face-to-face interviewing phase of the enumeration. The trade-off in this process is to improve the hit[2] rate in the TDD frame without producing dramatic increases in the number of addresses which must be interviewed in face-to-face mode.

Calling strategy

We had anticipated being able to use the phone numbers in the machine readable list to perform a reasonably efficient telephone data collection effort. It was not clear to us that further exploitation of the phone collection system would necessarily produce savings in data collection costs. As a result we used a strategy which would allow us to evaluate the desirability of going the TDD route before actually committing our resources to it. The decision procedure was to perform an initial data collection attempt using the phone numbers given in the machine readable address list. Then to use a sample of the remaining addresses for face-to-face interviewing and so determine approximately what percentage of the remaining housing units had phones. This in turn enabled us to forecast an approximate hit rate for the remaining portion of the TDD phone numbers, and hence to evaluate the possible effectiveness of the strategy in advance.

The initial phone attempt

The machine readable directory contained a total of 8155 addresses with telephone numbers. Adult children and siblings had individual listings so duplicates where both addresses and phone numbers were identical were pulled. In instances where the same address was listed for more than one telephone number, all were pulled, as it was suspected these might be due to multi-units or apartments with missing apartment numbers. This winnowing reduced the potential number of telephone housing units in this phase to 6028.

Addresses identified by the field listing effort as being outside the enumeration area were then pulled and this reduced the number of phone numbers available to 5397. These 5397 numbers were then issued for phone interviewing.

At the initial contact, the resident was asked to confirm the telephone number. If the phone number was incorrect or if a number had been changed no further contact was made as it was possible that the new address would be out of frame or that the new number might be included under another listing. If the telephone number was confirmed, the informant was asked whether it was a residential number. If the number was indeed residential, the address was confirmed.

In those instances where the address was different, the new address was recorded and household data collected. The new address was checked on the listing sheets at the end of this phase and if eligible was recorded as a completed interview/household. This procedure produced data for 4645 households.

A sample of the remaining addresses was sent out for personal interviewing. In these interviews, the respondent was asked if the household had a telephone, and for the phone number if the household had a phone. Since a high proportion of the returns had a telephone, it seemed to confirm the desirability of continuing the telephone mode of data collection.

Consequently the remaining 6041 phone numbers in the TDD frame were released for telephone interviewing. In this phase, the respondent was asked to give his exact address and whether his address was located in the target area. Each part of the address, e.g., street direction, apartment number, etc. was requested. When the respondent admitted being in the target area, data was collected. In all cases, the address was matched with the listing sheets and coded with the appropriate identification number. This phase produced data for 1023 housing units in the census area and for 100 housing units outside the census area. All addresses not accounted for by telephone were then contacted face to face. These included those who had refused by telephone.

RESULTS

At the end of the enterprise 6,654 households had been enumerated. Eighty-five percent of these were by telephone and fifteen percent were from personal face-to-face interviews. The overall response rate was 97 percent. One hundred and sixty-seven or two and one-half percent of the completed households had no telephone. Conversely 100 or one and one-half percent of the interviews completed by telephone were not in the housing unit frame generated by the field listing.

Relative cost

While we cannot say what the cost per interview would have been if only face-to-face methods had been employed, we do know that the face-to-face per interview cost was 140 percent (i.e., a 40 percent increase) of the telephone per interview cost. We refer here only to the marginal cost of interviewing; the cost of frame construction is not included. From this figure, we conclude that the use of the telephone resulted in lower overall cost per interview.

Wrap-up comments

The use of the TDD frame and telephone to collect the data reduced the cost of the enumeration. The TDD frame lends some improvement in coverage to the whole effort, and does not seem to affect the overall response rate of the effort.

FIGURE 1

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(003)   4th   (EVEN)   ADDITIONAL

001	104 1/2 4th	_____
002	104 4th	_____
003	208 4th	_____
004	212 1/2 4th	_____
005	212 4th	_____
006	214 4th	_____
007	218 4th	_____
008	302 4th	_____
009	304 4th	_____
010	308 4th	_____
011	312 4th	_____
012	314 1/2 4th	_____
013	314 4th	_____
014	318 4th	_____
015	320 4th	_____
016	322 4th	_____
017	326 4th	_____
018	406 4th	_____
019	408 4th	_____
020	410 4th	_____
021	412 4th	_____
022	414 4th	_____
023	500 4th	_____
024	504 4th	_____
025	508 4th	_____

[1] The term, foreign exchange, is used here to denote an exchange prefix or central office code whose legitimate exchange area does not include any part of the target area. Such numbers may occur in the target area if the phone subscriber pays a special fee to have the unusual number.

[2] The hit rate is the ratio of number of completed interviews to total number of phone numbers attempted.

Bibliography

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