Comparison of Outcome Codes Used for Attrition Calculations for Telephone Samples
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Abstract
The Telephone Point of Purchase Survey (TPOPS) is one of several surveys that are used by the Bureau of Labor Statistics to create the Consumer Price Index. TPOPS is conducted to create the establishment frame for the pricing of goods and services used for the market basket of goods. It is conducted quarterly over a one-year cycle. A sample for each panel is drawn via random digit dialing. The quarterly target sample size is approximately 24,000 households. Twenty-five percent of this is new RDD sample, along with some supplemental sample added due to attrition. This study focuses on the outcome variables needed to compute an attrition rate for the TPOPS. Outcome codes consist of all major work actions taken on each case, which may affect its work progress and final disposition. This includes interviewer actions, supervisor's actions, and programs set up in the instrument (e.g., maximum call attempt rules). Multitudes of decisions are made before a final outcome code is assigned to a case. We compare distributions based on what data are included in outcome codes that are used to calculate attrition. The limitations of the current outcome codes are also discussed.

Comparison of Final Disposition Codes Used for Attrition Calculations for Telephone Samples

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Panel studies share common concerns about bias that can be introduced due to sample loss over-time. There is a plethora of studies on how to reduce nonresponse by encouraging potential respondents to respond to household surveys (e.g., incentives, confidentiality statements, and advance letters). Other papers have examined increasing the number of opportunities to respond by varying the mode of administration used for follow-up and varying the time and day of contact attempts. There is also a nice body of literature on how to account for nonresponse statistically (e.g., imputation, sample weights, over-sampling of sub-populations). Less attention has been paid regarding how to calculate attrition rates in telephone panel surveys, especially for Random-Digit Dialed (RDD) generated samples.

Another ongoing source of concern has been the lack of standardized response rates in household surveys. In the early 1980s, the Council of American Survey Research Organization (CASRO, 1982) completed a special report that offered standardized definitions of response rates. More recently, the American Association for Public Opinion Research (1998) built on the CASRO and extended that report to produce the Standard Definitions: Final Distributions of Case Codes and Outcome Rates for Surveys for RDD (Random Digit Dialed) Surveys and In-Person Household Surveys. The latest report includes mail surveys for specifically named persons (AAPOR, 2000).

In this paper we will use the AAPOR final depositions codes for RDD surveys to calculate an attrition rate for the Telephone Point of Purchase Survey. What we will see in this report is that the first quarter final disposition code is not overly informative about the final disposition code assigned to the case in the last quarter. Clarification and further training regarding the calling rules and coding rules may also be required.

Methodology

The data comes from the Telephone Point of Purchase Survey (TPOPS). The Bureau of Labor Statistics (BLS) conducts the TPOPS to collect the establishment sample frame used in pricing goods and services for the Consumer Price Index (CPI). The TPOPS identifies the name and address of the outlets (e.g., grocery stores, theatres, physicians, and mail-order catalogs) where households purchase various types of goods and services. The sample for each panel is selected via RDD. Each quarter one-quarter of the sample is new RDD sample and the rest are returning sample (n=42,000 cases per quarter). Once a household is selected they may be reinterviewed up to three more times over the next nine to 12 month period. Targeted completed cases each quarter is approximately 17,000 urban households. The sample used for this study includes the RDD sample drawn in the second quarter of 2000 to its retirement in the first quarter of 2001 (n=16,228).

AAPOR has four main final disposition codes, Eligible Interview; Eligible Non-interview; Unknown Eligibility; and Not Eligible.

Figure 1. AAPOR Main Final Dispositions Codes

I	=	Eligible Interviews
EN	=	Eligible Non-interviews
UN	=	Unknown Eligibility
NE	=	Not Eligible

The four codes are broken into other sub-categories as shown in Figure 2. These sub-categories are broken into more specific outcome codes that are not shown.

Figure 2. Response Rate Calculation Codes Uses:

I	=	**I**	Interview
		P	Partial Interview
EN	=	**NC**	Noncontact
		R	Refusal
		O	Other (death, hearing, lang.)
UN	=	**UH**	Unknown If HH
		UO	Unknown, Other
		e	Estimated proportion of cases of unknown eligibility that are eligible
NE	=	Not Eligible	

Included within the Eligible Interview (I) are completed interviews and partial completed interviews. Eligible Non-interviews (EN) include Refusals and Breakoffs at the household and respondent level (R). Non-Contact (NC) the telephone number is confirmed as eligible but a respondent is never reached or never available (e.g., uncompleted callbacks, answering machine message that indicates that it is a eligible case). EN also includes eligible cases that cannot be completed for other (O) reasons (e.g., death, hard of hearing, language barrier).

Unknown Eligibility (UN) includes such cases as the number always busy, ring no answer and call-blocking and call-screening systems (UH) and Other (UO) for highly unusual situations that leave the case undetermined. There is also an estimate of the proportion of the unknown eligible cases that would be eligible (e) that can be used in response rate

calculations. Westat has studied this estimate and uses .27.

Not eligible are cases so designated by the requirements of the study (e.g. telephone numbers outside the sampled geographic area, military and farm households, and non-residential households).

Caveats That Impact Final Disposition Codes

The refusal conversion method used for TPOPS adds to the complexity for calculating attrition rates. If a case is a refusal such as a hang-up, the interviewer will call back with an attempt to at least confirm they dialed the correct telephone number. Unless it is a hard refusal, they will attempt to convert the refusal. If this is a failure, they will call the case back one more time in the current quarter. If they receive a second refusal this will end with a final disposition code of refusal for that quarter. However, the case will return until it has received two refusals in two consecutive quarters. Interviewers convert between 25-30% of refusals using this method. This means that the EN is inflated by the refusals returning the subsequent quarters. In contrast, NC is relatively small for TPOPS. We use a 12 call rule and a 30 call rule. If the telephone is called 12 times in a row without contacting a person or an answering machine it is considered a NC. However, it any type of contact is made (e.g., refusal, callback, answering machine, child, maid, or friend answers, etc.) 30 call attempts will occur for the case before it is coded as a noncontact. Therefore, we report the subcategories for EN. UN will be used because the number of cases in UO contains eleven of fewer cases across the four quarters.

Results

The RDD panel began with an initial sample size of 16228 cases. This is reduced by about one-half by removing the ineligible from the sample. This leaves a beginning sample size of 8,133 cases for the second quarter. As we mentioned earlier, NC is not a major concern for TPOPS (n=457) as shown in Table 1. By the fourth quarter only 60 cases are removed via a final outcome code of NC.

Table 1: TPOPS Outcome Distributions

			EN		
Quarters	n	I	NC	R	UN
1	8133	3764	457	1772	2140
2	7502	3605	399	1353	2145
3	6680	3459	219	865	2137
4	6283	3219	274	650	2140

We use the data from Table 2 for the attrition calculation. The attrition calculation uses the estimate of the unknown cases assumed to be eligible based on Westat's estimate of .27. Since we use the estimate of the unknown will refer to it as the "effective sample size."

Figure 3. TPOPS Attrition

Effective Sample Size:

$$3764+2229+.\ 27(2140) = 6570$$

Quarter One: $\frac{3764}{6570} = .573$

Quarter Four : $\frac{3219}{3764} = .855$

TPOPS Sample Loss = 14.5%

Fourteen and one half percent seems to be a reasonable attrition rate. It is very close to the pretest estimate when the TPOPS was changed from personal interview to telephone interviews. However, when we began to explore the data more closely this does not adequately capture what is occurring across the four quarters. A closer look at Table 1 finds some inconsistencies in the anticipated outcomes for some categories.

When we looked at cases that receive the same outcome code for all four quarters, the most stable outcome codes are the completed interview's (I) with 30% being a completed interview for all four quarters. Twelve percent of the unknown (UN) cases remain unknown for all four quarters. Less then one-half percent of the cases remain EN or NC across four quarters. There is considerable movement between

Between quarter one and quarter four, 16.5% of the eligible cases are removed from the sample based on the refusal rules. The distribution of the final outcome code as misusing cases due to R or UN final outcome codes are reported in Table 2 (next page). In Table 2 first three columns indicates cases that were removed at the end of the second quarter. The codes I, R indicate one completed interview followed by a hard refusal, R, R indicates that 813 cases refused in the first two quarters. The next most frequent final outcome is I, R, R, an initial completed interview followed by two subsequent quarters resulting in refusals (n=200). The total missing cases by the fourth quarter represents about 16% of the effective sample size.

Table 2. Missing Cased Due to Final Outcome of Refusal and Unknown

Final Outcome	IR	RR	UNR	IRR	NCRR	NCUNR		Total
Refusals	4	813	5	200	26	10		1058
	RRUN	IRUN	NCUN	NCUNUN	UNRUN	UNUNUN	UNUNUNUN	Total
Unknown	131	1	10	3	7	4	748	904

In the first quarter there are 2140 UN cases, 748 of these remain unknown for all four quarters (35%). The rest of the unknown received at least one other outcome code. Once a UN receives a different outcome code, theoretically that case should not receive UN designation again (e.g., ring no answers in a subsequent quarter should go into NC rather then UN). However 131 cases began as a refusal in the first two quarters ended in the third as UN. These cases should probably be counted among the Rs, rather then the UNs. There is a mixed bag of another 25 UN cases that are missing by the fourth quarter. It is clear that something in the coding operation is incongruously impacting the distribution for the UN cases. Why 35% of the UN cases remain in the sample as UN to the end of the panel is unclear. Theoretically, the calling rules should have removed these cases based on either the 12 or the 30 call rules (.e,g, always busy, ring-no answer and call–blocking and call-screening systems). In summary by the fourth quarter interview missing cases include 60 NCs, 1058 Rs, and 904 UN cases. The 904 UN cases are double the estimate of e(UN) used in the effective sample size calculation.

Interestingly, 472 cases that were deemed ineligible in the first quarter were return to the sample for quarter two and quarter three interviews, 32 of these cases were dropped at the end of the third quarter. Of the 440 NE cases that survived all four quarters, fifty-percent of these were completed interviews in the next three quarters of interviews (n=210). Looking within the second and third quarters for the 472 cases, 296 were completed interviews for quarter two (63%) and 242 cases were completed interviews in quarter three (61%). There are 80 NE cases that remained NE all four quarters (18%). These 472 cases are mixed into the final outcome codes of UN, NC, and I. We should point out the 220 the 3129 completed interviews in quarter four began as NE (about 7% of the final completed interviews).

Conclusions

There is a considerable changing of response codes within individual cases during the panel period. This movement is not adequately captured using the AAPOR standardized codes for NEs, since NE's in one-time only surveys may become eligible in subsequent periods.

We need a better mechanism for calculating response rates and attrition specifically for panel telephone surveys. It may be advisable to use an expression similar to that of the unknown eligibility respondents. This could greatly increase the number of cases called back in subsequent quarters.

Determination of ineligible cases should be reevaluated. The NEs, which were based on Census' initial determination of ineligibility in the first quarter and then dropped for the next quarter, were not treated in the same fashion in the subsequent quarters. Coding practices may be improved.

The extensive calling of the UNs used for TPOS should be reevaluated. The unproductive nature of continuing to contact UN's should also be considered. Further analysis to estimate bias would be advisable.

Adjustment of survey period concept should be addressed. If the focus is the response rates in each quarter, then the current definitions based on the one quarter only are adequate. However, when focus shifts to the entire panel period of four quarters, then definitions of eligibility may need to be revisited. An ineligible in one quarter may truly be ineligible at that time, even though that case may have been eligible in a different quarter.

Additional training of interviewers on what codes to use for various situations could significantly improve code reliability.

Further investigation/analysis is needed. Subsampling, weighting, or Hazard modeling to deal with NEs are possibilities for consideration.

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