

USING A MOST KNOWLEDGEABLE RESPONDENT RULE IN A HOUSEHOLD TELEPHONE SURVEY

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1. Introduction

Since 1978 the National Center for Health Statistics (NCHS) has conducted or sponsored a number of telephone survey research studies. The telephone survey has a number of attractive features which have a great deal of appeal to NCHS such as lower data collection costs than the personal interview survey, small design effects, the potential for closer monitoring of data quality, and more rapid turn-around of survey results. Many of the NCHS studies have contrasted the results from telephone surveys with the results obtained from NCHS's ongoing face-to-face National Health Interview Survey (NHIS). Two of the major studies have attempted to duplicate parts of the NHIS in a telephone survey. The first study of the NHIS questionnaire was conducted by the Survey Research Center (SRC) at the University of Michigan [1] in the fourth quarter of 1979 and the second study was conducted by the Bureau of the Census [2] in the first and second quarters of 1984.

One of the most important features of the NHIS that could not be duplicated in a telephone survey was the respondent rule. In the NHIS information is collected on all household members. All persons 17 years old and older who are home at the time of the interview are asked to participate in the interview. Information is obtained from a proxy respondent for all persons under 17 years of age and for other persons who are not present at the time of the interview. The proxy respondent must be 19 years old or older unless no one in the household is that old. To attempt to duplicate this type of group interview in a telephone survey is not practical and any multiple respondent requirement within a household would require a major revision of the NHIS questionnaire. For the study conducted by SRC, two alternative respondent rules were evaluated. Under the first rule the phone answerer was interviewed if they indicated that they were 19 years old or older and were knowledgeable about the health of the members in the household. Under the second respondent rule an adult was randomly selected to respond for all household members. For the study conducted by the Bureau of the Census a "most knowledgeable respondent (MKR)" was identified and interviewed about all household members. This paper presents the study results related to the MKR rule.

2. Selection of a Respondent Rule

A joint NCHS/Census Task Force was set up to plan and design a random digit dialed (RDD) telephone survey using the NHIS questionnaire. One of the main areas of investigation undertaken by the Task Force was the selection of a respondent rule to be used for the RDD study. The five respondent rules which received the most consideration of the NCHS/Census study are listed below along with a brief summary of their advantages and disadvantages.

Rule 1. Selection of One Person Per Household

The appeal of this rule is its simplicity, the short length of the household questionnaire, and

the self response for all adults. Whether these advantages will outweigh the high costs involved with only obtaining information about one person per household is the critical question. A larger design effect will also result from the unequal probabilities of selection. Requiring self response should only slightly reduce the overall response rate.

Rule 2. Selection of One Adult and One Child Per Household

This rule maintains most of the advantages of rule 1 and dampens the design effect due to differential sampling. The per person cost for this rule is also somewhat reduced. This rule tends to truncate the length of the household interview. The major questions of interest are who should respond for children and what response rate can we obtain.

Rule 3. Selection of All Family Members With All Adults Responding for Themselves

The advantage of this rule is the acquisition of the maximum amount of information in each household with a minimum amount of proxy information. The sampling error will depend on how the design effect due to clustering within households is offset by the elimination of the design effect due to weighting. The major questions are about the response rate and the length of the household interview.

Rule 4. Family Informant for All Family Members

This rule has tremendous appeal in terms of cost, response rate, and a short per person interview time for a family style questionnaire. The major question about this rule is the potential for a large proxy response bias.

Rule 5. Selection of All Family Members with Adults Present Responding for Themselves

This rule is probably most like the face-to-face NHIS respondent rule with respect to who is providing information. The rule will slightly increase nonresponse, lengthen the interview relative to rule 4 and reduce the percent of proxy information relative to rule 4.

Upon completion of a preliminary analysis the Task Force recommended that rule 4, a family informant for all family members, be adopted for the Census RDD study. The major reasons for selecting this rule included the comparability with the face-to-face NHIS and the many advantages of this rule given that the proxy information is adequate. Collecting information about everyone in the household has always been done in the NHIS and the Task Force felt that this was a very desirable analytical feature to maintain if at all possible. If the quality of the information collected from proxy respondents is nearly comparable to the information that could be obtained from self respondents, this rule would clearly be the best respondent rule for the telephone NHIS. The Task Force felt that comparing and/or validating self response versus proxy response should receive a high research priority.

A number of research studies on survey respondent rules have been conducted, several of which have focused directly on the NHIS. Nisselson and Woolsey [3] showed that more

chronic conditions were reported by self respondents than proxy respondents in a health survey, but that the opposite was true for bed days. Elinson and Trussel [4] and Cartwright [5] confirmed the first result above although Enterlane and Capt [6] showed almost no difference in self and proxy reporting for selected chronic conditions. In a 1972 study conducted by Census for NCHS [7] the use of an all self respondent rule produced significantly higher levels of reporting for almost all NHIS variables when compared to the current respondent rule of proxy response for those not present at the time of the interview. In two earlier record check studies conducted by NCHS [8,9] it was shown that hospitalizations and chronic conditions are best reported by self, next best by spouses, and worse by children and other relatives. More recent studies by Kolonel, et. al. [10], Marshall, et. al. [11], and Humble, et. al. [12] investigated the reporting of health habits and dietary intakes by spouses. In general, the studies showed that wives only slightly underreport events for husbands while husbands are poorer respondents for wives.

In the 1979 telephone survey conducted by SRC for NCHS [1] Cannell, et. al. reported that proxy respondents reported higher measures for most health variables than for themselves. This result was true for both randomly selected respondents and knowledgeable phone answerers. These results contradict most of the previous face-to-face survey results and no conclusion could be reached about the probable causes of the difference. Two subtle changes were made in the first NHIS telephone survey that might partially explain the results. The first change involved a slightly different formatting of the questionnaire. In the NHIS a few sections are formatted in a "family style" where single global questions are asked for all members of the household. In the SRC study these questions were reformatted so that the questions were asked one person at a time. The second departure from the NHIS procedures was the order of the household roster. In the NHIS the roster is usually ordered head, spouse, and then oldest to youngest. In the SRC study the household respondent was listed first followed by other members of the household. These orderings were used when administering the questionnaire. If a positive learning effect were present, the SRC person style questionnaire could produce higher levels of reporting for others than for the household respondent. This hypothesis about a learning effect is counter to a more popular one that the more a respondent knows about the questionnaire and possible respondent burden the more he or she will underreport events.

The unexpected results from the SRC study had several impacts on the Census NHIS telephone study. A test of the family style and person style questionnaires was incorporated into the study and the roster ordering was designed to be identical to the NHIS face-to-face procedures.

Once a decision was made to have a single household respondent, the only remaining respondent rule issue was to decide which household member should be the respondent. In the SRC study the phone answerer sample produce higher levels of reporting and a slightly higher

response rate than the random respondent sample. The one improvement that the Task Force felt might possibly be made over a knowledgeable phone answerer respondent rule was to select the single most knowledgeable respondent in the household. In selecting the most knowledgeable respondent (MKR) rule for the telephone NHIS study, a number of issues were identified which should, if possible, be addressed by the study.

The issues were:

- 1) What is the best way to identify the MKR?
- 2) How often will the MKR be home on the initial contact and how many callbacks will be needed to reach the MKR?
- 3) What is the effect of the MKR rule on the response rate?
- 4) What is the quality of proxy information provided by the MKR, and
- 5) What are the demographic characteristics of the MKR and those identified as not the MKR?

Even though the members of the Task Force felt that identifying the single MKR in each household might be difficult at the beginning of the interview, it was hoped that the phone answerers who were least knowledgeable would identify someone else who was more knowledgeable for the interview.

3. Methods Used

The sample designed by the Bureau of the Census for the telephone NHIS called for 3,024 households to be interviewed during the survey period. These households were divided into 12 replicates, each consisting of 252 cases in 21 primary sampling units (PSUs), and were selected using the random digit dialing procedure described by Waksberg [13]. One replicate was introduced each week for 12 consecutive weeks and was interviewed for 3 weeks.

To compensate for the exclusion of ineligible units and for nonresponse, respectively, it was decided to use replacement and substitution. A case was replaced by another number from the PSU when the number was dialed and found to be nonresidential (e.g., a business establishment). A case was substituted for if the residential number was dialed, but a respondent refused to be interviewed or could not be interviewed or contacted for other reasons.

There were two types of questionnaires used in the study. The first, a Person-by-Section version, asked all questions in each section about one family member before proceeding to the next family member. The second, a Family/Individual version, asked each question about every family member before proceeding to the next question. Half of the sample was assigned to each version of the questionnaire.

In selecting the MKR for the study, the interviewer identified himself to the phone answerer and proceeded to ask a series of screening questions:

"This survey collects information on the nation's health. I would like to speak to someone in the household who is at least 19 years old and knows the MOST about the health of the people in this family. Are you the most knowledgeable person?"

If the phone answerer was not the MKR, he was asked:

"May I speak to someone at least 19 years old

and who knows the MOST about the health of people in the family?"

Once identified, the MKR was called to the phone or a callback was scheduled. When the MKR was finally reached, the interviewer continued:

"Hello I'm (name) from the United States Bureau of the Census in Washington, D.C. We are conducting a health survey for the United States Public Health Service. I was told that you would know the MOST about the health of the people in the family."

To further assess the ability of the phone answerer to identify the MKR, the respondent was asked a series of questions at the end of the interview:

"Now that you have heard the type of questions we ask in a health study, do you feel YOU ARE the person in your family who knows the most about the health of the family members?"

If yes, ask:

"Is there anyone else in the family who would know EQUALLY as much about the health of the family members? If so, who would that person be? Anyone else?"

If no is response to first question, ask:

"Is there anyone in the family who would know MORE about the health of the family members? If so, who would that person be? Anyone else?"

One analysis that was conducted was an evaluation of the demographic characteristics of respondents who were classified at the end of interview as being most knowledgeable, equally knowledgeable, or not the most knowledgeable respondent.

The effort required to reach the MKR was partially analyzed by examining the proportion of time the MKR was called to the phone, the number of callbacks necessary to reach the MKR, and the proportion of time the phone answerer had difficulty identifying the MKR. We hypothesized that the MKR would often be the phone answerer or someone else at home at the time of the initial contact. This is supported by other studies which have independently shown that wives are better proxy respondents and females usually answer the telephone in RDD surveys.

Another objective of the study was to determine the expected response rates for the telephone component of the NHIS. These rates were computed by replicate and questionnaire versions and compared to the rates obtained from other RDD health surveys. The effect of the MKR rule, specifically, on response rates was measured by the number of times the phone answerer refused to call the MKR to the phone and by the proportion of time the MKR was reached and an interview obtained when callbacks were required.

To partially evaluate the quality of proxy information provided, the respondent was asked at the end of the interview to rate his responses overall for each family member as very accurate, fairly accurate, or not very accurate. The response to this question was crosstabulated with the respondent's claim to be most knowledgeable, equally as knowledgeable, or not most knowledgeable about the health of the family members at the end of the interview. It was thought that there might be some difference in the level of reporting of health events for self

reports (i.e., response for themselves) versus proxy reports (i.e., response for other family members). A higher level of reporting for the MKR than for respondents who were not most knowledgeable was also hypothesized. In addition reinterviews were planned with proxy respondents to further assess the accuracy of the information provided by the respondent. However, this activity was deleted from the study due to cost and operational considerations.

4. Results and Conclusions

Data was collected for approximately 7450 persons in 2800 responding households. An overall response rate of 79 percent was achieved, although a response rate of 85 percent was obtained in the last 3 replicates of the study. Basic demographic characteristics of household members was collected along with such health topics as disability days, physician and dental visits, acute and chronic conditions, and short-stay hospitalizations. A final sample of 1621 respondents was obtained for the MKR rule analysis by deleting incomplete household interviews, substitute cases, respondents less than 17 years of age, and one person households.

The number and percentage of respondents and sampled persons in the multiple person households by age and sex are shown in Table 1. By letting the total 17 years and older sample approximate the eligible respondent sample, Table 1 shows that a much higher proportion of females (65.7 vs 49.2) and smaller portion of persons 17-24 years of age (11.2 vs 17.2) were actual household respondents. These are the two demographic subdomains that are suspected to be most and least knowledgeable about the health of all household members.

Based on the initial screening question, the phone answerer claimed to be the MKR 92 percent of the time, the MKR was called to the telephone 4 percent of the time, and 4 percent of the initial contacts required callbacks to reach the MKR or obtain a completed interview. This result along with discussions with the interviewers suggest that the telephone answerers had little difficulty in identifying the MKR. A somewhat different perception was obtained, however, when the results of the post interview questions were examined. Table 2 shows that 8 percent of the original MKR said they were not the MKR at the end of the interview. A slightly higher percent (12) of persons called to the telephone as the MKR said they were not the MKR at the end of the interview. This suggests that the phone answerer should be given more information about the survey during the introduction to more accurately identify the MKR. Another interesting finding shown in Table 2 is the large percentage (63) of respondents who indicated someone else in the household was equally knowledgeable.

Table 3 presents the age and sex distribution of the originally identified MKRs by their self classification at the end of the interview. Again the results conform to the hypothesis that young persons and males are more likely not to be the MKR. A higher percentage of these subdomains indicate that they were not the MKR at the end of the interview. We conclude from this analysis that the study was only partially successful in screening out the less knowledgeable respondents

in the survey introduction. Some evidence that indicates the study may have screened out some of the less knowledgeable respondents is a comparison of the demographic characteristics of phone answerers who were MKR and MKRs who were called to the phone. Table 4 shows that MKRs called to the phone were less likely to be under 24 years of age and over 65 years of age. It appears that some persons in the age groups suspected to be less knowledgeable were screened out.

For the assessment of the impact of the MKR rule on the response rate we first looked at the number of refusals to call the MKR to the telephone. Although the tabulated results are not as precise as we would like, it appears that there were no problems associated with having the phone answerer ask the MKR to the telephone. No analysis was done on the refusal rate for MKRs who were called to the phone during the initial household contact.

There is evidence to show that callbacks to reach the MKR had a major impact on the refusal rate. In a report by Roman [14] the refusal rate for scheduled callbacks to reach the MKR resulted in a refusal rate 5 times as large as the initial refusal rate. A second stage refusal rate of 60 percent is alarming, even though the impact was small on the overall survey refusal rate because of the small number of followback cases. One possible explanation for such a large refusal rate is the overall inexperience of the interviewers.

The quality of the information provided by the respondent is presented in Tables 5 - 8. In Table 5 the post survey self assessed degree of accuracy of information provided is crossed with the post survey self assessed MKR status. The results show that the most or equally knowledgeable respondents were less likely to indicate their accuracy of reporting as fairly good or not very good than the respondents who said they were not the MKR. It is interesting to note, however, that over 80 percent of all respondents said they provided very accurate information. In Table 6, the self assessment of accuracy is compared for self responses and proxy responses. As expected, respondents felt they were more accurate reporting for themselves than for others, although the differences were not large.

Using more substantive survey results, an analysis was conducted to compare the reporting of health events for self and proxies. These results were then compared to the results from the 1979 SRC study. In the survey conducted by Census higher levels of reporting were obtained from self responses than from proxy responses. This conforms to all of the earlier self and proxy results [7-9] for the NHIS. For the SRC comparison, data collected using a knowledgeable phone answerer were used. As indicated earlier the SRC study generally produced higher levels of reporting from proxies than from self responses. This suggests that the ordering of the household roster does have an impact on reporting and a learning effect may be present. That is, answering questions for the first listed household member may aid the respondent in providing better information for others. The overall levels of reporting health events appears

to be about the same for the two surveys.

Table 8 presents the reporting of health events for self and proxy status by MKR status. Some of the results confirm what might be generally expected: MKRs have higher levels of reporting than do equally and less knowledgeable respondents; and MKRs and equally knowledgeable respondents have higher levels of reporting for themselves than for other members of the household. One of the surprising results, however, was that the less knowledgeable respondents have higher reporting for proxies than for themselves for most of the health characteristics. The only explanation we have for this result is that one of the reasons a person may say they are less knowledgeable is that they have fewer health problems than do other members of the household. The relationships shown in Table 8 need further research.

The conclusions that have been drawn from this research study are listed below.

- 1) A MKR can readily be identified by the phone answerer, usually themselves.
- 2) Very little extra effort or cost is required for using a MKR rule in a telephone survey.
- 3) The response rate for scheduled callbacks to reach the MKR is a major problem.
- 4) The MKRs are more likely to be female and middle aged adults.
- 5) A simple screening question is not likely to identify all MKRs. It does appear that some of the less knowledgeable phone answerers can be identified.
- 6) A simple self assessment of accuracy question may not be possible.
- 7) The relationship between levels of reporting health events for self and proxies is similar to earlier NHIS results.
- 8) The MKR rule appears to work, although a MKR at home at the time of the initial contact may be a better alternative.
- 9) More research is needed on the validity of self and proxy responses.

5. References

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TABLE 1. PERCENT DISTRIBUTION FOR DEMOGRAPHIC CHARACTERISTICS OF ALL RESPONDENTS AND ALL SAMPLED PERSONS IN MULTIPLE PERSON HOUSEHOLDS

Age and Sex	Respondents		Total Sample			
	Number	Percent	17+ years		All persons	
			Number	Percent	Number	Percent
< 17 years	0	0.0	0	0.0	1334	26.4
17-24 years	182	11.2	640	17.2	640	12.7
25-44 years	776	47.9	1562	42.0	1562	30.9
45-64 years	460	28.4	975	26.2	975	19.3
65+ years	196	12.1	434	11.7	434	8.6
Unknown	7	.4	107	2.9	107	2.1
Male	540	33.3	1769	47.6	2439	48.3
Female	1065	65.7	1830	49.2	2474	49.0
Unknown	16	1.0	119	3.2	139	2.7
All Persons	1621	100.0	3718	100.00	5052	100.0

TABLE 2. POST INTERVIEW EVALUATION OF MKR

Screening Questions	Post Survey Question		
	MKR	EQUALLY KR	NOT MKR
Phone Answerer Was MKR	29	63	8
Correct Person Called to Phone	31	57	12

Table 3. AGE AND SEX DISTRIBUTIONS OF RESPONDENTS BY POST INTERVIEW CLASSIFICATION

Age and Sex	Classification		
	MKR	Equally KR	Not MKR
17-24	19	67	14
25-44	32	59	9
45-64	28	65	6
65+	29	65	6
Unknown	29	57	14
Male	14	68	18
Female	37	60	3
Unknown	47	53	0

TABLE 4: PERCENT DISTRIBUTION FOR DEMOGRAPHIC CHARACTERISTICS OF RESPONDENTS BY TELEPHONE - ANSWERING DISPOSITION

Age and Sex	Phone Answerer was MKR		Correct Person Called to Phone	
	Number	Percent	Number	Percent
17-24 years	168	11.3	5	8.1
25-44 years	700	47.0	38	61.3
45-64 years	427	28.7	14	22.5
65+ years	186	12.5	5	8.1
Unknown	7	0.5	0	0.0
Male	498	33.5	20	32.3
Female	974	65.4	42	67.7
Unknown	16	1.1	0	0.0

TABLE 5. ACCURACY OF INFORMATION REPORTED BY POST INTERVIEW CLASSIFICATION OF RESPONDENT

Accuracy	MKR	Equally KR	Not MKR
Very	83	88	70
Fairly/not very	17	12	26
Unknown	0	0	4

TABLE 6. ACCURACY OF INFORMATION BY SELF-PROXY RESPONSE IN 2+ PERSON HOUSEHOLDS

Accuracy	Self	Proxy
Very	85	77
Fairly/not very	15	19
Unknown	--	4

TABLE 7. REPORTING OF HEALTH EVENTS FOR SELF AND PROXIES (17+) FOR CENSUS AND SRC STUDIES

Event	Census		SRC	
	Self	Proxy	Self	Proxy
Two Week Recall	(rate per 100 persons per quarter)			
Bed Days	169	169	143	226
Work Loss Days	189	137	162	228
Cut Down Days	195	169	264	241
Doctor Visits	189	130	143	150
Twelve Month Recall	(percent with at least 1)			
Hospitalizations	13	10	15	12
Doctor Visits	74	62	78	68

TABLE 8. REPORTING OF HEALTH EVENTS (17+) BY POST SURVEY CLASSIFICATION OF RESPONDENT

Event	MKR			EK			NMK		
	All	Self	Proxy	All	Self	Proxy	All	Self	Proxy
Two Week Recall	(rate per 100 persons per quarter)								
Bed Days	236	242	231	139	152	129	155	137	167
Work Loss Days	134	136	132	169	214	138	126	171	90
Cut Down Days	265	248	278	181	190	173	224	144	279
Doctor Visits	167	207	136	146	186	113	137	103	162
Twelve Month Recall	(percent with at least 1)								
Hospitalizations	11.7	7.3	6.5	10.6	5.2	5.4	10.1	2.8	7.3
Doctor Visits	70.5	33.9	36.6	66.0	31.4	34.6	66.6	26.5	40.1