Reporting Response Rates for Telephone Surveys Used In Agricultural Economics Research

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Response rates are one indicator of a survey's data quality, as a great deal of importance has been placed on the mail survey's response rate. However, a telephone survey's response rate usually is not reported. Even if one is reported, the numbers used in the calculation are rarely defined making the response rate interpretation unclear. Using a recent telephone survey of Pennsylvania dairy managers, this paper demonstrates how telephone survey data should be reported. Essentially, every research report should include a discussion of how the survey was conducted, a disposition table, and well-defined formulas used to calculate response rates.

Mail, telephone, and face-to-face surveys are common methodologies of obtaining primary data for economic analysis. Although proper procedures for preparing surveys have received considerable research attention, less attention has been focused on assessing the quality of such data (Biemer).

Information on how a survey was conducted and a survey's response rate are two indications of sample representativeness and data quality (Dillman; Leeuw and Zouwen). Most mail survey research describes how the survey was conducted, including whether a postcard reminder was sent, the number of waves of follow-up surveys, and a basic and adjusted response rate. This information helps the reader assess sample representativeness and data quality. Procedures used in a telephone survey, such as how many times unanswered or busy numbers were recalled and how eligible respondents who wanted to complete the survey but could not at that particular time were handled, also relay important information to the reader in assessing the sample representativeness and data quality. Generally this information is not provided for the reader and while response rates are occasionally reported in telephone survey research their interpretation is unclear.

The lack of information provided in research using telephone survey data allows one to question the representatives of the sample and data quality. Furthermore, as Luloff and Ilvento show just because proper sampling techniques are used to ensure the sample represents the universe, the information obtained from the survey instrument must also represent the universe.

Telephone survey response rate calculations are more problematic given the great number of dispositions possible. Further attention is needed on this topic, especially since the technique is increasingly being used by agricultural economists.

The interpretation of telephone response rates is not clear for several reasons. First, the numbers used in determining a reported response rate usually are not defined or given in research reports making the interpretation of the response rate unclear. However, this problem can be addressed by providing a disposition table, which is designed to summarize the log of all telephone numbers dialed (Lavrakas). Second, standard formulas for calculating telephone survey response rates are not being used (Nelson, et al.). Several telephone survey response rate formulas are presented. Because these rates are calculated using information in the disposition table, which defines all the numbers, the interpretation of the response rates is clear.

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Reported Telephone Response Rates

Telephone surveys allow researchers to obtain data for any desired number of respondents because an unwilling participant can be replaced by someone

who does want to participate (although respondents are most often chosen randomly). However, the total number of telephone numbers needed to achieve the desired sample size is rarely mentioned. For example, if two surveys of 1,000 respondents each were achieved by calling 2,000 and 5,000 telephone numbers[1] respectively, the response and efficiency rates of these two surveys would be quite different. Regardless, given the limited amount of information provided in the reports of most research using telephone surveys, such obvious differences often go undetected.

Ideally, researchers would like to reach the desired sample size with the fewest calls. At the same time, researchers are concerned with the quality of the survey data. Implementing multiple call-backs for busy or unanswered phones may decrease efficiency but increase data quality. Therefore, researchers are faced with the challenge of maximizing benefits, such as a representative sample and data quality, while minimizing costs, such as making unnecessary calls (Mitchell and Carson).

An assessment of recently published articles in each of the four regional agricultural economics journals and the *American Journal of Agricultural Economics* finds an insufficient amount of information on the final disposition statistics for telephone surveys. Table 1 presents the results of this literature review for the past 8 years of the *Northeastern Journal of Agricultural and Resource Economics* (NJARE), which was continued as the *Agriculture and Resource Economics Review* (ARER); *North Central Journal of Agricultural Economics* (NCJAE), which was continued as the *Review of Agricultural Economics* (RAE); *Southern Journal of Agricultural Economics* (SJAE); the *Western Journal of Agricultural and Resource Economics* (WJAE), which was continued as the *Journal of Agricultural and Resource Economics* (JARE), and the *American Journal of Agricultural Economics* (AJAE).

From 1986 to 1993, twenty articles were identified that used telephone survey data. Table 1 provides some evidence that telephone survey data are becoming more popular as only 3 articles were found in the journals during the years 1986 through 1989 while 17 articles were found during the period 1990 to 1993. None of the articles contained a disposition table. Very little information was provided about response rates in most of the articles. Surprisingly, only eight articles even reported a response rate. Another seven articles only provided the number of completed surveys.

The lack of information, as cited above, makes comparing response rates from different research projects difficult due to the uncertainty in how they were calculated. For example, the response rates from the telephone surveys presented in Table 1 were calculated using at least two different methods. The Lass, et al., and Kelsey articles used a gross completion rate (completed surveys divided by the total number of calls less ineligible respondents). The Leistritz, et al. article used the basic response rate (completed surveys divided by the number of eligible respondents). The article by Hanemann, et al. gave a cooperation rate (the percentage of contacted eligible respondents who completed the survey). The articles by Leistritz and Ekstrom; Baker; and Lass and Gempesaw did not provide enough information to determine how the response rates were calculated. However, even though the type of response rate can sometimes be identified in these articles, the numbers going into the calculations may not represent the same thing for different surveys.

Presenting Research Findings

When presenting telephone survey data in research articles, three issues should be addressed. First, research findings should provide sufficient information about how the survey was conducted including information about the population, how the sample was chosen, and the methodologies used, such as whether or not scheduled call backs were permitted. This information is especially important if a low ratio of completed surveys to telephone numbers dialed occurs.

Second, the outcome of all the telephone numbers called should be presented in a disposition table and the response rates should be well defined. By indicating which categories from the disposition table are included in the numerator and denominator, the interpretation of the response rate(s) becomes clear. In addition, the reader can calculate their own response rates of interest.

The third issue to be addressed by researchers is explaining how their research findings can be generalized to the population. Currently, surveys are being used to obtain data in all the fields of agriculture. For example, Table 1 reports that survey data were used for topics such as assessing use value from recreational participation (Whitehead), who might adopt new technology (McNamara, et al.; and Zepeda), and determining why farmers

[1] This refers to the actual number of telephone numbers needed to obtain the desired sample size not necessarily the total number of calls made to those telephone numbers (eg. several calls to one telephone number due to busy signals or no one answering is considered calling *one* telephone number).

Table 1. Recent Telephone Survey Information and Response Rates

Authors (year published)	Journal	Who Surveyed	Where Surveyed	Attempted Calls Made	Completed Surveys[1]	Response Rate
Leistritz, et al. (1986)	NCJAE	Farmers	North Dakota	1206[2]	933	77%
Leistritz and Ekstrom (1988)	NCJAE	(1) Farmers and Ranchers;	North Dakota	(1) —	(1) 759	(1) 88%
		(2) Displaced Farm Families[3];		(2) 260	(2) —	(2) —
		(3) Business Operators; and		(3) —	(3) —	(3) 48%
		(4) Community Residents		(4) —	(4) —	(4) —[4]
Lass, et al. (1989)	NJARE	Farm Households	Massachusetts	507	159	31.3%
Cox, et al. (1990)	WJAE	Residents	Honolulu, Hawaii	500	306	—
Kinnucan and Venkateswaran (1990)	SJAE	Households	National (9 US Census Regions)	—	3600	—
Turner, et al. (1990)	SJAE	Residents	Georgia	—	418	—
Zepeda (1990)	WJAE	Milk Producers	California	—	153	86%
Bailey et al. (1991)	SJAE	(1) Extension Specialists and	Both National	—	(1) 50	—
		(2) County Ag Agents		—	(2) 100	—
Kelsey (1991)	NJARE	Family Members of People Killed in Farm Accidents	New York	87	52	60%
Hanemann, et al. (1991)	AJAE	Households	San Joaquin Valley, the rest of California, Oregon, Washington, and Nevada	1,239[5]	1,004	94.9%[5]
McNamara, et al. (1991)	RAE	Peanut Producers	65 Georgia Counties	—	376	—[7]
Baker (1992)	AJAE	Nonfarm Agricultural Businesses	New Mexico	300	—	62%
Lass and Gempesaw (1992)	AJAE	Farm Households	Pennsylvania	—	989	30%
Makus, et al. (1992)	JARE	Potato Producers	Idaho	339	166	—[8]
Whitehead (1992)	SJAE	Households	3-County Region in Kentucky, the Rest of Kentucky & States Adjacent to Kentucky	—	730	—
Davis and Wohlgenant (1993)	AJAE	Households	Washington, D.C., Northern	—	558	—
Jensen, et al. (1993)	RAE	(1) Households and	Both National	(1) —	(1) 1706	(1) —
		(2) Households		(2) —	(2) 1290	(2) —
Koontz and Ward (1993)	JARE	Sheep Producers	Oklahoma	254[9]	252	—
Lin and Milon (1993)	AJAE	Adults	Mid-Atlantic and Southeastern United States	—	—	—
Ozuna, et al. (1993)	AJAE	Households	Texas	—[10]	—	—

[1]This column includes all the surveys where some information was provided by the respondent.
[2]The authors refer to this as the number of farm operators contacted.
[3]Farm operators who stopped their operation, for reasons other than retirement, were contacted. Sixty percent were contacted by phone and the others by mail, of which a combined 169 questionnaires were completed.
[4]The authors only provided a refusal rate of 33%.
[5]Contact was made with 1,960 eligible respondents where 1,239 agreed to participate in the study.
[6]This actually is a cooperation rate as the authors divided the 1,004 completed telephone interviews by the 1,058 respondents who were contacted (54 refused).
[7]The authors only provided a cooperation rate of 89%.
[8]The telephone survey was conducted with respondents who did not answer a mail survey. The authors only report a response rate of 83.6%, which is for the mail and telephone survey combined [(716 + 166)/1055)].
[9]This is the number of eligible respondents.
[10]The telephone survey was used to identify households that traveled to one of three estuaries, then those households were mailed a questionnaire.

also work off-farm (Leistritz, et al.; and Lass, et al.). In each case, the survey respondents may only represent certain groups in the general population because some groups might be over or under sampled which can lead to various biases (Halstead, et al.).

Pennsylvania Dairy Farm Survey

The Pennsylvania Dairy Farm Survey provides an example of how research using data from a telephone survey could be presented. From December 1992 to March 1993, the Pennsylvania Dairy Farm Survey was conducted to assess the economic sustainability of the Commonwealth's dairy farm operations. This data set was used to both create a detailed profile of Pennsylvania dairy farm operations and managers and to assess how proposed policies would affect them.

A list of 12,524 Pennsylvania individuals, who subscribe to farm magazines and journals[2], was acquired from Communications Data Services, Inc. (CDS). The total number of Pennsylvania commercial dairy farms (defined as having 10 or more milk cows) in 1991 was estimated at 13,000 by the Pennsylvania Agricultural Statistics Service (PASS). An examination of the overlap between these lists, as indicated by county counts, suggested that the list from CDS included most Pennsylvania dairy farm owners and managers. For the purposes of this survey, 26 percent (or 3,259) of the listed names were deleted because phone numbers were either incorrect or unlisted, and an additional 13 percent (1,596) were deleted because the total herd size did not meet our selection criteria[3]. The final survey sample included a list of 7,669 potential Pennsylvania dairy farm managers.[4]

The pretest and survey was conducted by TMR, Inc., a tele-marketing research company. The purpose of the pretest was to analyze respondents' answers and identify troublesome questions. As a result of this process, several questions were revised.

The final number of completed surveys was 2,045, which included additional surveying efforts to ensure proper geographical distribution of the respondents. Over 90 percent of the names on the survey sample list were called. Just over one of every six farm managers in Pennsylvania completed this telephone survey.[5]

Table 2. Disposition Table of the Pennsylvania Dairy Farm Survey

Disposition Category		Number of Calls
Contacted But Did Not Complete (CNC)		
Farm Manager Unavailable	176	
Language Problems	12	
Incomplete But Scheduled Call Back Not Needed (INC)*	48	
Scheduled Call Back Not Needed*	454	
Total Contacted But Did Not Complete		690
Refusals (R)		
Initial Refusals (IR)	471	
Terminated Before Survey Complete (did not schedule a call back)	49	
Total Refusals		520
Completed Surveys (C)		2045
Total Eligibles (E)		3255
Ineligibles (I)		
Never Involved in Dairy	489	
Business or Government Phone	72	
Farmed Once But Not Now	437	
Disconnected Phone	573	
Computer Tone	88	
Total Ineligibles		1659
Not Contacted (NC)		
No Answer or Answering Machine	1934	
Phone Busy	141	
Total Not Contacted		2075
Total Number of Phone Numbers Dialed		6989

*The target number of survey respondents in that particular region was reached before the call back contact was made; and therefore, that respondent was not needed to meet the number of completed surveys for that region.

The Disposition Table

Protocols for the conduct of this research, including how many times the telephone would ring before hanging up or how many times a number would be called back for a busy or an unanswered phone, must be set prior to beginning the survey process. Then, the result of each telephone number called is logged, tabulated, and placed into a dis-

[2] Subscribers included farmers, educators, and agricultural administrators, among others.

[3] For our survey sample to be consistent with PASS, a dairy farm was defined as having a herd size of ten or more milk cows, dry and lactating.

[4] We recognize that Old Order Amish and Old Order Mennonite farmers were under represented since most do have access to telephones although an increasing number do place them in their barns.

[5] Preliminary analysis comparing certain variables to the 1987 Agricultural Census (1992 will be used when available) indicated no significant differences.

position table, similar to the one shown in Table 2 (Lavrakas).

The major headings included in the table were Contacted But Did Not Complete (CNC), where an eligible respondent was reached but could not complete the survey at that time; Refusals (R), where an eligible respondent refused to complete the survey; Completed Surveys (C), the number of eligible respondents who completed the survey; Ineligibles (I), where an eligible respondent could not be reached; and Not Contacted (NC), where no one was contacted to determine eligibility. The sum of the first three categories, CNC, R, and C, represents the eligible respondents (E) (Luloff and Ilvento). The eligible respondents are all the numbers dialed where a farm manager either was or could be contacted.

Calculating Telephone Survey Response and Efficiency Rates

The Pennsylvania Dairy Farm Survey also provides examples of how various response and efficiency rates are calculated using numbers from the disposition table in Table 2. The first response rate—38.4 percent—is a gross response rate (RR_1) or simply, the number of completed surveys divided by the total number of calls less the ineligibles (Table 3). The second response rate—62.8 percent—is the basic response rate (RR_2), which is calculated as the number of completed surveys as a percent of all eligible respondents (Nelson, et al.). These two response rates usually indicate the range of possible response rate values.

The variation in response rates is attributable to how the Not Contacted heading is treated in the denominator (Groves and Lyberg). At the extremes, the assumption that all the no contacts are either eligible (or ineligible), and therefore including (or eliminating) them in the denominator, is very restrictive. The gross completion rate and the basic response rate, presented above, illustrates this as the first assumes all the no contacts are eligibles and the second assumes them all to be ineligibles. However, a better assumption would permit the no contact category to be made of both eligibles and ineligibles. Other response rates attempt to weight the Not Contacted heading based on the portions of eligibles and ineligibles identified in the actual telephone survey, or to weight them on the basis of other data in similar telephone surveys.

An example of the former type of response rate is the CASRO estimator proposed by Frankel in a special report for the Council of American Survey Research Organizations (CASRO). This response rate places all phone numbers dialed into two groups—the knowns and the unknowns. The known group contains the eligible and ineligible groups from Table 2, while the Not Contacted heading makes up the unknown group. The CASRO estimator (RR_3) assumes the proportion of eligible to ineligibles in the unknown group to be the same as the proportion of eligible to ineligibles in the known group (Nelson, et al.). The Pennsylvania Dairy Farm Survey response rate using the CASRO estimator was 44.3 percent.

In a paper by Nelson, Vaske, and Luloff, a Modified CASRO Estimator was developed to consider the efficiency of the sample strategy employed. This response rate distinguished between eligible respondents who were and were not reached. The modified CASRO estimator (RR_4) weights a no contact phone call with unknown status less than those numbers which were reached, unlike the original CASRO estimator. As a result, the modified CASRO estimator yields a slightly higher response rate, 46.9 percent, than the original CASRO estimator for the Pennsylvania Dairy Farm Survey.

The data reported in the disposition table (Table 2) also can be used to calculate efficiency rates such as a contact, cooperation, and completion rate (Table 4). The contact rate (ER_1) is the percentage of farm managers actually contacted out of all the eligible respondents (Groves; Groves and Lyberg). The numerator in this case would include Completed Surveys and Refusals. The number of Incomplete Surveys With a Scheduled Call Back (INC) is also included in the numerator because even though these respondents could not finish the survey, they were willing to set up a time (or call back) to complete it. The Scheduled Call Back Not Needed category was not included in the numera-

Table 3. Various Response Rates From the Pennsylvania Dairy Farm Survey

Response Rate Name	Formula	Response Rate
Gross Response Rate	$RR_1 = C / (E + NC)$	38.4%
Basic Response Rate	$RR_2 = C / E$	62.8%
CASRO Estimator	$RR_3 = C / [E (1 + (U / K))]$	44.3%
Modified CASRO Estimator	$RR_4 = C / [E + ((I / C)(E / K) * U)]$	46.9%

Table 4. Various Efficiency Rates From the Pennsylvania Dairy Farm Survey

Efficiency Rate Name	Formula	Response Rate
Contact Rate	$ER_1 = (C + R + INC^*) / E$	80.3%
Cooperation Rate	$ER_2 = C / (C + R + INC^*)$	78.3%
Completion Rate	$ER_3 = C / [C + (R - IR^{**}) + INC^*)$	95.5%

*The only number where a farm manager was contacted in the Contacted But Did Not Complete heading from Table 2 was the Incomplete But Scheduled Call Back Not Needed category.
**This is the number of Initial Refusals from Table 2.

tor because the survey was not started and, therefore, was not considered a contact with a farm manager. Of the 3,255 eligible respondents, the farm managers were contacted 80.3 percent of the time.

The cooperation rate (ER_2) is the percentage of contacted farm managers who finished the survey (Groves; Groves and Lyberg). Once the farm manager was on the phone, 78.3 percent completed the survey. Finally, the completion rate (ER_3) is the percentage of completed surveys once the survey began. In this case, Initial Refusals (IR) would not be included in the denominator because the survey was ended before any questions could be asked. Of the 2,142 farm managers who started the survey, 95.5 percent completed it. These efficiency rates indicate that once the farm manager was reached, there was a very good chance that the survey would be completed.[6]

Conclusion

This paper emphasized the importance of discussing how the telephone survey was conducted, presenting the final disposition table, and explaining how the response and efficiency rates were calculated because increasing numbers of researchers, agricultural economists in particular, are turning to telephone surveys to provide their primary data sources. The literature search identified twenty articles using telephone survey data with none presenting a disposition table and only eight reporting a response rate.

Editors and reviewers should insist that researchers using telephone survey data supply information about the population, sample, and disposition of the sample. According to Dillman, a well written report of survey data should describe, "the population that the sample is intended to represent, indicate the number of potential respondents, explain how the sample was selected, give the exact wording of questions, and provide detailed information on the response rate" (Dillman, 1992:55). This information would allow telephone survey response rates to be easily compared with confidence.

[6] The dairy farm managers were very interested in the topic as 86 percent wanted to receive a copy of the survey results and 85 percent indicated an interest in participating in a detailed follow-up on-farm interview.

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