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Examination of the Effect of the Respondent and Collection Method on Survey Results

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Abstract

Potential problems exist in surveys in which the data collection method is changed during the course of data collection. Problems also exist when the definition of the respondent for a survey is not consistent throughout the survey. This paper looks at data collected in nine States in the 1985 September Crop Integrated Survey Program. No differences were found between data collected by telephone and personal enumeration. Responses obtained from the spouse of the farm operator were significantly different from those obtained from the operator or from other knowledgeable individuals.

Keywords: Respondent bias, Collection method bias

Contents

Summary

There is some evidence of a difference in both the response rates and the contact rates for farm operators, their spouses, and other knowledgeable individuals between personal interviews and telephone interviews. However, since the data examined did not assign farm operations randomly to collection methods, further analysis is needed to confirm this result.

There is also an indication that these contact rates vary considerably from State to State. Although this variation could be the result of differing policy in the several SSOs, there is enough of a geographic variation to suggest that there could be some other underlying influence in addition to policy variations.

The data strongly indicate that responses given by the spouse of the farm operator tend to give smaller acreages and counts of hogs and pigs on the operation, compared with responses given by the farm operator. Both of these results could be due to the likelihood that the spouse would be more familiar with the operation, and hence more likely to be able to report for smaller operations than for larger ones. The data also indicate that for operations which are small in acreage, there is a higher probability that the respondent is the spouse. Unfortunately, it is impossible to determine from the data whether the differences observed are due to the respondent or due to the sampling bias. Since the study by Nealon and Dillard (1984) strongly indicates a bias due to the respondent, and since the estimated land in farm for which this potential bias exists could be as large as 16.5 percent, further research on this point is necessary.

But such research would be operationally difficult to pursue as an integral part of the regular surveys. It would be impractical to interview both the spouse and the farm operator as a regular part of the ongoing survey, or to designate at random whether the desired respondent was the farm operator or the spouse for a selected operation, and to pursue that designated respondent for the data. A possible plan would be to accept responses from the spouse for the main survey but to continue attempts to contact the operator for a period after the end of the regular survey period. These responses could then be paired for analysis as in the Nealon and Dillard study. However, the indications are that such an effort would not achieve an adequate sample size to be conclusive.

Based on the evidence outlined in this paper, I recommend that the agency place a greater emphasis on obtaining responses from the farm operator rather than the spouse of the farm operator. This can be done in telephone surveys with only a minimal increase in operational costs. For example, an examination of timing of CATI contacts to achieve a higher probability of contacting the farm operator is given in Warde (1986). Phraseology of the introductory statement on telephone surveys should be changed to discourage responses from the spouse of the farm operator and encourage providing of information for call backs to contact the farm operator instead. These two changes in current operating procedures should aid in reducing potential response errors made in surveys conducted by the agency and thereby improve the precision of the estimates made from them.

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Introduction

This paper examines the possibility of differences in sample survey response rates and quality of response as a function of the individual contacted. In surveys of farm operations conducted by the National Agricultural Statistical Service (NASS), the respondent is coded as the farm operator, the spouse of the farm operator, or some other knowledgeable individual. It is preferable that the respondent be the farm operator whenever feasible, and it is important to determine whether the answers given by different respondent categories are significantly different in any way. This study, like others, is also concerned with differences in response rate as a result of interviewing technique (telephone or personal) or differences in quality of the responses due to these two interviewing methods.

Review of Literature

The effect of changes in the medium of the interview (telephone versus personal interview) have been examined by a number of researchers. Rogers (1976), for example, found no significant difference in the response rates in her study despite the length of time required to complete the interviews (about 50 minutes). No significant difference in the response rates between the two methods was found by Anesheusel, Frerichs, Clark, and Yokopenic (1982), Hochstim (1967), Groves (1977), Klecka and Tuchfarber (1978), Lucas and Adams (1977), and Wiseman (1972).

Jordan, Marcus, and Reeder (1980) reported a substantial difference in the response rates for telephone and personal interviews. They observed a 29-percent refusal rate in telephone interviews, compared with an 18-percent refusal rate in personal interviews. Siemiatycki (1979) observed refusal rates of 21-percent in telephone interviews versus 12-percent in personal interviews in Los Angeles; and 19-percent refusal on the telephone versus 14-percent refusal to personal interviews in Canada. Cahalan (1960) reported 24-percent refusal to telephone interviews, compared with 11-percent with personal interviews.

Telephone refusal rates have been reported to range from 5.9 percent to 36 percent, with a median refusal rate of about 28 percent (Dillman, Gallegos, and Frey (1976), Frey (1983), Steeh (1981), Wiseman (1972), and Wiseman and McDonald (1979)). Also, several authors have noted that telephone respondents tend to be younger, better educated, and to have higher incomes than those responding to a personal interview (Groves (1977), O'Niel (1979)).

These results were also confirmed by Greenlees, Reece, and Zeischang (1982) whose data indicated that individuals with higher wages and salaries have a smaller probability of response; those interviewed in person were more likely to respond than those interviewed by telephone; older individuals were

less likely to respond than younger individuals; and those with more years of education were less likely to respond than those with fewer years of education. Their data were based on the Consumer Price Survey conducted by the Census Bureau for 1973.

Bushery, Cowan, and Murphy (1978) concluded that telephone interviewing and personal interviewing produced comparable data. They noted a slight (nonsignificant) improvement in the quality of data from personal interviews compared with telephone interviews. Tyebjee (1979) also concluded that data collected by the two methods were equivalent despite some demographic and other differences between the samples obtained.

Jordan, Marcus, and Reeder (1980) commented that the telephone data which they collected were not of as good a quality as that obtained in personal interviews. They noted more missing data on questions about income; more acquiescence, evasiveness, and extreme response bias; and contradictory checklist answers in the telephone responses.

Jordan, Marcus, and Reeder (1978) earlier noted a significantly higher income reported in a personal interview compared with the income reported in telephone interviews. Also, there was a considerable difference in item nonresponse, with income being reported by 88 percent of those contacted using a personal interview compared with 79 percent of those contacted using the telephone. This response difference was highly significant ($z=4.58$). In the variables of interest in this survey, which related to the health of the respondent, they found highly significant differences between the two groups in 6 of 10 items reported. Anesheusel, Frerichs, Clark, and Yokopenic (1982) noted a similar trend with 16.7 percent missing data on income in the telephone interview compared with 8.8 percent missing in the personal interview. However, they found no significant effect due to the method of data collection on their variables of interest: questions about mental depression. Weeks, Kulka, Lessler, and Whitmore (1983), however, noted a methodological bias in two of seven health-related variables.

Shih (1983), in a Florida survey of income, reported a demographic effect on the likelihood of item nonresponse to questions about income in a telephone survey. Female respondents who were the head of the household were more likely to refuse to respond to the survey; this effect was particularly pronounced among widows. Age was also a significant effect, with more item nonresponse among older respondents. Bell (1984) also reported that item nonresponse was higher for the income item among older respondents, and to some degree item nonresponse for income was higher among those who were married. He also noted that race had an effect, with whites less likely to respond than blacks when contacted, although he noted that overall it was easier to make initial contact with whites. Tyebjee (1979) commented that telephone interviewers encountered more resistance to items about income and personal finances, and also noted an interaction between the method of collection and the social desirability of the response elicited.

Groves (1979) reported lower cooperation rates in a telephone survey than in a personal interview. Fewer of those responding on the telephone preferred it as a medium while a majority of those interviewed using a personal interview preferred the face-to-face contact. These findings were also reported in the book by Groves and Kahn (1979). They commented that the respondents to the

telephone interviews reported a higher level of unease in reporting topics related to their income compared with those responding to a personal interview (27.9 percent compared with 15.3 percent); racial attitude (9.2 percent compared with 8.8 percent); income tax returns (14.1 percent compared with 8.6 percent); health (3.0 percent compared with 1.6 percent); their job (3.1 percent compared with 1.9 percent); voting behavior (9.1 percent compared with 8.0 percent); and their political opinions (12.1 percent compared with 8.5 percent). The study was based on 1,365 telephone interviews and 1,348 personal interviews. There were 101 households in which there was no telephone among the latter group.

They also reported that the problem of partial interviews was negligible in the personal interviews but was encountered between 4.2 percent and 5 percent of the time in the telephone interviews. Also, 78 percent of the telephone interviews versus 91 percent of the personal interviews were completed within five calls. However, the telephone interviews were being conducted using the random digit dialing method, and hence more calls could be expected in order to complete a telephone interview than would be expected if a "good" telephone number were originally available.

Numerous authors (Anesheusel, Frerichs, Clark, and Yokopenic (1982), Freeman, Kiecolt, Nicholls, and Shanks (1982), Mulry-Liggan (1983), Tull and Albaum (1977), Tyebjee (1979) and Weeks, Kulka, Lessler, and Whitmore (1983)) have noted the demographic differences between households with and those without telephones, or between those with telephones and the general public. Respondents for those households which had a telephone tended to be better educated, more likely to be white than hispanic or black, to have higher incomes, and to be younger. They were more likely to own or to be buying a home than to be renting, and were less likely to be single. Mulry-Liggan (1983) noted that males were more likely not to have a telephone, while Tull and Albaum (1977) noted that households classified as rural were more likely not to have a telephone: 29.3 percent of those with no telephone were classified as rural compared with 18.4 percent of those with a telephone. Their data were based on the 1970 Census, however, and this difference may well have become considerably smaller since that time.

Bosecker (1977) performed an analysis of the 1976 December Enumerative Survey (DES) for Oklahoma and observed a number of differences in the data when comparisons were made across the respondent. In this study, 76 percent of the responses were from farm operators, 14 percent from the spouse of the farm operator, and 10 percent from other individuals knowledgeable about the operations of the designated farm. Of the 791 operations selected in the sample, 44 refused to respond (5.6 percent), and 31 were classified as inaccessible (3.9 percent). Bosecker noted that operations where the response was obtained from the spouse and those classified as inaccessible tended to be smaller, both in acreage and in number of cattle on that acreage. However, those where a refusal was recorded tended to be larger than the remainder of the survey responses. The data reported for refusals and inaccessibles were, in fact, imputed data. Average farm size and average number of cattle on the operation are summarized in table 1.

Table 1. Summary of data from Bosecker (1977) report

Respondent code	Number of responses	Size of operation	
		Mean acres	Mean total number of cattle
Operator	543	1,007	112
Spouse	98	460	46
Other	75	910	103
Refusal	44	1,925	104
Inaccessible	31	695	42
Total	791	969	100

Nealon and Dillard (1984) reported a nationwide telephone survey in which a comparison was made of the responses between 473 husbands and their wives for six farm characteristics obtained during 1980. The wives had significantly more missing data than their husbands in five of the six characteristics measured. They also had lower mean responses for all six of these characteristics, significantly so for four of them. These four responses were total land, number of beef cattle, farm value, and farm debt. Whenever there was a nonzero response to one of the six characteristics, it was found that the percent of total agreement ranged from 13.3 percent for beef cattle to 40.9 percent for total acres, and that the percentage of agreement to within 10 percent of each other ranged from 21.3 percent for number of hogs and pigs to 64.8 percent for total acres (table 2).

Table 2. Summary of results from Nealon and Dillard (1984)

Farm Characteristic	Percent agreement			Difference (husband - wife)	
	Number of positive respondents	Total agreement	Agreement to within 10% of each other	Relative difference	Significance level
Total acres	455	40.9	64.8	-5.1	<0.01 *
Cropland acres	409	23.7	40.3	-3.2	.17
Beef cattle	225	13.3	24.4	-12.5	<.01 *
Hogs and pigs	108	16.7	21.3	-12.8	.19
Farm value	262	20.6	26.7	-20.5	<.01 *
Farm debt	242	20.7	30.6	-25.9	<.01 *

When the wife was at least occasionally involved in the farm activities related to the characteristic of interest, the responses of the two members of the couple were then very similar for the following three variables: total land, cropland acres, and total number of hogs. However, the answers given were found to be quite disparate for number of beef cattle, farm value, and farm debt. This latter comparison is of most interest for application to NASS surveys since those wives who were at least occasionally involved in the operations of the farm would be the ones most likely to volunteer to provide information when the operator (typically the husband) was unavailable.

Results

In order to examine the incidence of respondent and collection method effects in NASS data, an analysis was performed on the results of the 1985 September Crop Integrated Survey Program (CRISP) in nine States: Georgia, Indiana, Iowa, Kansas, Minnesota, Missouri, Nebraska, North Carolina, and Ohio. The analysis was conducted on data already collected and consequently involved no experimental design to control for outside sources of variation. Thus, a number of the results observed must be interpreted with caution.

There is considerable evidence in the sampling literature of potential biases in survey results due to changes in the method of data collection (personal interviewing versus telephone interviewing) and changes in the respondent (such as from operator to spouse or other knowledgeable individual). The farm operator is the preferred respondent in USDA surveys. However, in order to obtain any data at all, interviewers must often take responses from the spouse or from some other individual knowledgeable of the farm operation. This research was undertaken in order to examine the effects which may be due to collecting data from a respondent other than the farm operator, and also to examine several variables which might affect the probability of contacting the farm operator rather than his spouse or some other knowledgeable individual. For this purpose, the response rate is defined to be the number of completed interviews divided by the number of individuals contacted whereas the contact rate is the number of individuals contacted divided by the number selected to be contacted.

In the 1985 June Enumerative Survey (JES), for example, the farm operator was the contact person for 69 percent of the total agricultural tracts, the spouse for 11 percent, and another knowledgeable person for 13 percent. The farm operator contact rate varied from a low of 57 percent in Colorado to a high of 79 percent in North Carolina. The contact rate for the spouse varied from a low of 6 percent in both North and South Dakota to a high of 18 percent in Michigan and Oregon. For the other knowledgeable individual, the contact rate varied from 6 percent in Iowa to 24 percent in Virginia. Table 3 contains the response summary for the 1985 JES.

Although the rates quoted for the JES are for personal interviews, similar proportions and variations exist for telephone interviews. Table 4 contains summary data from the September CRISP in the nine States examined in this study. This table shows the results for both personal and telephone interviews, although the former was somewhat sparse and was not usable in Kansas. In this study, the farm operator contact rate for personal interviews varied from 67 percent in Indiana and Ohio to 84 percent in Iowa. For telephone interviews, the low was 69 percent in Kansas and Ohio rising to a high of 88 percent in North Carolina.

Table 3. Summary of respondent category for the 1985 area agricultural tracts for the JES

State	Total Ag Tract	Operator		Spouse		Other		Refusal		Inaccessible	
		#	%	#	%	#	%	#	%	#	%
AL	1,003	688	68	138	14	140	14	16	2	21	2
AZ	753	438	59	63	9	145	20	27	4	62	8
AR	1,311	933	71	166	13	143	11	32	2	37	3
CA	3,519	2,092	59	477	14	750	21	65	2	135	4
CO	1,136	644	57	166	14	149	13	76	7	101	9
CT	109	74	68	11	10	23	21	0	0	1	1
DE	329	215	65	48	15	42	13	10	3	14	4
FL	1,573	1,026	65	171	11	278	18	11	1	87	5
GA	988	717	73	82	8	104	11	54	5	31	3
ID	1,317	865	66	170	13	146	11	67	5	69	5
IL	1,644	1,220	74	135	8	138	8	124	8	27	2
IN	1,266	871	69	132	10	126	10	90	7	47	4
IA	1,620	1,264	78	114	7	102	6	115	7	25	2
KS	1,619	1,133	70	138	9	114	7	149	9	85	5
KY	1,679	1,154	69	208	12	225	13	48	3	44	3
LA	757	463	61	72	9	164	22	13	2	45	6
ME	349	237	68	51	15	41	12	4	1	16	4
MD	1,087	697	64	114	10	212	20	18	2	46	4
MA	151	94	62	22	15	22	15	2	1	11	7
MI	1,023	612	60	182	18	137	13	46	5	46	4
MN	1,430	1,061	74	117	8	96	7	112	8	44	3
MS	1,343	950	71	146	11	202	15	27	2	18	1
MO	1,564	1,159	74	140	9	117	7	90	6	58	4
MT	718	537	75	55	8	69	9	49	7	8	1
NB	1,531	1,070	70	130	8	121	8	168	11	42	3
NV	162	101	62	13	8	29	18	4	3	15	9
NH	92	63	69	16	17	13	14	0	0	0	0
NJ	1,108	774	70	131	12	145	13	16	1	42	4
NM	841	572	68	108	13	131	16	12	1	18	2
NY	1,120	720	64	115	10	213	19	26	3	46	4
NC	1,276	1,007	79	87	7	133	10	26	2	23	2
ND	1,278	912	71	74	6	154	12	77	6	61	5
OH	1,251	922	74	118	9	120	10	64	5	27	2
OK	1,639	1,211	74	154	9	119	7	74	5	81	5
OR	1,328	836	63	238	18	189	14	23	2	42	3
PA	1,504	1,035	69	199	13	202	14	35	2	33	2
RI	67	39	58	11	16	10	15	2	3	5	8
SC	966	654	67	65	7	210	22	7	1	30	3
SD	1,114	796	72	70	6	116	10	98	9	34	3
TN	1,484	1,067	72	204	14	176	12	19	1	18	1
TX	3,228	2,320	72	334	10	346	11	12	3	116	4
UT	1,225	798	65	158	13	187	15	14	1	68	6
VT	222	157	71	27	12	32	14	2	1	4	2
VA	1,037	629	60	136	13	246	24	7	1	19	2
WA	1,116	719	64	184	17	134	12	40	4	39	3
WV	899	585	65	146	16	136	15	12	2	20	2
WI	1,364	1,010	74	127	9	145	11	59	4	23	2
WY	461	314	68	47	10	42	9	33	7	25	6
US	54,583	37,455	69	6,010	11	7,034	13	2,175	4	1,909	3

Table 4. Responses by respondent type and refusals to September 1985 CRISP

State	Response Type	Type of respondent: Operator #	Operator %	Spouse #	Spouse %	Other #	Other %	Total responses #	Total responses %*	Refusal #	Refusal %	Survey totals@ #	Survey totals@ %
GA	PI	35	80	1	2	8	18	44	100	5	10	317	91
	TI	202	87	25	11	6	3	233	100	35	13	354	100
IN	PI	71	67	16	15	19	18	106	100	11	9	439	89
	TI	206	80	32	12	19	7	257	100	65	20	493	100
IA	PI	54	84	7	11	3	5	64	100	6	9	574	84
	TI	325	85	44	11	15	4	384	100	120	24	685	100
KS	PI	0	0	0	0	1	100	1	100	0	0	537	88
	TI	249	69	56	15	58	16	363	100	173	32	612	100
MN	PI	64	81	7	9	8	10	79	100	15	16	546	83
	TI	242	78	52	17	16	5	310	100	142	31	654	100
MO	PI	54	83	2	3	9	14	65	100	25	28	330	86
	TI	176	82	28	13	10	5	214	100	26	11	385	100
NB	PI	18	78	2	9	3	13	23	100	12	34	600	87
	TI	320	81	51	13	24	6	395	100	170	30	692	100
NC	PI	39	74	1	2	13	25	53	100	6	10	235	86
	TI	140	88	13	8	7	4	160	100	16	9	272	100
OH	PI	20	67	6	20	4	13	30	100	2	6	339	96
	TI	191	69	69	25	17	6	277	100	30	10	354	100

PI designates personal interview.
TI designates telephone interview.
% Percentages expressed as a function of response type totals. Refusal percentages are expressed as the ratio of response type totals to the sum of response type totals and refusals.
* Percentages may not add to 100 due to round off.
@ Top number is the total data for the State as presented in the table. Bottom number is the total for all responses for that State. Totals differ due to inaccessibles, known zeros, estimates, and mail responses.

Additional data concerning the farm operator contact rate for telephone surveys are provided by the analysis of the Fall Acreage and Production Survey in California, conducted between November 12 and November 28, 1985 (see Pafford (1986) and Warde (1986)). Here, 1,597 interviews were completed using the Computer Assisted Telephone Interviewing (CATI) system: 1,360 (85 percent) were responses from the farm operator, 157 (10 percent) were responses from the spouse and 80 (5 percent) were responses from other knowledgeable individuals. Despite the difference in time frame and methodology between the September CRISP and the Fall Acreage and Production Survey, the farm operator contact rates are comparable.

The distribution of response rates for personal interviews and for telephone interviews tended to be the same in five of the eight States whose data were usable for this comparison. There was a significant difference in the distribution of responses in Georgia, Indiana, and North Carolina as shown by the chi-square tests in table 5. Six States out of the eight in which a valid comparison could be made showed better farm operator contact rates by telephone, but only in Indiana and North Carolina were these differences

statistically significant (For Indiana, z = -2.68, P = .007; for North Carolina, z = -2.40, P = .014). These are indicated by the two-sample z-tests shown in table 5. These differences are at least in part due to the relative ease with which a call back can be made using the telephone compared with the additional expense involved in a personal interview call back (see Weidenhamer (1983) page 38). Also, the assignment of farm operations to be contacted by personal interview or by telephone interview was undoubtedly not made at random by the various State Statistical Offices (SSO).

Table 5. Results of chi-square and z-tests on September 1985 CRISP data

State	Chi-square		z-test for personal - telephone interview					
			Operator		Spouse		Other	
	value	sig	z	P	z	P	z	P
GA	20.88	***	-1.24	0.215	-1.86	0.063	6.71	0.001
IN	10.06	**	-2.68	.007	.95	.342	4.97	.001
IA	.10	n.s.	-.05	.960	-.13	.897	.34	.734
KS	-		-		-		-	
MN	5.19	n.s.	.57	.569	-1.89	.060	2.16	.031
MO	4.65	n.s.	.15	.878	-2.58	.010	3.93	.001
NB	1.96	n.s.	-.33	.741	-.56	.580	1.32	.188
NC	20.50	***	-2.40	.014	-1.90	.057	13.99	.001
OH	2.34	n.s.	-.26	.795	-.52	.603	1.59	.112

- No comparison was made for Kansas due to no data for personal enumeration.
All entries in the chi-square column have 2 degrees of freedom.
Significant chi-square values are as follows:
5% = 5.99; 2.5% = 7.38; 1% = 9.21; 0.5% = 10.6.

Only in Missouri was there a significant difference in the contact rates for the spouse between the two methods, although in Georgia, Minnesota, and North Carolina there is a near significant trend (P=.063, .060, and .057 respectively).

There was a significant difference in the rate of contact for other knowledgeable individuals between personal interviews and telephone interviews in five of the eight States where this comparison could be made. In all cases, there was a larger percentage of "Other" contacts in the personal interview when compared with the telephone interview. This trend held true for the other three States but was not statistically significant for them. This is probably partially attributable to the ease with which another telephone contact can be made, compared with the logistics problems and expense involved in revisiting the farm at a later date in order to conduct a personal interview with the farm operator. Thus, the interviewer may well be more inclined to conduct the interview with a "knowledgeable" individual who is available to them when they visit the farm than to interview that same person when contact is made on the telephone.

In four of the nine States studied, there was a significant difference in the distribution of contacts between those who responded with a completed interview and those who refused. In all nine of the CRISP States, there was a

much higher proportion of refusals for cases where the spouse was the person contacted, even though the the difference was statistically significant only in Indiana, Kansas, Minnesota, and Nebraska. This result reinforces the social science literature on surveys of the general public which was reviewed earlier: female contacts are more likely to refuse. These results are summarized in table 6.

Table 6. Chi-square results comparing overall completion rate and type of respondent

State	Outcome	Type of respondent						Total statistic		Chi-square	P
		Operator		Spouse		Other					
		#	%	#	%	#	%	#	%		
GA	Complete	237	88	26	81	14	93	277	87	1.61	0.45
	Refusal	33	12	6	19	1	7	40	13		
IN	Complete	277	85	48	67	38	95	363	83	18.90	.0001
	Refusal	48	15	24	33	2	5	74	17		
IA	Complete	379	88	51	81	18	95	448	88	3.54	.17
	Refusal	51	12	12	19	1	5	64	12		
KS	Complete	249	86	56	68	59	36	364	68	120.15	.0001
	Refusal	39	14	26	32	103	64	168	32		
MN	Complete	306	73	59	61	24	100	389	72	15.46	.0004
	Refusal	114	27	38	39	0	0	152	28		
MO	Complete	230	87	30	83	19	95	279	87	1.57	.46
	Refusal	34	13	6	17	1	5	41	13		
NB	Complete	338	73	53	52	27	82	418	70	19.45	.0001
	Refusal	127	27	49	48	6	18	182	30		
NC	Complete	179	91	14	88	20	95	213	91	.71	.70
	Refusal	18	9	2	12	1	5	21	9		
OH	Complete	211	91	75	87	21	100	307	91	3.36	.19
	Refusal	21	9	11	13	0	0	32	9		

% Percentages are expressed as column percentages within each State for better comparison between completions and refusals for the three classes of contact.

A review of the refusal rates for the nine States in the study shows an interesting geographic trend. The two Southeastern States, Georgia and North Carolina, have two of the smallest refusal rates: 13 percent and 9 percent, respectively. As one progresses west and north, there is a tendency for the refusal rate to increase to its highest rates in the most Northern and Western States, Kansas (32 percent), Nebraska (30 percent), and Minnesota (28 percent). The main part of this trend is exhibited when the telephone interviews are studied without the personal interview data. However, a similar trend exists in the personal interview data, although the restricted sample sizes here make conclusions based on this data alone unreliable. This trend is also apparent in the JES data where Georgia (5 percent) and North Carolina (2 percent) are relatively low in refusal rate, while Kansas (9 percent), Nebraska (11 percent), and Minnesota (8 percent) are three of the five States having

the highest refusal rates (8 percent or more).

The completion rate by the farm operator appears to be somewhat regional in distribution, as illustrated in table 7. The four regions presented in this table are arbitrary and meant to show geographic regions from the southeast to the northwest. A chi-square contingency table analysis for independence between State and a combination of outcome and type of respondent showed a highly significant effect (chi-square = 782.9, df = 40). Since Kansas performed all of its interviewing by telephone, whereas the other eight States performed some by telephone and some using personal enumeration, a contingency table analysis was performed on the eight States with Kansas eliminated. When Kansas was eliminated, the chi-square became 204.7 with 35 df and was also highly significant.

Table 7. Response and refusal rates by persons contacted for telephone interviews in 9 CRISP States (@)

Region	State	Outcome	Type of respondent: Operator #	Operator %	Spouse #	Spouse %	Other #	Other %	Total #	Total %*
1	GA	Complete	202	75	25	9	6	2	233	86
		Refusal	28	10	6	2	1	-	35	12
	NC	Complete	140	80	13	7	7	4	160	91
		Refusal	13	7	2	1	0	0	15	8
2	IN	Complete	206	64	32	10	19	6	257	80
		Refusal	41	13	22	7	2	1	65	21
	OH	Complete	191	62	69	22	17	6	277	90
		Refusal	19	6	11	4	0	0	30	10
3	IA	Complete	325	73	44	10	15	3	384	86
		Refusal	48	11	12	3	1	-	61	14
	MO	Complete	176	73	28	12	10	4	214	89
		Refusal	21	9	5	2	0	0	26	11
4	KS	Complete	249	47	56	11	58	11	363	69
		Refusal	39	7	26	5	103	19	168	31
	MN	Complete	242	54	52	12	16	4	310	70
		Refusal	105	23	34	8	0	0	139	31
	NB	Complete	320	57	51	9	24	4	395	70
		Refusal	120	21	48	9	2	-	170	30

- indicates a percentage of less than 0.5 percent.
* percentages may not add to 100 due to round off error.
@ Differences between the number of refusals analyzed in table 4 and in table 7 are due to failure to correctly code the variable identifying the contacted individual who refused to provide data.

A comparison of the operator as the respondent and the spouse as the respondent data on the mean acreage and mean number of hogs on the farm (summarized in table 8) showed smaller means for the spouse in all but 5 of the 34 cases. Three of these five were for the hog estimates while two were for the acreages: Minnesota and North Carolina, both using personal interviewing. Only one of these cases, North Carolina hog estimates, occurred when telephone

interviewing was used; some caution should be used in interpreting the personal interview data due to the extremely small sample sizes, especially for the responses made by the spouses of the farm operators. This result confirms to some extent the observations made by Bosecker (1977) in Oklahoma and by Nealon and Dillard (1984).

Table 8. Mean acreages and hog totals for 9 CRISP States

State	Variable	Telephone Interview			Personal Interview		
		Operator	Spouse	Other	Operator	Spouse	Other
GA	Acres	572.9	237.1	962.0	588.4	116.0	906.7
	Hogs	571	209	1111	331	46	1127
	n	202	25	6	35	1	8
	m	195	23	4	34	1	3
IN	Acres	502.1	501.1	578.4	633.0	426.4	1113.7
	Hogs	390	250	617	1736	1923	3246
	n	206	32	19	71	16	19
	m	183	23	14	67	15	12
IA	Acres	406.9	336.9	363.1	442.3	399.3	770.0
	Hogs	455	272	665	995	1195	4865
	n	325	44	15	54	7	3
	m	299	29	13	51	7	2
KS	Acres	1032.9	1032.1	1010.0	*	*	*
	Hogs	705	302	75	*	*	*
	n	249	56	58	0	0	1
	m	230	50	4	0	0	0
MN	Acres	493.6	438.2	456.9	750.0	1143.7	435.6
	Hogs	254	162	225	1302	542	2672
	n	242	52	16	64	7	8
	m	228	41	14	60	3	8
MO	Acres	517.4	224.0	350.0	607.2	*	1004.4
	Hogs	244	71	112	972	*	981
	n	176	28	10	54	2	9
	m	169	23	9	50	0	5
NB	Acres	897.5	565.2	395.7	1382.5	44.0	12.0
	Hogs	433	260	922	6965	175	1996
	n	320	51	24	18	2	3
	m	293	36	15	15	1	2
NC	Acres	532.2	184.2	561.7	541.7	2035.0	1587.6
	Hogs	694	857	424	2320	160	54114
	n	140	13	7	39	1	13
	m	128	9	3	37	1	5
OH	Acres	383.0	246.5	368.4	395.8	153.3	1020.0
	Hogs	260	89	516	1011	367	442
	n	191	69	17	20	6	4
	m	179	36	11	17	6	2

* No data obtained in this category.
n = actual number of responses for contact type and interview type.
m = number of operations reported having nonzero acreage for that contact type and interview type.

Table 9. Telephone responses by operation size and respondent type for September 1985 CRISP

State	Farm Operator Size of farm (acres)									
	1-40		41-80		81-160		161-640		>640	
	#	%	#	%	#	%	#	%	#	%
GA	20	77.9	11	68.8	27	93.1	80	89.9	57	91.9
IN	19	79.1	11	84.9	27	87.1	69	83.1	57	82.6
IA	23	76.7	16	88.9	42	87.5	164	90.6	54	84.4
KS	12	66.7	10	71.4	19	76.0	77	84.6	112	82.4
MN	9	90.0	8	66.7	30	83.3	132	79.5	49	83.1
MO	10	66.7	6	54.6	25	86.2	76	83.5	52	94.6
NB	19	67.9	10	62.5	23	88.5	124	85.5	117	90.7
NC	26	92.9	12	85.7	25	86.2	44	93.6	21	95.5
OH	16	64.0	16	80.0	28	80.0	91	80.5	28	84.9

State	Spouse Size of farm (acres)									
	1-40		41-80		81-160		161-640		>640	
	#	%	#	%	#	%	#	%	#	%
GA	6	23.1	5	31.3	2	6.9	[illegible]	7.9	3	4.8
IN	4	16.7	2	15.4	2	6.5	[illegible]	10.8	6	8.7
IA	5	16.7	2	11.1	5	10.4	11	6.1	6	9.4
KS	6	33.3	4	28.6	6	24.0	17	13.2	22	16.2
MN	1	10.0	2	16.7	5	13.9	27	16.3	6	10.2
MO	2	13.3	5	45.5	3	10.3	13	14.3	0	0
NB	5	17.9	4	25.0	2	7.7	17	11.7	8	6.2
NC	2	7.1	2	14.3	2	6.9	[illegible]	6.4	0	0
OH	8	32.0	4	20.0	6	17.1	15	13.3	3	9.1

State	Other Knowledgeable Individual Size of farm (acres)									
	1-40		41-80		81-160		161-640		>640	
	#	%	#	%	#	%	#	%	#	%
GA	0	0	0	0	0	0	[illegible]	2.2	2	3.2
IN	1	4.2	0	0	2	6.5	[illegible]	6.0	6	8.7
IA	2	6.7	0	0	1	2.1	[illegible]	3.3	4	6.3
KS	0	0	0	0	0	0	[illegible]	2.2	2	1.5
MN	0	0	2	16.7	1	2.8	[illegible]	4.2	4	6.8
MO	3	20.0	0	0	1	3.5	[illegible]	2.2	3	5.5
NB	4	14.3	2	12.5	1	3.9	[illegible]	2.8	4	3.1
NC	0	0	0	0	2	6.9	0	0	1	4.6
OH	1	4.0	0	0	1	2.9	[illegible]	6.2	2	6.1

Percentages are expressed as a function of the total of the responses for the operator, spouse, and other knowledgeable individual within each State and size classification.

There is no consistent trend in the size of the operation between data reported by the farm operator and data reported by another knowledgeable individual. In 20 cases out of 34, smaller figures are reported when the operator is the respondent than when another knowledgeable individual is the

respondent, while the reverse is true in the other 14 cases.

The response rates for the farm operator, spouse, and other knowledgeable individual separated into various classes by size of the farm operation are presented in table 9. The spouse has a greater chance of being the respondent to a USDA survey for the smaller operations (generally those less than 80 acres), and another knowledgeable individual is more likely to be the respondent for the larger operations. In the latter case, this classification of respondent probably represents a paid farm manager.

In order to explore further the potential effect of the differential responses by the spouses, we can study the table 10 response rates by the spouse for telephone interviews in the CRISP, compared with the estimated proportion of land in farm covered by responses from the spouse. This latter value was computed using data from the 1982 Census of Agriculture (1984). To compute this value, the relative response rate by the spouse (number of responses by the spouse divided by the total number of responses) is computed for each of the Census land-in-farm categories. This relative response rate is then multiplied by the percentage of land in farm for that Census category. These products are then summed over the 12 categories to obtain the estimated proportion of land in farm covered by the spouses' response. Only in Kansas is the response rate to the CRISP by the spouse greater than the estimated proportion of land in farm covered by responses from the spouse. However, for six of the nine States, the estimated proportion of land in farm covered by responses from the spouses is significantly smaller than the CRISP response rate for the spouses.

Table 10. Comparison of telephone response rates by spouses of farm operators to estimated proportion of land in farm covered by those responses.

State	Response Rate by spouse for CRISP (%)	Estimated proportion of land in farm covered by spouses' responses (%)	z score	P value (1 tailed)
GA	10.73	6.65	2.50	0.006
IN	12.45	10.41	1.27	.101
IA	11.46	6.17	3.53	.0002
KS	15.43	16.51	-.05	.519
MN	16.77	16.03	.34	.369
MO	13.08	8.59	2.82	.002
NB	12.91	8.74	2.16	.015
NC	8.13	5.86	1.92	.028
OH	24.91	14.61	3.69	.0001

For most States, a personal interview may likely have been conducted whenever there was prior knowledge that the operators were extreme (large) operators. A comparison of strictly the telephone interview situations for the nine States shows five States out of the nine in which the difference between operator-reported acreage and spouse-reported acreage is larger than the difference between operator-reported acreage and the acreage reported by other knowledgeable individuals. Only two States out of the nine exhibited the same contrast for the number of hogs reported. Both Minnesota and

Missouri exhibited the contrast for both acreage and number of hogs reported. Thus, it does not appear that the spouse is consistently better than any "other knowledgeable individual" from the perspective of the values reported for acreage and number of hogs and pigs on the farm operation.

Conclusions

There is some evidence of a difference in both the response rates and the contact rates for farm operators, their spouses, and other knowledgeable individuals between personal interviews and telephone interviews. However, since the data examined did not assign farm operations randomly to collection methods, further analysis is needed to confirm this result.

There is also an indication that these contact rates vary considerably from State to State. Although this variation could be the result of differing policy in the several SSOs, there is enough of a geographic variation to suggest that there could be some other underlying influence in addition to policy variations.

The data strongly indicate that responses given by the spouse of the farm operator tend to give smaller acreages and counts of hogs and pigs on the operation, compared with responses given by the farm operator. Both of these results could be due to the likelihood that the spouse would be more familiar with the operation, and hence more likely to be able to report for smaller operations than for larger ones. The data also indicate that for operations which are small in acreage, there is a higher probability that the respondent is the spouse. Unfortunately, it is impossible to determine from the data whether the differences observed are due to the respondent or due to the sampling bias. Since the study by Nealon and Dillard (1984) strongly indicates a bias due to the respondent, and since the estimated land in farm for which this potential bias exists could be as large as 16.5 percent, further research on this point is necessary.

But such research would be operationally difficult to pursue as an integral part of the regular surveys. It would be impractical to interview both the spouse and the farm operator as a regular part of the ongoing survey, or to designate at random whether the desired respondent was the farm operator or the spouse for a selected operation, and to pursue that designated respondent for the data. A possible plan would be to accept responses from the spouse for the main survey but to continue attempts to contact the operator for a period after the end of the regular survey period. These responses could then be paired for analysis as in the Nealon and Dillard study. However, the indications are that such an effort would not achieve an adequate sample size to be conclusive.

Based on the evidence outlined in this paper, I recommend that the agency place a greater emphasis on obtaining responses from the farm operator rather than the spouse of the farm operator. This can be done in telephone surveys with only a minimal increase in operational costs. For example, an examination of timing of CATI contacts to achieve a higher probability of contacting the farm operator is given in Warde (1986). Phraseology of the introductory statement on telephone surveys should be changed to discourage responses from the spouse of the farm operator and encourage providing of information for call backs to contact the farm operator instead. These two changes in current

operating procedures should aid in reducing potential response errors made in surveys conducted by the agency and thereby improve the precision of the estimates made from them.

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