

AN EXPERIMENT TO MEASURE THE EFFECTS OF RESPONDENT RULES
ON HEALTH SURVEY RESPONSES

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1. Introduction

The increasing costs of survey research have prompted designers to show greater concern between errors and cost. One method of decreasing sampling error with negligible increases in costs has been the use of household or family informants to report information both about themselves and all other members in the unit. Generally, however, the clustering of additional sample persons in the same households as the informant produces increases in design effects. These losses generally do not outweigh the gains in numbers of persons. The decrease in sampling variance, however, is often combined with an increase in response errors, since informants may not report as accurately for others as they do for themselves.

This paper addresses the relationships between survey error and the respondent rule chosen for the survey. A review of the literature on response error for different respondent rules is also presented. The emphasis of the paper is a presentation of findings of a telephone survey experiment designed to investigate various aspects of self and proxy responses. Two different comparisons are presented, one that most closely resembles a previous self-proxy response experiment conducted as part of the Health Interview Survey of the National Center for Health Statistics and one that contrasts self responses from a randomly selected adult and his/her responses about all other adults in the family.

2. Response Error Differences in Self and Proxy Reporting

A review of the literature concerning validity of reporting generally supports two findings: (1) there is net underreporting in the Health Interview Survey and (2) self reports are more accurate than proxy reports. However, a number of these studies are plagued by problems of inference due to their unusual samples.

Many of the earlier studies comparing self reporting to proxy reporting utilized hospital and doctor records to determine the degree to which these events were underreported. The first of these studies focused on reporting of hospitalizations (Cannell, *et al.*, 1965). A probability sample of persons with one or more

hospitalizations between April 1, 1958 and March 31, 1959 from 21 hospitals was selected and their families interviewed using standard Health Interview Survey procedures. (All adults who were home at the time of the interview reported for themselves.) Cannell reported that approximately 58% of adults were self reporters, 75% of the women and 25% of the men. The underreporting rate for proxy reports was twice that of self reports (14% as compared to 7%).

A second study of hospitalizations employed three different survey techniques designed to reduce the rate of underreporting (Cannell and Fowler, 1965) The three techniques were: a) control (similar to HIS); b) experimental interview with follow-up questionnaire; and c) self-administered questionnaire. Underreporting rates were lowest for the experimental questionnaire (9%) as compared to the control (17%) and self-administered (16%) questionnaires. Although self reports were more accurate in both the control and self-administered interviews, there was no difference between self and proxy reports in the experimental interview.

The studies of hospital reporting concluded that self reports were generally more accurate than reports by proxies. To investigate whether these findings were applicable to other health measures, a study of reporting visits to doctors was conducted (Cannell and Fowler, 1963). The sample was based on out-patient clinic records of Metropolitan Hospital in Detroit. A high proportion of non-whites (50%) and a concentration of persons in middle income and education categories in the sample restrict the degree to which inferences about the HIS population can be made.

More accurate reporting by self respondents did not occur in this study. Underreporting, ranged from 30% (self reports) to 34% (proxy reports) when only the single question used in HIS at that time was asked. additional probes were added to the HIS question, the underreporting rate was reduced to 25% for both self and proxy reports. (These additional probes are now part of the standard HIS schedule.)

More recent studies also support the finding that health events are consistently underreported. A comparison of the number of chronic conditions reported in an interview with

the records obtained from a Kaiser Foundation Health Plan, revealed a 12% net underreporting rate (Madow, 1973).

3. Research Design

A telephone survey adaptation of significant portions of the Health Interview Survey was conducted by the Survey Research Center in the Fall of 1979. The focus of the study was 1) to provide data for comparison with the Health Interview Survey face-to-face interview, and 2) to explore several models of telephone interviewing. The sample was divided into three replicates introduced at the beginning of October, November, and December. Each was a two-stage stratified sample of randomly generated telephone numbers, following that of Waksberg (1978). Data on 8210 persons were obtained, (4,400 cooperating families) for a response rate of 80%, including unanswered numbers in the denominator of the response rate.

In all households, one person from each family acted as a reporter on the health status of all adult family members. As part of a study of relative response errors using different respondent rules, two alternative procedures were used. In the random respondent half-sample a household listing was taken from the person who answered the telephone. One respondent from among those 17 years or older was then selected using procedures similar to those of Kish (1949). In the knowledgeable adult half-sample any adult answering the telephone who judged themselves capable of answering the health questions did so for their own family. In addition, families were assigned to one of two interviewing methods ("control", modeled after the Census interviewers' behavior and "experimental", including several standardized experimental interviewing techniques) and to one of two questionnaire types (a computer-based telephone interviewing system and a standard paper and pencil questionnaire).

4. A Comparison of Telephone and Personal Self-Proxy Experiments

A special study, designed to measure the effect of proxy respondents on national statistics, was conducted by the National Health Interview Survey during the spring of 1972 (Kovar and Wright, 1973). Since this is the only study (known to the authors) which uses the HIS sampling procedures and contrasts self-proxy reports, it provides a good comparison with our telephone survey experiment.

The HIS experiment utilized alternative respondent rules during the second quarter of 1972. A control sample of households was interviewed using the standard respondent rule, a

rule which permitted any adult family member to report for all other family members who were absent. Adults who were home at the time of the interview were encouraged to report for themselves. This rule resulted in approximately 67% of adults aged 19 or older reporting for themselves. For the households assigned to the experimental group, 96% of the adults were self respondents. Proxy respondents were still used for all children and adults for whom it was impossible to obtain a self report. Interviewing under alternative respondent rules varied throughout the sample period, to minimize differences which may occur in health conditions and medical care utilization due to seasonality.

Given the findings from the studies which employed record checks, it was hypothesized that the self-respondent rule would yield higher rates of illness and medical utilization than the standard interviewing procedure. As noted above, due to large rates of underreporting, higher rates of reporting health events are understood to represent more accurate responses. A trend towards more reporting by self respondents is evident for eight of the ten health measures analyzed by Kovar and Wright, six of which are significant using a one-tailed test.

The use of two respondent rules in the telephone implementation of HIS permits a comparison of response differences for the telephone sample similar to Kovar and Wright's. As described above, interviews in half of the sampled households were conducted with randomly chosen respondents, the remaining interviews were conducted with a "knowledgeable" phone answerer. Since the random respondents are all self reporters by definition, they provide estimates similar to Kovar and Wright's self-respondent rule. (In 94 families, the random respondent was unable to be interviewed; the interview was conducted with a knowledgeable adult family member. These interviews are eliminated from this analysis but cause no change

in results when included in the analysis.) Of all respondent rules used, the knowledgeable phone answerer reporting for all family members best replicates the HIS standard interviewing procedures. Approximately 55% of adults were self reporters in this later sample. This is to be compared with 67% self respondents in the standard HIS rule. The difference arises because of the restriction of one self respondent per family in each respondent rule used in the telephone survey.

The results of both the personal interview and telephone interview experiments are presented in Table 1. For all but three variables in the

telephone sample, activity limitations, 12 month doctors visits, and chronic conditions the standard rule resulted in higher rates than those reports taken from only self-reporters. A two tailed test of significance, however, shows that for most variables the differences are insignificant. This of itself is an important finding since most of the previous studies concluded that self reporters were better than proxy reports. The comparison between the personal and telephone interviews is quite contradictory. Whereas in the personal interviews self reporting resulted in a rather consistent trend toward "better" reporting, the opposite finding, that better reporting occurs when using the standard procedures, appears to be the trend for telephone interviews.

There are a number of issues which affect the comparison of the HIS and SRC samples. The first of these deals with the quarter during which the respective experiments were conducted. As seen in Table 1, the rates for the SRC sample tend to be higher than those of the HIS sample, especially for "two week events". In part, this is due to the greater number of illnesses which occur during the fourth quarter (October - December). However, this seasonal difference probably does not affect the comparison of self and standard

respondent rules within each study.

Another difference concerns the population of inference in the two studies. The SRC study was limited to households with telephones and collected information only on adults in the household. Proxy respondents for children under age 17 were used in both samples of the HIS design. Proxy reports for children have been shown to be better than proxy reports for adults, but are still poorer than adult self reports (Cannell, *et al.*, 1965)). The inclusion of proxied children in both respondent rules of the HIS sample probably reduces the magnitude of the self / standard differences found by Kovar and Wright.

The demographic characteristics of self reporters in each sample is the final issue which may affect the comparison. The proportion of male self reporters is approximately the same for both modes under each respondent rule. However, under the standard respondent rules, there is a large difference in the proportion of women self reporters for each of the studies. The 18 point difference in the percent female self reports under the comparable standard HIS and knowledgeable phone answerer samples may affect the comparison.

5. Self-Proxy Differences under the Random Respondent Rule

Some of our criticism of the past

Table 1. Comparison of SRC^a and HIS Samples Means for Self Respondent and Standard Respondent Rules

Variable	Self Respondent Rule ^b		Standard Respondent Rule ^c		Percent Differences ^d	
	HIS	SRC	HIS	SRC	HIS	SRC
1. Two Week Recall: (Rates per 100 people per quarter)						
Days in Bed	141.1	110.5	148.9	161.9	-5.2*	-31.7*
Lost from Work	140.7	101.4	117.6	167.1	19.6*	-39.3*
Out Down Days	(e)	178.1	(e)	246.4	(e)	-27.7
Total Restricted Activity	404.3	(e)	377.4	(e)	7.1*	(e)
Doctor Visits (Person Section)	(e)	124.2	(e)	149.5	(e)	-16.9
Doctor Visits (Supplements)	128.9	146.9	114.8	172.3	12.3*	-14.7
Dental Visits	36.4	51.4	38.3	55.9	-5.0*	-8.1
Acute Conditions	47.9	104.7	42.6	113.8	12.4*	-8.0
2. 12 Month Recall: (Rates per 100 people per year)						
Hospitalizations	14.7	15.6	13.8	16.9	6.5	-7.7
3. 12 Month Recall (Percentage with):						
Activity Limitation	13.6	21.5	12.4	20.2	9.7*	6.4
Mobility Limitation	3.6	(e)	3.1	(e)	16.1*	(e)
Doctor Visits	73.6	74.1	72.0	72.3	2.2	2.5
Chronic Conditions	(e)	31.1	(e)	29.2	(e)	6.5
approximate n	15,178	1068	18,145	2099		

^aSRC columns based on "control" questionnaire data only.

^bSelf Respondents: HIS "self-respondent" rule consists of self reports for all but 4% of adults but includes proxy reporting for all children. SRC column presents weighted values for random adult respondents (100% self reporters) where, weight = (number of eligible adults in family) / (number of telephone numbers).

^cStandard respondents: HIS standard respondent rule has 67% self reporters among adults and proxy reporting for all children. SRC column reports results for phone answerer rule where 55% of the adults were self reporters and children are excluded. SRC data weighted to adjust for the number of telephone numbers in the household, weight = (1 / number of telephone numbers).

^dDifference = [(Self - Standard)/Standard] * 100

^eNot Presented

* Significant difference at .05 level, using standard errors reflecting the complexity of the sample design.

literature focused on the confounding of response errors with different expected values between the self and proxy respondents. Generally the self respondents were those who were present in the housing unit at the time of first contact. Those who were not present are reported on by others. The typical finding in such a design is that the percentage of females who are self-respondents exceeds significantly the percentage of males who are self-respondents. One part of the telephone survey design employed a respondent rule that permitted the random assignment of sets of respondents with equivalent expected values on measurements to self or proxy respondent rules. It is important to note both the power and the limitation of such a design for the investigation of self-proxy differences. The design purifies the group who respond for themselves, since they are randomly selected within the household. The proxy reporting under the rule, however, is provided by the same respondent for all others in the household. For this reason, the self-proxy differences obtained are those expected from the entire population of persons in multi person families. In

contrast the proxy responses of prior comparisons are those expected from persons likely to be home when the interviewer is about those absent from the household.

Table 2 presents the results of the self-proxy comparison for the random respondent rule. Columns 2 and 3 should have the same expected values (because of the random designation of the respondent) unless differential response or nonresponse errors are present. The trend in the comparison is clear; in contrast to the hypothesis generated from previous work, proxy reporting produces more health events than self reporting for most of the measures presented. Approximately half of the measures with higher proxy reporting would be judged statistically significant in separate tests.

6. Summary, Speculations, Conclusions

Some of these results are so contradictory to the beliefs dominant among survey researchers and to the weight of the previous findings, that some speculation about causes of the differences is needed. There are several differences between the administration of this survey and others which address the self-proxy difference.

Table 2. Self-Proxy Differences for the Random Respondent Rule^a

Variable	Self Respondents		Persons With Proxy Reports	Difference ^b
	1 Person Families	2+ Person Families		
1. Two Week Recall (Rates per 100 people per quarter)				
Bed Days	182.7	102.1	226.9	-124.8 [*]
Work Loss Days	162.5	137.8	199.6	-61.8
Cut Down Days	256.1	219.7	289.3	-69.6
Doctor Visits (Person Section)	155.4	124.8	168.4	-43.6 [*]
Doctor Visits (Supplements)	175.5	143.7	168.4	-24.7 _a
Dental Visits	64.4	50.1	67.6	-17.5 _a
Acute Conditions	137.8	98.2	119.0	-20.8 [*]
2. 12 Month Recall (Rates per 100 people per year)				
Hospitalizations	16.4	15.6	15.2	+0.4
3. Two Week Recall (Percentages with at least one)				
Bed Days	8.0	5.3	9.9	-4.6 [*]
Work Loss Days	7.8	5.7	7.5	-1.8 [*]
Cut Down Days	9.3	8.5	9.5	-1.0
Doctor Visits (Person Section)	17.4	14.4	16.1	-1.7
Doctor Visits (Supplements)	19.8	15.2	17.2	-2.0 _a
Dental Visits	6.9	6.2	8.1	-1.9 _a
Acute Conditions	17.8	13.3	17.0	-3.7 [*]
4. 12 Month Recall (Percentages with at least one)				
Chronic Conditions	37.4	33.7	29.6	+4.1 [*]
Hospitalizations	11.5	13.0	11.8	+1.2
Doctor Visits	76.9	75.7	73.2	+2.5
approximate n	734	1345	1795	3140

^aEstimates adjusted for the existence of multiple telephone numbers in a household and the unequal chance of selection as the "random respondent." For random respondents, weight = [(number of eligible adults in family) / (number of telephone numbers)]. For persons with proxy reports, weight = [(number of eligible adults in family - 1) / (number of eligible adults in family)] [1/(number of telephone numbers)]. Estimates based on both the control and experimental questionnaire data.

^bDifference = (Self respondents in 2+ families) - (persons with proxy reports).

^{*}Significant difference at .05 level, using standard errors reflecting the complexity of sample design.

- 1) The medium of data collection was the telephone in this study, rather than personal interviews in past studies. Others have speculated that response errors may be greater in telephone surveys than in personal interview surveys (Woltman, et al., 1980). However, this would not yield an hypothesis of better proxy than self response.
- 2) The only reasoning supporting improved proxy reporting uses a social desirability hypothesis -- that some respondents (perhaps men more than women) feel social pressure not to reveal health problems to others. We have no way to test this hypothesis, but it implies improved proxy reporting over self responses.
- 3) As noted earlier, studies differ in the nature of the self and proxy respondent groups. Because this survey was conducted by telephone, it was judged too problematic to attempt separate interviews with each adult family member. Thus, in the vast majority of cases there is only one self respondent per family in this study, but not necessarily in past studies. This difference could produce discrepancies between our results in the knowledgeable phone answerer group and past studies. The differences would be manifested either if 1) the magnitude of event reporting by self respondents for the knowledgeable phone answerer was lower than the average of all those present, or 2) the magnitude of event reporting about proxied persons was higher for the telephone answerer than for others present.
- 4) The format of the instrument was different in this study than in HIS. In the HIS personal interview, some questions are asked about all members of the household at once (e.g. "During the past two weeks did anyone in the family go to a dentist?"); others are asked about each family member in sequence before going on to the next question (e.g. "During those 2 weeks, did ___ stay in bed because of any illness or injury?"). In such a design the referent person changes very quickly, and there may be some tendency to fail to report events for those absent. In our design, all core questions are asked about each family member individually. This may promote increased attention and a tendency to recall events experienced by other family members.
- 5) The interviewing procedures in this survey differed from those of past work. Half of the sample households were assigned to an interviewing

procedure that specified instructions to the respondent about questions (e.g. We'd like to get as exact a number as possible on this question.) and feedback after the response (e.g., "That's the kind of information we want.") The features were added to test the effects of the techniques on respondent motivation. The other half sample omitted these features but probably restricted interview behavior more than previous studies. With such controls it is possible that proxy reporting is improved over that in past studies. The possible lower recall error for proxied cases would diminish self-proxy reporting differences, but not necessarily increase levels of proxy reporting higher than those of self reports.

- 6) The quarter during which interviews were conducted may have an effect on the results. The period from October until December is one with a marked increase in health events. Previous studies have shown that underreporting decreased with an increase in the number of chronic and acute conditions reported. The heightened awareness of illness during the fourth quarter may have resulted in greater reporting for other family members.

There are, therefore, a variety of hypotheses which would explain the effects observed in this study, but few are testable without the presence of validating data. The use of the random respondent rule comparisons, we believe, most properly isolates the effect of self vs. proxy reporting for the adult household population. We would cite those results for estimates of reporting errors solely attributable to self or proxy reporting. It is unlikely, however, that a survey collecting data on all family members would use a randomly chosen person to report for the whole family. The knowledgeable phone answerer rule is a more typical design because it used informants of the kind to be found in practical applications of a family informant. Differences between self and proxy reporting, therefore, seem to be dependent on the choice of persons acting as informants about others and the criteria for designation of self respondents.

This project has been funded at least in part with Federal funds from the National Center for Health Statistics under contract 233-78-2034. The contents of this publication do not necessarily reflect the views or policies of the National Center for Health Statistics

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