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ABSTRACT

The question of how high a response rate is needed in order for telephone surveys to obtain data that accurately represent the entire sample, was investigated via reevaluating results of three previously published studies and reporting on three 1989 studies for the first time. The three previous studies indicated that, if the sample characteristics had been estimated on the basis of respondents rather than the entire sample, the conclusions would have deviated from the true sample by 4.8%, 2.1%, and 2.8%, respectively. In the first of the new studies in 1989, 811 households were telephoned to complete 700 interviews about the likelihood of purchasing savings bonds, for a response rate of 86%. In the second study in 1989, a customer satisfaction study, 149 out of 150 people responded, a rate of 99%. In the third study in 1989, 928 telephone interviews were completed out of 969 households, for a response rate of 96%. Data from all six studies indicated that response rates of at least from 65% to 75% are needed before non-response bias is reduced to a level where it is not likely to have a significant effect on decision making. The reduction in non-response error associated with increasing response rates past the 75% level will not usually justify the cost of such additional effort. Seven tables summarize data from the studies. (SLD)

HIGH INTFRVIEW RESPONSE RATES: MUCH ADO ABOUT NOTHING?

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HIGH INTERVIEW RESPONSE RATES: MUCH ADO ABOUT NOTHING?

ABSTRACT

This research addresses the question: How high a response rate is necessary for telephone surveys to obtain data that accurately represent the entire sample? Results from three previously published studies are reevaluated from a new perspective, and results from three 1989 studies are reported for the first time. The results suggest that resources allocated to achieving response rates in excess of 65-75% may be better utilized for other purposes--given the likelihood that response rates in that range will yield data that closely approximate data based on higher response rates.

HIGH INTERVIEW RESPONSE RATES: MUCH ADO ABOUT NOTHING?

An important question has received insufficient attention by survey research methodologists: What percentage of a telephone survey sample must be successfully interviewed to insure that responses represent the entire sample to a degree that whatever variation may exist would not be sufficient to affect decision making? Attention has been diverted from this seminal question because researchers have devoted their efforts to tangential questions such as: How many telephone interview attempts are necessary to reach certain percentages of the final number of people who are ultimately contacted? (Wiseman and McDonald, 1978; Smead, 1980). Findings from this latter type of research have limited generalizability because of idiosyncracies that different populations have regarding the percentage of people who respond after certain numbers of contacts. Therefore, seeking guidance in regard to how many interviews are required for reliable data by counting "contacts" (or, alternatively, "callbacks") will not be as useful as looking at response rate, a measure that has the same meaning across all types of telephone surveys.

Concern about nonresponse bias in telephone (and personal) interview studies is not new. Wiseman and McDonald, in their 1978 landmark study, advocate the "need for research that answers the question, 'What is the nature

and extent of demographic, attitudinal, and behavioral differences between survey respondents and nonrespondents?'" Tyebjee (1979) cites the results of research that show the nature of bias when insufficient telephone response rate is attained: "The more serious of these biases is an overrepresentation of the over-64 age group; low education and income age [sic] groups; respondents with home-related occupations such as farmers, housewives, or retired persons; and an underrepresentation of residents of large central SMSAs" (p. 72). Wilcox (1977) cites the work of other researchers who have reported differences in personal interview situations between respondents and nonrespondents in terms of economic status and education (Benson, et. al, 1951; Hawkins, 1975; Lovelock, et. al., 1976; Dunkelberg and Day, 1973; Lasing and Eapen, 1959). These researchers based their conclusions on answers to the question: Do nonrespondents differ from respondents in relevant ways? Underlying all this research is the accepted belief that large percentages of telephone survey samples must respond if the data are to represent the sample and, ultimately, the population within stated degrees of precision.

It has recently been argued that research into the effect of nonresponse bias in mail surveys has been misguided and that, "During the past 60 years, researchers have

investigated nonresponse bias by asking the wrong question: Do respondents differ from nonrespondents? (or alternatively: Do early respondents differ from later ones?). Focus should have been directed to a more practically important question: Do data based on partial returns differ meaningfully from data based on more complece returns?" (Berdie, 1989, p. 61). Berdie found that response rates of 50% and higher for mail surveys usually yield results that closely approximate the entire sample. This may be because, even if differences do exist between respondents and nonrespondents, if these differences are trivial or if, "the number of cases in the unsuccessful contacts is so small that their influence on the total trends is practically unnoticeable" (Gaudet and Wilson, 1940, p. 776), then the effect of any nonresponse bias upon survey based decision-making would be negligible.

The present study extends this redirected focus to the telephone interview methodology. The research reported herein consists of two parts. First, the results of a literature search which analyzes previous research regarding demographic differences between respondents and nonrespondents are presented. The purpose of this presentation is to determine whether differences observed in these earlier studies were large enough to have a meaningful impact on decision making. Second, the results of

three recently completed studies that compare the representativeness of data at various response levels are presented.

RESEARCH METHOD

The research method is described below in two sections: a description of the method used to conduct the literature review; and a description of the methods used to conduct the three surveys whose results are presented here for the first time.

A. Literature Review

Reviews of research bibliographies and relevant professional journals uncovered only three studies that present raw data in a way allowing for response comparisons between low response rates and higher response rates to telephone surveys. These studies allow us to address the question, "How much do data based on early response rates change compared to data based on more complete response rates?" Therefore, these three studies have been included.

B. Data from Three New Studies

In 1989, three telephone studies were conducted whose results are useful for the present purpose. In each, the number of contacts needed to complete interviews was recorded, making it possible to compare overall data for each

variable at a number of different response rates.

The first, Study A, was a telephone survey conducted with 700 Minnesota residents to ascertain their likelihood of purchasing college savings bonds for children or grandchildren. A total of 811 households were contacted to complete the 700 interviews--resulting in an overall response rate of 86%. The questionnaire used contained 34 dichotomous questions, and analyses were conducted that compared the cumulative responses after each of 8 contacts to the final data.

The second study, Study B, was a customer satisfaction survey conducted with 149 customers of a service organization. The overall sample was 150 people, so the 149 completions resulted in a response rate of 99%. This questionnaire contained 55 rating scale items whose 5-point scale anchors were: 1 = "very dissatisfied", and 5 = "very satisfied." Analyses were conducted that compared the cumulative responses after each of 11 contacts to the final data.

The third study, Study C, consisted of 928 customer satisfaction interviews with owners of a specific type of heavy equipment. A total of 969 calls were made to complete the 928 interviews, resulting in a response rate of 96%. The questionnaire contained 10 rating scale questions with the

same 1-5 rating scale as in Study B, and 23 dichotomous qu' tions. Analyses were conducted that compared the cumulative responses after each of 8 calls to the final data.

Data presented for Studies A, B, and C have all been rounded to one decimal point.

RESULTS

The results from the three previous research studies are presented first, followed by the results from the three 1989 studies.

A. Results from Reassessing Earlier Studies

Struebbe, et. al. (1986), surveyed a random sample of Cincinnati residents and conclude: "refusals are associated with older age, lower income, and nonparticipation in the work force" (p. 32). Their conclusions are based on comparisons between respondents and nonrespondents. When their data are recalculated to show the differences in response between the respondents (who made up 52% of the sample) and the sample as a whole (for which they had complete data from other sources on these variables), the results are shown in Table 1.

[insert Table 1 about here]

Table 1 shows, that if one were to draw conclusions about age

of the sample based on the 52% response rate achieved, such conclusions might err by as much as 3.7%. Similarly, the error in drawing conclusions about education could be as high as 2.9%, the error in drawing conclusions about income could be 3%, the error in drawing conclusions about work status could reach 4.8%, and the error in drawing conclusions about household size might be as high as 2.9%. In other words, if conclusions about the data presented by Struebbe, et. al., would have been made based on their 52% response rate, these conclusions would deviate from the true sample characteristics by up to 4.8%.

O'Neil (1979) conducted a telephone survey of 1,209 Chicago households. His data are presented in a way that allows us to compare the responses after a 75% response rate to the responses based on his final response rate of 87%. This comparison is shown in Table 2. (Raw data presented by O'Neil do not always coincide with the "difference data" he presents--most likely due to rounding error. The inconsistencies are insignificant, usually .1%, so, for present purposes, the assumption has been made that the "difference data" are accurate, and his response data have been rerounded for consistency in this regard.)

[insert Table 2 about here]

Table 2 shows that, of the 10 questions asked by O'Neil, and

the 51 possible response options associated with those questions, the responses based on the 75% response rate never varied by more than 2.1% from the responses based on the final 87% response rate.

Weaver, et. al. (1975), contacted 514 San Antonio city employees from a sample of 600 (86% response rate). They compared the demographic responses of the 458 people who agreed to be interviewed (76% of the sample of 600) to known demographic information about the 56 people who were contacted and refused to participate. Table 3 shows the results from comparing data from respondents to data from the entire group of people who were contacted.

[insert Table 3 about here]

Table 3 shows that, if one had estimated the sample characteristics related to race, salary, and age based on respondents rather than the entire group of people contacted, one's estimates would never have varied by more than 2.8%.

By comparing the data in Tables 1-3, we can see that the response rate of 52% shown in Table 1 results in data that deviate from the final data by amounts that might lead to different decisions. However, the deviations in Tables 2 and 3, based on response rates of 75% and 76%, respectively, are not large enough to have practical impact on most decisions that might be made based on the data.

B. Results from Three 1989 Studies

In the recently completed study of Minnesota residents related to college savings bonds, the data show that responses after only one call (33% response rate) to nine of the 34 questions varied by at least 4% from the final data (Table 4), with responses to the other 25 questions varying by less than this amount.

[insert Table 4 about here]

As the number of calls (and, response rate) increased, variation between the cumulative responses to that point and the final data decreased markedly. Data cumulated after three calls (67% response rate) were within 2% of final data for 33 of the 34 variables measured. After 6 calls (80% response rate), cumulated data for all 34 variables were within 1% of the final data.

Table 5 shows the results of comparing cumulative data after varying numbers of calls to final data for Study B.

[insert Table 5 about here]

This table shows that after only one call (11% response rate), the data from 34 of the 55 variables differ by more than 3% from final data. By the time 6 calls had been made (71% response rate), the cumulative data for only one of the 55 variables differed from final data by more than 3%.

Table 6 shows the results from the customer satisfaction

survey of heavy equipment owners.

[insert Table 6 about here]

Table 6 shows that data after only one call differ subtantially from final data, with four of 23 dichotomous variables showing differences of at least 3%, and two of the interval-level measures varying by .1 on a 1-5 scale. After 3 calls (73% response rate), however, cumulated data for all 23 dichotomous questions are within 2% of final data, and only one interval-level question showed variation from the final data.

By comparing Tables 4-6 (in terms of response rate, not number of calls), we can see that response rates of about 65-75% were needed before all substantial variation between cumulated and final data are eliminated.

Table 7 shows that "number of calls" does not always predict response rate accurately.

[insert Table 7 about here]

The table shows that, for Studies A and C, one-third of the sample had successfully been interviewed after only one call, whereas for Study B, only 11% of the sample had been interviewed. Whereas only four calls were needed to attain a response rate exceeding 70% for Studies A and C, six calls were required to reach that response rate for Study B. Finally, no substantial benefit was attained by exceeding

eight calls for Study A or C, but major improvements in response rate were attained in Study B from the eighth to the 18th call.

DISCUSSION

A synthesis of the results from the literature review and the three 1989 studies leads to several conclusions. First, given the wide variation in response rate that is associated with various numbers of calls in different telephone surveys, we should not look to "number of calls" as a guide for obtaining representative response. Rather, we should focus on the response rate needed to obtain representative response--regardless of how many calls it takes to attain that response rate.

Second, comparisons of cumulated data at varying response rates to final data in all six studies examined suggest that response rates of 65-75% are needed before nonresponse bias is reduced to a level where it is not likely to have a significant effect on decision making.

Third, the reduction in nonresponse error associated with increasing response rates past the 75% level will not usually justify the cost of such additional effort. The resources needed for such effort are usually better spent enhancing the study in other ways (e.g., larger sample size allowing for more detailed segmentation analysis, longer

questionnaire obtaining more detailed information, etc.).

Although the reasons for nonresponse may vary somewhat from telephone to mail surveys, the conclusion in both cases regarding the question, "How much response rate is enough?" seems to be the same. As response rates pass 50%, the data start to converge on the results of much higher response rates, and by the time response rates of 65-75% have been attained, data very closely approximate total sample data. This is not surprising because once response rates of this magnitude have been attained, even divergence among subsets of nonrespondents can only have a minor impact on the overall data.

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TABLE 1

Responses at Different Response Rates

Variable Measured	52% of Sample Who Responded	Total Sample (Respondents and Nonrespondents)	Difference Between Respondents and Total Sample
Age (n=188)			
Under 25	9.2%	6.9%	2.3%
25 - 29	17.3%	15.5%	1.8%
30 - 34	11.2%	12.2%	1.0%
35 - 39	12.2%	10.6%	1.6%
40 - 44	9.2%	10.1%	.9%
45 - 49	18.4%	14.9%	3.5%
50 - 59	11.2%	14.9%	3.7%
60 and over	11.3%	14.9%	3.6%
	100.0%	100.0%	
Education (n=191)			
Some high school or less	14.0%	12.0%	2.0%
High school graduate	47.0%	47.0%	.0%
Some coll./tech. diploma	17.0%	19.9%	2.9%
College graduate	22.0%	21.1%	.9%
	100.0%	100.0%	
Household Income (n=143)			
Less than $15,000	14.1%	20.2%	2.1%
$15,000 - $19,999	14.1%	14.7%	.6%
$20,000 - $24,999	16.7%	16.1%	.6%
$25,000 - $29,999	17.9%	15.4%	2.5%
$30,000 - $39,999	16.7%	16.1%	.6%
$40,000 or more	20.5%	17.5%	3.0%
	100.0%	100.0%	

TABLE 1 (CONT.)

Responses at Different Response Rates

Variable Measured	52% of Sample Who Responded	Total Sample (Respondents and Nonrespondents)	Difference Between Respondents and Total Sample
Employment Status (n=192)			
Employed full-time	27.0%	25.5%	1.5%
Employed part-time	20.0%	16.7%	3.3%
Not employed	53.0%	57.8%	4.8%
	100.0%	100.0%	
Household Size (n=190)			
One person	6.9%	7.9%	1.0%
Two persons	27.7%	27.4%	.3%
Three persons	20.8%	19.5%	1.3%
Four persons	22.8%	20.5%	2.3%
Five or more persons	21.8%	24.7%	2.9%
	100.0%	100.0%	

TABLE 2

Responses at Different Response Rates

Variable Measured	First 75% of Sample Who Responded	Data Based on Final 87% Who Responded	Difference Between 75% and 87%
Occupation			
Professional	16.1%	14.9%	1.2%
Executive	10.5%	10.2%	.3%
Clerical	20.4%	20.3%	.1%
Skilled	8.8%	9.7%	.9%
Semiskilled	7.9%	7.8%	.1%
Unskilled	3.2%	3.3%	.1%
Service	6.4%	6.6%	.2%
Protective service	2.0%	2.1%	.1%
High school student	3.0%	3.6%	.6%
Coll/grad. student	3.6%	3.2%	.4%
Housewife	18.1%	18.3%	.2%
	100.0%	100.0%	
Family Income			
less than $3,000	9.5%	9.7%	.2%
$3,000 - $6,000	13.2%	13.7%	.5%
$6,000 - $10,000	21.9%	22.5%	.6%
$10,000 - $15,000	25.5%	25.0%	.5%
more than $15,000	29.9%	29.1%	.8%
	100.0%	100.0%	
Education			
Grammar school	10.0%	10.5%	.5%
Some high school	17.8%	18.6%	.8%
High school graduate	29.2%	29.7%	.5%
Some college	23.5%	23.1%	.4%
College work	11.1%	10.4%	.7%
Graduate work	8.4%	7.8%	.6%
	100.0%	100.0%	

TABLE 2 (CONT.)

Variable Measured	Responses at Different Response Rates: First 75% of Sample Who Responded	Data Based on Final 87% Who Responded	Difference Between 75% and 87%
Race			
White	60.9%	62.7%	1.8%
Black	39.1%	37.3%	1.8%
	100.0%	100.0%	
Ethnicity			
Black Africa	48.3%	46.1%	2.2%
Germany	14.5%	15.5%	1.0%
Ireland	8.5%	9.0%	.5%
Italy	6.8%	6.7%	.1%
Poland	9.4%	10.7%	1.3%
Scandinavia	5.3%	4.9%	.4%
Britain	7.2%	7.1%	.1%
	100.0%	100.0%	
Religion			
Catholic	36.0%	36.9%	.9%
Protestant	40.1%	39.8%	.3%
Jewish	5.5%	5.6%	.1%
Other	6.8%	6.7%	.1%
None	11.6%	11.0%	.6%
	100.0%	100.0%	
Age			
19 or less	5.6%	5.9%	.3%
20 - 24	11.3%	10.8%	.5%
25 - 34	30.0%	28.6%	1.4%
35 - 44	15.6%	15.3%	.3%
45 - 54	13.8%	14.5%	.7%
55 - 59	6.7%	6.4%	.3%
60 - 64	5.8%	6.1%	.3%
65 - 74	8.6%	9.5%	.9%
75 and over	2.6%	2.9%	.3%
	100.0%	100.0%	

TABLE 2 (CONT.--2)

Variable Measured	Responses at Different Response Rates: First 75% of Sample Who Responded	Data Based on Final 87% Who Responded	Difference Between 75% and 87%
Presence of Children			
Children present	47.5%	46.2%	1.3%
Children not present	52.5%	53.8%	1.3%
	100.0%	100.0%	
Dwelling Type			
Single family	[illegible].1%	38.1%	1.0%
Multifamily	62.9%	61.9%	1.0%
	100.0%	100.0%	
Owner Occupancy			
Rent	61.1%	59.8%	1.3%
Own or buying	38.9%	40.2%	1.3%
	100.0%	100.0%	

TABLE 3

Responses at Different Response Rates

Variable Measured	76% of Sample Who Responded	Data Based on All Contacts (86% of Sample)	Difference Between 76% and 86%
Race			
Black	29.3%	27.2%	2.1%
Mexican-American	22.9%	22.8%	.1%
White	47.8%	50.0%	2.2%
TOTAL	100.0%	100.0%	
Salary			
less than $600/month	40.9%	38.1%	2.8%
$600 - $649.99/month	32.9%	35.2%	2.3%
$650 or more/month	26.2%	26.7%	.5%
TOTAL	100.0%	100.0%	
Age			
less than 30 years	39.1%	37.5%	1.6%
30-39 years	20.7%	21.2%	.5%
40-49 years	22.3%	22.0%	.3%
50 or more years	17.9%	19.3%	1.4%
TOTAL	100.0%	100.0%	

TABLE 4

Changes in 34 Dichotomous Variables When Comparing Cumulative Data After a Certain Number of Calls to the Final Data

Data Compared to Final 700 Responses (86% Response Rate--s=811)	Response Rate	Number of Questions Showing Specified Changes in Cumulative Percentage				
		0%	+/-1%	+/-2%	+/-3%	+/- 4% or more
After 1 call (s=264)	33%	3	11	8	3	9
After 2 calls (s=430)	53%	11	8	8	4	3
After 3 calls (s=541)	67%	9	15	9	0	1
After 4 calls (s=588)	73%	15	11	7	1	0
After 5 calls (s=622)	77%	16	17	1	0	0
After 6 calls (s=650)	80%	25	9	0	0	0
After 7 calls (s=666)	82%	29	5	0	0	0
After 8 calls (s=684)	84%	29	5	0	0	0

TABLE 5

Changes in 55 Variables When Comparing Cumulative Data After a Certain Number of Calls to the Final Data

Data Compared to Final 149 Responses (99% Response Rate--s=150)	Response Rate	Number of Questions Showing Specified Changes in Cumulative Mean Score (1-5 Rating Scale)				
		.0	+/-.1	+/-.2	+/-.3	+/-.4 or more
After 1 call (s=17)	11%	1	5	6	9	34
After 2 calls (s=38)	25%	5	8	12	16	14
After 3 calls (s=55)	37%	8	11	22	9	5
After 4 calls (s=81)	54%	5	18	22	7	3
After 5 calls (s=95)	63%	7	29	15	3	1
After 6 calls (s=106)	71%	4	35	13	2	1
After 7 calls (s=111)	74%	13	36	5	1	0
After 8 calls (s=122)	81%	15	36	3	1	0
After 9 calls (s=129)	86%	21	32	2	0	0
After 10 calls (s=134)	89%	30	24	1	0	0
After 11 calls (s=138)	92%	33	22	0	0	0

TABLE 6

Changes in 33 Variables When Comparing Cumulative Data After a Certain Number of Calls to the Final Data

Data Compared to Final 928 Responses (96% Response Rate--s=969)	Response Rate	Number of Questions Showing Specified Changes in Response: Changes in Cumulative Means of 10 Questions with 1-5 Scale		Changes in Cumulative Percentages of 23 Dichotomous Questions			
		.0	+/-.1	0%	+/-1%	+/-2%	+/- 3% or more
After 1 call (s=326)	34%	8	2	5	8	6	4
After 2 calls (s=578)	60%	7	3	9	7	5	2
After 3 calls (s=703)	73%	9	1	12	8	3	0
After 4 calls (s=784)	81%	10	0	13	9	1	0
After 5 calls (s=828)	85%	10	0	17	5	1	0
After 6 calls (s=870)	90%	10	0	17	5	1	0
After 7 calls (s=891)	92%	10	0	16	7	0	0
After 8 calls (s=909)	94%	10	0	19	4	0	0

TABLE 7

Response Rates Attained After Varying Numbers of Calls for Each of Three 1989 Studies

	Response Rate Attained		
Number of Calls	Study A	Study B	Study C
1	33%	11%	34%
2	53%	25%	60%
3	67%	37%	73%
4	73%	54%	81%
5	77%	63%	85%
6	80%	71%	90%
7	82%	74%	92%
8	84%	81%	94%
9	84%	86%	94%
10	85%	89%	95%
11	85%	92%	95%
18	86%	99%	96%