RESPONSE RATES IN RANDOM DIGIT DIALING (RDD) TELEPHONE SURVEYS

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A. INTRODUCTION

Over the past 20 years there has been a dramatic increase in the use of random digit dialing (RDD) telephone surveys by both private and public organizations to collect information on a variety of topics. The term "random digit dialing" refers to the use of all possible telephone numbers as a sampling frame for telephone surveys. A review of RDD and other telephone survey sampling methods are discussed by Lepkowski (1988).

As the proportion of the United States household population without telephones decreased to under 10 percent in the 1970s, national RDD surveys became more feasible. As the concern over telephone undercoverage decreased, more attention began to be focused on response rates and the quality of data obtained in RDD surveys. Response rates over 70 percent were being obtained by many organizations in the 1980s with a reasonable amount of effort. Several government organizations adopted a RDD methodology for their major household surveys because of lower cost and other attractive features of the RDD methodology. The National Center for Education Statistics has used a RDD methodology for their National Household Education Survey (NHES) since the late 1980s. Response rates in the 1991 and 1993 NHES exceeded 70 percent for almost all components of the surveys. In 1995 and 1996, however, the NCES response rate declined by about 10 percentage points for most components (NCES technical report 97-948).

The objectives of this project were to:
- identify RDD surveys sponsored by government and other organizations over the past 5 years and document the response rates obtained in the surveys;
- review and summarize methods used by government agencies and survey research organizations to calculate and report RDD response rates;
- to the extent possible, identify the key correlates of response rates in RDD surveys; and
- review and summarize standards and guidelines used by government agencies and survey research organizations for RDD survey response rates.

B. OVERVIEW OF RESPONSE RATES IN RDD SURVEYS

Some have argued that high response rates in RDD surveys are not critical as long as the sample of survey respondents is a representative random sample of the population. While there is some validity to this argument, the nonresponse bias associated with estimates from RDD surveys is generally not known. Nonresponse bias refers to the difference between the observed value from a survey and the value that would have been observed given no nonresponse in the survey. (This is one of several possible ways to define nonresponse bias - Lessler and Kalsbeek 1992). Since the difference between respondents and nonrespondents in surveys is generally not known or very difficult and costly to estimate, obtaining a high response rate (low nonresponse) in a survey is often the only way to control for the potential of a significant nonresponse bias in the survey estimates.

The first step in investigating the current state of RDD response rates is to define response rate. The Council of American Survey Research Organizations (CASRO) prepared a special report (1982) on the definition of response rates to serve as a guideline for reporting response rates in surveys. The CASRO report recommended that the RDD survey response rate, R, be defined as completed interviews divided by eligible reporting units.

This is conceptually the same definition as that used in the NCES Statistical Standards (1992) manual given as the weighted number of completed interviews divided by weighted number of units sampled and weighted to account for out-of-scope units. The CASRO definition of eligible units implies that out-of-scope units are excluded. Eligible reporting units refers to the total number of eligible units in the sample and includes both identified and unidentified eligible units during data collection.

While the concepts are fairly straightforward, their application to RDD surveys is not so straightforward. The largest single problem in estimating response rates in RDD surveys is the determination of the eligibility of some of the sampled numbers from the RDD sampling frame.

In their review paper on telephone survey rates, Groves and Lyberg (1988) define response rates in terms of telephone dialing outcomes (often referred to as dispositions). Groves and Lyberg indicate that in telephone surveys the following outcomes are relevant: completed interview, partial interview, noncontacted but known eligible numbers, unanswered numbers, refused eligible numbers, noneligible units, other noninterview units.

Because many of the final dispositions have some uncertainty about whether they represent nonresponding eligible households in RDD surveys, response rates have been defined in a number of ways for different RDD surveys. Other terms such as completion rates and cooperation rates have also been used in conjunction with or in the place of response rates as telephone survey response indicators. The CASRO report and Kviz (1977) present discussions of the proper distinctions between response rates and completion rates. It was clear from the start of the investigation of RDD response rates, that it would be necessary to understand exactly how response rates were defined in terms of the final dispositions to properly evaluate a survey's response rate and to compare response rates across surveys.

C. METHODOLOGY

RDD surveys eligible for this study were identified through a literature search, contact with government agencies, contact with survey research organizations, and review of survey research newsletters. The government agencies and survey organizations contacted to identify RDD surveys were also asked whether they had guidelines or standards for the calculation and reporting of RDD response rates.

The following criteria were used to determine whether to include a RDD survey in our investigation:
- Research studies sponsored by government agencies or other research organizations
- National RDD surveys with 1,000 or more completed interviews
- State or multi-state survey with 5,000 or more completed interviews
- Survey data collection after 1990
- Response rate and method used to calculate the response rate is available.

Before attempting to contact government or survey organizations, a list of needed items and their definitions was developed. The list of items constitute a profile for an RDD survey. The key items for the RDD survey profile include identifying information (title, sponsor, contractor, topic, data collection period), target population, sampling frame, sample design, length of RDD interview, final dispositions, calling limits, response rate, method to calculate response rate, and factors affecting response rate.

D. FINDINGS

One of the important outcomes of the literature search was the identification of a number of recent articles on RDD response rates and other related methodological issues. The paper by Slattery et al., (1995) on response rate in case-control studies reviews

the different methods used to calculate RDD response rates and stresses the importance of accurately defining and estimating RDD response rates. A recent paper by Kessler et al., (1995) discusses the advances in strategies for minimizing and adjusting for survey nonresponse. A paper by T. Smith (1995) presents trends in response rates for general social surveys from 1975 through 1994. The collection of these papers indicates a widespread and continued use of telephone surveys and a continued interest in resolving methodological issues associated with RDD surveys.

A total of 24 government agencies and 56 private survey research organizations were contacted during the response rate investigation and asked about their sponsorship, data collection, and knowledge of RDD surveys since 1990. A list of the agencies and organizations is available from the authors. The most useful documents used to identify agencies and other organizations were the Office of Management and Budget's 1996 publication on "Statistical Programs of the U.S. Government" and the Newsletter of the University of Illinois at Chicago Survey Research Laboratory.

A total of 53 RDD surveys were identified that satisfied or appeared to satisfy the inclusion criteria. No systematic record of the surveys classified as out-of-scope for this investigation was kept, but more RDD surveys were excluded from the investigation than included.

Of the 53 eligible RDD surveys, a sufficient amount of information was collected to estimate the RDD response rate and to determine how the response rate(s) was calculated for 29 of the surveys. Six of these 29 surveys were conducted multiple times producing a total of 46 RDD survey observations.

One of the simpler issues that needed to be resolved for this investigation was how to count the number of RDD surveys. Should surveys that are continuous from one year to the next be counted as a single survey or as multiple surveys? For most purposes the continuous surveys were counted separately for each time period if a separate response rate was calculated each year or survey period.

A frequency distribution of the surveys by size (number of completed interviews) and whether they were national or subnational is shown in Table 1.

The likelihood of a selection bias for the investigation does exist. Even though the cooperation by organizations in this investigation was extremely good, not all organizations participated in the investigation and materials were not received for all RDD surveys conducted by participating organizations. For the purpose of this investigation the existence of a selection bias makes little difference. The most

important question to address on response rates is "What is the best response rates one can expect to achieve when conducting an RDD survey?" The question relative to trends in response rate is "Have the best response rates obtainable in RDD surveys dropped in the past 5 years?" It is assumed that government sponsors and survey organizations are not reluctant to report RDD surveys with high response rates.

Analyzing the response rates from the various surveys was a challenge. Comparing surveys with different target populations, sample designs, sample selection procedures, screening procedures, and methods of calculating response rates is at best problematic. Because of the differences from one survey to another, the analysis was limited to 39 surveys which met basic comparability criteria.

Table 2 shows the distribution of response rates for the 39 surveys. The average rate is 62 percent with a range from 42 percent to 79 percent. The 24 independent surveys differ in size, shape, and form. Eleven of the 24 independent surveys excluded noncontacted numbers and answering machine outcomes from the denominator in the calculation of response rates. For the 17 observations from these 11 surveys, the average response rate was 57 percent. One might surmise that for these surveys, the response rate was already low enough.

It is clear from the response rates shown in Table 2 that response rates in RDD surveys over 70 percent are the exception and not the rule. Only about one-sixth of the RDD observations exceeded 70 percent, while one-third of the observations were below 60 percent. This leaves about one-half of the response rates between 60 and 70 percent. High response rates are very difficult to obtain, since most of the surveys shown in this report had extensive calling procedures to reach households and made a number of attempts to convert refusals and breakoffs.

Table 4 provides a summary of the methods used to calculate response rates for RDD surveys. Surveys conducted multiple times, but using the same method to estimate response rates were counted as one observation for Table 4. The results in Table 4 indicate that a little over 50 percent of the surveys used the CASRO method or some variation close to the CASRO guideline for calculating response rates. Forty-two percent of the surveys, however, used methods (c&d) that would tend to overestimate the response rate. These results are consistent with those reported by Slattery et al., (1995) in their investigation of the calculation of the RDD response rates in case-control studies.

Although identification of the key factors that influence and impact RDD response rates was not one of the primary objectives of this investigation, some of the factors could readily be identified and others were reported to us. The three most often mentioned factors were saliency, sponsorship, and endorsements of the survey. This is very apparent among the surveys with the highest reported response rates. The State Initiatives in Health Reform Survey sponsored by the Robert Wood Johnson Foundation had a response rate of 79 percent. In 8 out of the 10 states the survey had an endorsement by the governor's office. In the 2 other states the endorsement was given by the State Health Department. The survey organization conducting the survey indicated the endorsement by the governor's office was a major factor in obtaining high response rates. Another survey with a response rate over 75 percent was the Bicycle Exposure Survey in 1991. This survey achieved a high screener response rate and a very high person interview rate because of interest in the topic. The third survey with a response rate over 75 percent was the National Household Education Survey sponsored by NCES in 1991. This survey was for young children and stated among other things in the introduction that the study was based on the President's goals for improving education for children and adults. While the sponsorship, saliency, and endorsements are certainly not the only reasons for high response, they clearly are important.

While no systematic analysis was done, some of the reasons reported for low response in the survey profiles included complexity of the survey design, respondent burden, lack of interest in topic, and level of effort made to convert refusals to responders. Recent articles by Kessler et al., (1995), Groves et al., (1992), and Kristal et al. (1993), discuss these and other factors that influence response in surveys such as survey design, incentives, advance letters, callbacks, and interview-respondent interactions. While all of these factors play a part in response rates, a more detailed analysis of the RDD surveys in this investigation is needed to better understand the differences in response rates between the surveys.

One of the important questions related to the response rates in RDD surveys is the change in response rates over time. There is some evidence from this investigation that suggests that RDD response rates may be dropping slightly. The four surveys, other than the NHES, that have been conducted multiple times since 1990 were examined for changes in response rates. Results are presented in Table 5.

In two of these surveys there have been dramatic drops in response rates (NPTS and HDS). The SFP shows a slight decline from 1994 to 1996, but shows it lowest response rate in 1993. The YATS shows a very stable response rate. No additional information was

available from the HDS or SFP surveys to help explain the drop in response rates. For the NPTS survey, significant changes in the survey procedures were made that could account for all or a great deal of the change. For the YATS the survey methods have not changed significantly. No definite conclusions could be reached about a drop in response rates from this limited analysis.

Several other reports and articles have appeared recently that discuss trends in survey response rates. These studies are not restricted to RDD surveys. Tom Smith (1995) has written a very comprehensive article on trends in nonresponse rates. He concludes that the drop in surveys response rates is due to multiple causes, but did not reach the conclusion that there has been a real drop in survey cooperation among respondents. In a 1994 study on response rates in federal surveys, Shettle et al. (1994) concluded that there was no hard evidence of a drop in response rates. Research by Groves (1989) and Kessler et al. (1995) suggest slight drops in response rates.

E. GUIDELINES FOR RDD SURVEYS

One of the primary goals of this investigation was to identify existing guidelines and standards for RDD response rates or the calculation of RDD response rates. Guidelines for federal agencies was particularly germane.

Our investigation did not uncover a single specific guideline or standard on RDD response rates for any federal agency. The only manual that specifically addressed survey response rates was the NCES Statistical Standards publication (NCES92-0218). The NCES manual has a very specific set of guidelines for the computation of response rates. Several other federal agencies had standards manuals, but they were not specific on response rates.

What our investigation did discover was a number of articles and reports that have already been published or are in process of being prepared on the computation of response rates for RDD surveys. Some of them have already been referenced. The following list of papers and reports will provide (when they are all published) an excellent set of guidelines for RDD surveys.
- CASRO report (1982) on the definition of response rate
- Groves and Lyberg (1988) paper on nonresponse issues in telephone surveys
- Slattery et al., (1995) paper on response rates in case-control studies
- Massey (1995) paper on the calculation of RDD response rates in telephone surveys with screening
- American Association of Public Opinion Research (AAPOR) committee report (1997 draft) on RDD

disposition codes to define nonresponse
- National Opinion Research Corporation (NORC) report (1997 draft) for Department of Transportation (DOT) on calculating and reporting RDD survey response rates
- NORC report (1997 draft) on reducing nonresponse in travel surveys for DOT

The CASRO report is still an excellent guide for the calculation of response rates. The Slattery paper provides a good discussion of what researchers are reporting and what they should report. The AAPOR committee report should be a valuable addition for classifying all RDD outcomes using a standard set of definitions. The other papers contain important information related to the calculation of response rates and ways to reduce nonresponse.

F. CONCLUSIONS AND RECOMMENDATIONS

The results from this investigation lead to the following conclusions:
-   Only a small percentage of RDD surveys are obtaining a true response rate of over 70 percent.
-   Considerable effort is required to obtain a response rate over 60 percent in RDD surveys where some households are not eligible for the survey, persons within the household are subsampled, or multiple questionnaires are used.
-   While there is some evidence that RDD response rates may have declined slightly over the past 10 years, most declines in response rates are attributable to longer interviews, more complex surveys, and changes in the surveys.
-   Increased use of answering machines, multi-purpose telephone lines, call-forwarding, and the increased magnitude of telephone solicitation have all increased the survey burden in RDD surveys.
-   There is greater use of telephone surveys today than ever before, especially at the state and local levels.
-   The calculation of response rates is very variable across surveys.
-   A significant number of RDD surveys are reporting completion rates or cooperation rates instead of response rates. This is generally an indication of a lower response rate.
-   Nonresponse in RDD surveys is here to stay.
Recommendations:
-   The pervasiveness of nonresponse increases the importance of evaluating the impact of nonresponse and adjusting for nonresponse whenever possible, and this is strongly recommended.
-   Evaluation of the level and potential impact of nonresponse should be viewed as a critical part of the design and analysis of the survey results. The response rate(s), how it is calculated, and the potential impact of

nonresponse are all important to program analysts and data users for the interpretation of survey results.

- We should continue to be rigorous in the calculation of response rates at every stage of the design.

- Completion rates and cooperation rates are useful measures, but should not be used to replace response rates.

- We should continue to develop better methods of obtaining respondent cooperation.

- To the extent possible, we should use simple designs.

- We should consider different types of incentives for both interviewers and respondents.

- We should monitor and develop better quality control procedures for all components of RDD surveys.

- We should conduct additional research on interviewer and questionnaire effects.

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TABLE 1. SIZE AND SCOPE OF RDD SURVEYS
IN INVESTIGATION

Scope and Size	Number
National	
<5,000	22
5,000 - 9,999	7
10,000+	7
Unknown	1
Subnational	
5,000* - 9,999	2
10,000+	7
Total	46

*One survey slightly under 5,000 was included because of its relationship to a national survey.

TABLE 2. FREQUENCY DISTRIBUTION OF
RESPONSE RATES FOR RDD SURVEYS

Response Rate (percent)	Frequency	Percent	Cumulative Percent
<50	3	8	8
50 -54	5	13	21
55 - 59	6	15	36
60 -64	11	28	64
65 - 69	7	18	82
70 - 74	4	10	92
75+	3	8	100

TABLE 4. FREQUENCY DISTRIBUTION OF
METHODS TO CALCULATE RESPONSE RATES
IN RDD SURVEYS

Method	Frequency	Percent
a. All unknown eligibles in denominator	1	3
b. Part of unknown eligible in denominator	15	52
c. No unknown eligibles in denominator	4	14
d. Other definitions	8	28
e. Not able to determine	1	3

TABLE 3. TELEPHONE OUTCOMES INCLUDED
AND EXCLUDED IN THE CALCULATION OF
RDD RESPONSE RATES

	Outcome	Included in Calculation
Numerator	Eligible Cases	
	Completed interviews	Yes
	Partial interviews	Sometimes
Denominator	Eligible Cases	
	Completed interviews	Yes
	Partial interviews	Yes
	Refusals	Yes
	Breakoffs	Yes
	Answering machine	Sometimes
	Other non-interview	Sometimes
Denominator	Eligibility Status Unknown	
	Noncontacted numbers	Sometimes
	Answering machines	Sometimes
	Screening refusals and breakoffs	Sometimes

TABLE 5. TIME TRENDS BASED ON PERIODIC
SURVEYS

Survey	Year	Response Rate
Youth Attitude Tracking Survey (YATS)	1990	65
	1991	66
	1992	60
	1993	64
	1994	64
	1995	64
National Personal Transportation Survey (NPTS)	1990	64
	1995	55
Health and Diet Survey (HDS)	1990	70
	1995	57
Southern Focus Poll (SFP)	1993	47
	1994	54
	1994	54
	1995	56
	1995	54
	1996	51
	1996	49