

REFORMATTING A SELFADMINSTERED QUESTIONNAIRE BASED ON ITEM NON-RESPONSE

Frances M. Chevarley, Center for Financing Access and Cost Trends,
Agency for Healthcare Research and Quality, 540 Gaither Road, Rockville, MD 20850

The views in this paper are those of the author and no official endorsement by the Department of Health and Human Services, or the Agency for Healthcare Research and Quality (AHRQ) is intended or should be inferred. I wish to acknowledge that Nancy Krauss, Janet Greenblatt and I worked closely with staff from Westat in reformatting the MEPS 2001 Self Administered Questionnaire. This material was presented as a poster at the 2003 AAPOR meetings.

KEY WORDS: MEPS, Self Administered Questionnaire, SAQ, item nonresponse, SUDAAN

1. Introduction

The Medical Expenditure Panel Survey's Self-Administered Questionnaire (SAQ) was designed as an enhancement to measure health care quality and health status for adults and provide national estimates on these dimensions for the Agency for Healthcare Research and Quality's congressionally mandated National Health Care Quality Report. While finalizing coding specifications for the 2000 SAQ using a preliminary coded file and while planning for the 2001 SAQ, we found some unusual patterns of item non-response. Based on analyses of item non-response of the preliminary coded file for the 2000 SAQ, several design changes were incorporated into the 2001 SAQ.

The purpose of this study was to analyze item non-response to see whether the redesigned 2001 SAQ produced lower item non-response than the 2000 version. To evaluate whether the changes made in the 2001 SAQ were improvements to the 2000 SAQ, we analyzed and compared item non-response (NR) for lead questions in skips and questions not in skips; and for follow-up questions in skips, errors of omission (EOO) and errors of inclusion (EOI) were analyzed.

2. Background

2.1 Medical Expenditure Panel Survey (MEPS)¹

The Medical Expenditure Panel Survey (MEPS) was designed to provide nationally representative annual estimates of health care use and expenditures, access to care, patient and customer satisfaction, health status, and insurance coverage for the U.S. civilian noninstitutionalized population. It is co-sponsored by the Agency for Healthcare Research and Quality (AHRQ) and the National Center for Health Statistics (NCHS).

The MEPS actually comprises a family of surveys that cover three different major components of the U.S. health care system: the Household Component (HC), the Medical Provider Component (MPC), and the Insurance Component (IC). In this paper we focused on the SAQ which is a special supplement to the MEPS-HC.

The MEPS-HC collects data through an overlapping panel design. In this design, two calendar years of information are collected from each household through five in-person interviews over approximately 2 ½ years. This series of data collection activities is repeated each year on a new sample of households resulting in overlapping panels of survey data.

2.2 2000 and 2001 Self Administered Questionnaire (SAQ)

Because AHRQ is mandated to Measure Healthcare Quality for a National Quality Report starting in 2003, a number of enhancements to measure health care quality were added to MEPS, including the SAQ which was added beginning with the 2000 MEPS-HC. The SAQ is a very brief paper questionnaire that contained a total of 39 questions in 2000 and 38 questions in 2001. A copy of the 2000 SAQ is available from the MEPS website (<http://meps.ahrq.gov/survey.htm#PaperInstr>). Both the 2000 and 2001 SAQ questionnaires contained thirteen questions from the CAHPS, the Consumer Assessment of Health Plans--a survey tool that measures health care quality information from a consumer perspective; as well as 3 questions about blood pressure and smoking; and two measures of health status, the Short Form 12 (SF-12[®] with 12 questions), and the EuroQol 5-D (EQ-5D with 5 questions about the extent of problems in 5 specific areas--mobility, self-care, daily activities, pain and anxiety/depression--and a 6th question asking respondents to rate their current overall health on a thermometer-type scale that ranges from 0 through 100, where 0 means "worst possible health" and 100 means "best possible health"). The SAQs also contained 4 questions that ascertain certain health-related attitudes. One additional question was contained in the 2000 SAQ and which was dropped from the SAQ starting in 2001 that asked about the respondents' health state of today compared to their general level of health over the past 12 months.

During 2000 and 2001, in advance of the round two and round 4 interviews, SAQs were mailed to the

household for each adult in the family to complete. A person was considered eligible to receive an SAQ if that person did not have a status of deceased or institutionalized, did not move out of the U. S. or to a military facility, was not a non-response at the time of the Round 2 or Round 4 interview date, and was 18 years of age or older as of July 1. No family members added in Round 3 or Round 5 were asked to complete an SAQ/PAQ questionnaire from the previous round.

Because the 2000 and 2001 SAQ information was needed for the 2003 National Quality Report, the SAQ information was matched back to preliminary files for 2000 and 2001. A conditional response rate of 87% was achieved for the SAQ in both the 2000 and 2001 preliminary files. The 2000 preliminary file had a total of 15,662 completed 2000 SAQs with a positive person weight; the 2001 preliminary file had a total of 21,435 completed 2001 SAQs with a positive person weight. The SAQ conditional response rate achieved for the final public use files (were somewhat higher than in these preliminary files because we received additional SAQs after the cutoff date for inclusion in the preliminary data. The conditional response rate achieved by the SAQ in the 2000 Full Year Population Characteristics File and the 2000 Full Year Consolidated File (HC-050) was 93.49%. The conditional response rate achieved by the SAQ in the 2001 Full Year Population Characteristics File 93.2%. These public use files are available on the MEPS website (www.meps.ahrq.gov).

3. Methods

3.1 Reformating the 2001 based on item non-response in a 2000 SAQ preliminary file

While finalizing coding specifications for the 2000 SAQ using a preliminary coded file and while planning for the 2001 SAQ, we noticed some unusual patterns of item non-response. Some of the unusual patterns involved questions in skip patterns. Skip patterns have a lead question and follow-up questions(s). Skip patterns can result in follow-up questions being inappropriately skipped (errors of omission) and follow-up questions being inappropriately completed (errors of inclusion). The patterns of item non-response, errors of omission, and errors of inclusion, along with good principles of questionnaire design suggested several formatting changes for the 2001 SAQ. Based on analyses of item non-response of the preliminary coded file for the 2000 MEPS SAQ, several formatting and layout

changes were incorporated in the 2001 MEPS SAQ. The content of the 2001 and 2000 SAQs were almost identical except that the 2001 SAQ had one additional question. In making formatting changes to the 2001 SAQ we tried to adhere to Don Dillman's Principles of Good Questionnaire Design and Visual Navigation Guides². The main principles and navigation guides that we used are listed in Table 1.

3.2 Unusual item non-response patterns in the 2000 SAQ and questionnaire changes in the 2001 SAQ

For questions that were grouped together and labeled with letters in the 2000 SAQ, often the second and/or third lettered question was inappropriately skipped and therefore had higher item non-response (Table 2). To try to ensure that these questions would not be skipped we tried to identify the beginning of each question in a consistent way. For example, in the 2000 SAQ some questions began with letters and were grouped together under one section. We sequentially numbered all of the question and did not group them together in the 2001 SAQ. We found grouping the questions together to be too difficult for the respondent as indicated by the higher item non-response in the 2000 SAQ for these types of questions. We also decided not to indent any of the questions.

We noticed unusual patterns of errors of omission and of inclusion for questions involved in skip patterns in the 2000 SAQ (Table 3). To try to ensure that skip patterns would be properly followed we made the following changes. For questions in skips, we changed "GO TO QUESTION #" to "Skip to Question #" to better get across the idea of skipping questions rather than continuing to the next question. We also included directional lines to explicitly instruct people to go to the next question when they pick a response different from the one that asks them to skip to another question. We also added separate instructions for questions in skip patterns.

Because of higher item non-response for the questions on the last page, the instructions "Please go to page #" was added to the bottom of each page (except for the last page).

Because there were still unusual patterns of item non-response in the 2000 SAQ, we tried to create consistent and simple visual navigational guides in the 2001 SAQ. For example, the questions were all bolded and the response options were not bolded. All questions were formatted in a similar way and if they could be were placed within two columns; questions that could not be formatted using two columns were moved to the end of the instrument on the last page.

We also moved the answer boxes to the left of the response labels to allow room for the skip instructions.

3.3 Comparison of 2001 and 2000 Item Non-response

The purpose of this study was to analyze item non-response to see whether the redesigned 2001 SAQ was more respondent friendly than the 2000 SAQ in terms of lower item non-response. To evaluate whether the changes made in the 2001 SAQ were improvements to the 2000 SAQ, we analyzed and compared item non-response (NR) for lead questions in skips and questions not in skips; and for follow-up questions in skips, errors of omission (EOO) and errors of inclusion (EOI) were analyzed. Weighted and unweighted results are shown in the tables. SUDDAN was used in the analysis to account for the MEPS survey design complexities³. In the analysis special weights that adjusted for SAQ non-response when matched to the preliminary 2000 and 2001 files were used. Both the unweighted and weighted results are shown in the tables though most of the analyses in the text are based on the weighted results.

4. Results

4.1 Item non-response results (weighted, Table 2)

Item NR decreased from the 2000 to the 2001 SAQ for 16 out of the 28 questions that were either lead questions in skip patterns or that were not involved in skip patterns, it increased for 11 questions and the change was not statistically significant for 1 question. Item NR decreased from the 2000 to the 2001 SAQ for those questions (except the questions that were placed on the last page of the 2001 SAQ) that had been indented and labeled with letters in the 2000 SAQ but were not indented and contained sequential numerical labels in the 2001 SAQ. There was a large reduction in item NR for Question 27 in 2000 and Question 34 in 2001 (the health-status thermometer-type scale which is the most difficult question to complete) from the 2000 to 2001 SAQ. It was the last question on the last page in the 2000 SAQ. Reformatting the thermometer-type scale vertically and moving it off the last page (to page 5) in the 2001 SAQ drastically improved this question's item NR from 13.9% to 4.1%.

There were small increases in item NR for the first 7 lead question or questions not in skips from 2000 (item NR range of 0.5 to 1.5) to 2001 (item NR range of 1.4 to 2.6). Although item NR was moderately higher for questions on the last page in

the 2001 SAQ (Questions 35-38 in 2001, item NR range of 4.1 to 4.5) than for questions on other pages of the 2001 SAQ, it was much improved from the item non-response of the questions on the last page of the 2000 SAQ (8.8 for Question 26 and 13.9 for Question 27 in 2000). The NR for these four questions on the last page in 2001 (Questions 35-38 in 2001 and Questions 24a-24d in 2000) had smaller item NR in 2000 when they were not on the last page (NR range in 2000 of 2.2 to 3.5).

4.2 Errors of omission results (weighted, Table 3)

For the 2001 and 2000 SAQ, single follow-up questions to lead questions in skip patterns tended to have higher EOO than the item non-response for the lead questions or for questions not involved in skip patterns. Item EOO decreased in the 2001 SAQ from the 2000 SAQ for 9 out of the 10 questions that were follow-up questions. These decreases in EOO tended to be 50% or greater. The level of the EOO for Questions 2, 4, 13 and 16 (above 4%) in the 2001 SAQ are still a concern, even though they are lower than they were for the 2000 SAQ. In the 2001 SAQ the beginning questions tended to do more poorly than later questions in the 2001 SAQ in terms of errors of omission and item non-response. We may want to better indicate in future SAQs the beginning of the questions. The errors of omission for Questions 13 and 16 may be because these are more difficult questions for the respondent. The only increase in the error of omission was for question 11 which increased from 1.4% to 2.5%.

4.3 Errors of inclusion results (Weighted, Table 4)

The follow-up questions in skip patterns have higher errors of inclusion (inappropriately being answered) than errors of omission (inappropriately not being answered). Errors of inclusion, though of concern, are not the same type of problem as errors of omission since information is not lost. The errors of inclusion increased for 8 of the 10 follow-up questions, but these were still within levels of errors of inclusion considered acceptable for self-administered questionnaires⁴.

5. Conclusion

Analyzing item non-response from a very preliminary file can be both timely and effective in improving the formatting of a paper questionnaire. The main problems with the 2000 SAQ involved questions in skip patterns; questions that were grouped together, indented and labeled with letters; and the "health-status thermometer-type scale"

question on the last page of the 2000 SAQ. The 2001 SAQ was a major improvement for questions in skip patterns as indicated by lower errors of omission in the 2001 SAQ than in the 2000 SAQ for 9 of the 10 follow-up questions. The 2001 SAQ was an improvement for grouped questions that were indented and labeled by letters, as indicated by lower item non-response for all of these questions except those that were moved to the last page of the 2001 SAQ, an area of the questionnaire which still has higher patterns of item non-response. Item non-response for the “health status thermometer-type scale” improved dramatically from 13.9% in the 2000 SAQ to 4.1% in the 2001 SAQ. Of note, the changes produced an increase in NR from 2000 to 2001 for questions at the beginning of the instrument that were not follow-up questions in skip patterns and we don’t know why this is so. Also within the 2001 SAQ, the beginning questions and end questions tended to do more poorly than other questions in the 2001 SAQ in terms of item NR and EOO. Improvements therefore still need to be sought for the MEPS SAQ to help further reduce the item non-response and errors of omission for these beginning questions and to reduce further the moderate levels of item non-response for questions on the last page.

References

1. Joel W. Cohen, Ph.D., Alan C. Monheit, Ph.D., Karen Beauregard, et al., *The Medical Expenditure Panel Survey: A National Health Information Resource*, AHCPR Pub. No. 97-RO43, March 1997.
2. Dillman, DA. *Mail and Internet Surveys. The Tailored Design Method*, second edition, John Wiley & Sons, Inc., 2000.
3. Shah BV, Barnwell BG, and Bieler GS (1997). SUDAAN User’s Manual, Release 8.0. Research Triangle Park, NC: Research Triangle Institute.
4. Redline C., Dillman D., Smiley R., Carley-Baxter L., Jackson A., *Making the Invisible and Experiment with Skip Instructions on Paper Questionnaire*, U.S. Census Bureau, Statistical Research Division.

Table 1
PRINCIPLES OF GOOD QUESTIONNAIRE DESIGN²

- Ask one question at a time.
- Identify the beginning of each succeeding question in a consistent way.
- Number the questions consecutively and simply from beginning to end.
- Place more blank space between questions than between subcomponents of questions.
- Use dark print for questions and light print for answer choices.
- In general, list answer categories vertically instead of horizontally.
- Place answer spaces consistently to either the left or right of category labels. (Because of the large number of skip patterns in the questionnaire we placed answer spaces to the left of the category labels because this provided more space for skip instructions and directional lines.)
- Major visual changes are essential for gaining compliance with skip patterns.
- Words and phrases that introduce important, but easy to miss, changes in respondent expectations should be visually emphasized consistently but sparingly.

SIX VISUAL NAVIGATION GUIDES²

- Increase the size of written elements to attract attention.
- Increase the brightness or color (shading) of visual elements to attract attention and establish appropriate groupings.
- Use spacing to identify appropriate groupings of visual elements.
- Use similarity to identify appropriate groupings of visual elements.
- Maintain a consistent figure/ground format to make the response task easier.
- Maintain simplicity, regularity, and symmetry to make the response task easier.

Table 2: ITEM NON-RESPONSE
Lead Questions in Skips and Questions not in Skips

	2001 Question No.	2000 Question No.	Sample Item % NR		Weighted Item % NR		Z-test (wgt'd) 2000 to 2001
			2001	2000	2001	2000	
CAHPS	1	1	2.9	0.5	2.4	0.5	13.74
	3	3	2.7	0.9	2.3	0.8	11.25
	5	5	2.7	1.7	2.4	1.5	5.24
	15	15	2.8	1.6	2.6	1.4	7.37
BP & Smoking	12	13	2.3	1.2	2.1	1.0	7.24
	14	12	2.0	1.4	2.0	1.2	4.67
SF-12	17	17	1.4	1.0	1.4	0.9	3.28
	18	18a	1.1	2.1	1.1	1.7	-4.28
	19	18b	1.2	5.7	1.2	4.9	-17.43
	20	19a	1.5	3.1	1.4	2.6	-7.06
	21	19b	1.8	5.2	1.7	4.6	-12.89
	22	20a	1.4	2.4	1.3	2.1	-4.92
	23	20b	2.2	5.6	2.1	5.2	-12.63
	24	21	1.3	1.4	1.2	1.2	-0.01
	25	22a	1.1	2.1	1.0	1.7	-4.70
	26	22b	1.0	2.5	0.9	2.0	-7.55
	27	22c	1.1	2.6	1.0	2.1	-7.10
	Eurol Qol.	28	23	1.1	1.3	0.9	1.2
29		25a	0.8	1.5	0.7	1.1	-4.03
30		25b	0.8	1.5	0.7	1.1	-3.46
31		25c	0.8	1.6	0.6	1.2	-5.10
32		25d	1.0	1.7	0.9	1.4	-3.71
33		25e	1.3	1.9	1.2	1.6	-2.71
34		27	4.9	15.2	4.1	13.9	-19.83
Hlth Attitudes	35	24a	4.4	2.5	4.1	2.2	7.82
	36	24b	4.9	3.6	4.5	3.0	5.55
	37	24c	4.9	4.1	4.5	3.5	3.70
	38	24d	4.7	3.4	4.3	3.0	4.91
		26		9.1		8.8	

Source: 2000 & 2001 Medical Expenditure Panel Survey, AHRQ.

Table 3: ERRORS OF OMISSION (EOO)—Follow-up Questions in Skips

	2001 Question No.	2000 Question No.	Sample Item %		Weighted Item %		Z-test (wgtd) 2000 to 2001
			EOO		EOO		
			2001	2000	2001	2000	
CAHPS	2	2	4.9	10.9	4.8	10.6	-12.32
	4	4	4.6	9.7	4.2	9.6	-8.92
	6	6	1.5	2.7	1.3	2.5	-5.50
	7	7	1.4	2.7	1.2	2.4	-5.74
	8	8	1.3	2.6	1.1	2.4	-6.23
	9	9	1.3	3.2	1.1	2.9	-8.14
	10	10	2.1	3.1	2.0	2.8	-3.73
	11	11	2.7	1.5	2.5	1.4	5.69
BP & Smoking	16	16	4.5	7.6	4.2	7.3	-5.66
	13	13	5.0	9.3	5.0	9.6	-6.26

Table 4: ERRORS OF INCLUSION (EOI)—Follow-up Questions in Skips

	2001 Question No.	2000 Question No.	Sample Item %		Weighted Item %		Z-test (wgtd) 2000 to 2001
			EOI		EOI		
			2001	2000	2001	2000	
CAHPS	2	2	17.8	13.2	15.6	11.8	4.76
	4	4	13.9	11.0	12.1	9.6	4.99
	6	6	16.8	7.9	15.4	7.4	9.89
	7	7	16.9	8.5	15.3	7.7	8.95
	8	8	16.4	8.5	14.9	7.6	8.50
	9	9	16.4	9.1	14.8	8.1	7.70
	10	10	16.8	8.8	15.2	8.1	8.17
	11	11	16.8	30.5	15.5	30.8	-13.27
BP & Smoking	16	16	13.4	6.8	12.0	6.2	13.77
	13	14	12.1	20.1	10.6	18.0	-12.24

Source: 2000 & 2001 Medical Expenditure Panel Survey, AHRQ.