

Does Using a Short Dietary Questionnaire Instead of a Food Frequency Improve Response Rates to a Health Assessment Survey?

ALAN R. KRISTAL,^{1,2} KAREN GLANZ,³ ZIDING FENG,¹ JAMES R. HEBERT,⁴ CLAUDIA PROBART,⁵ MICHAEL ERIKSEN,⁶ AND JERIANNE HEIMENDINGER⁷

¹Fred Hutchinson Cancer Research Center, Seattle, Washington 98104; ²Department of Epidemiology, University of Washington, Seattle, Washington 98195; ³Cancer Research Center of Hawaii, University of Hawaii, Honolulu, Hawaii; ⁴University of Massachusetts, Worcester, Massachusetts 01655; ⁵University of Florida, Gainesville, Florida (now at University of Pennsylvania, State College, Pennsylvania 16802); ⁶M. D. Anderson Cancer Center, Houston, Texas (now at Office on Smoking and Health, Centers for Disease Prevention and Control, Atlanta, Georgia 30358); ⁷National Cancer Institute, Bethesda, Maryland 20852

INTRODUCTION

Evaluating the effectiveness of health promotion interventions poses many methodologic challenges. One central concern in assessing health habits in the general population is using instruments that are valid, reliable, affordable, and that yield high response rates. Questionnaires that are too long or in other ways too burdensome are likely to yield poor response rates and bias a study's evaluation.¹

For dietary assessment, the problem of questionnaire length is particularly salient because relatively long questionnaires are required to measure nutrient intake with validity and precision.² The most widely used self-administered tools for dietary assessment are food frequency questionnaires (FFQ).³⁻⁶ Due to their length and complexity, FFQs may be excessively burdensome to participants in health promotion research.⁷ Less burdensome options include: (1) FFQs with modestly^{7,8} or significantly^{9,10} reduced numbers of food items, (2) questionnaires on usual dietary habits,¹¹⁻¹³ and (3) questionnaires on the use of specific foods in the previous day.¹⁴ There is evidence that all of these approaches can be reasonably valid; however, little is known about whether there are significant practical advantages when using these shorter questionnaires. This study evaluated whether using a short dietary questionnaire (22 items) instead of a FFQ (176 items) as part of a comprehensive health assessment survey would improve response rates,

questionnaire completeness, and respondents' overall evaluations of the questionnaire.

METHODS

Working Well Study. The data reported here were from the pilot study of baseline survey procedures in the Working Well Trial. The Working Well Trial is a randomized, prospective field experiment of cancer control interventions in 114 worksites.¹⁵ The Working Well Trial has multiple risk factor foci, but nutrition (decreased fat and increased fiber) is an emphasis at all sites.

Instrument. The self-administered survey instrument consisted of common core components with modifications for each study center. Core questions included respondents' sociodemographic characteristics; knowledge, attitudes, and behaviors related to nutrition and smoking; and 14 items asking respondents to evaluate the pilot questionnaire. Questionnaires at each study center were identical except for the number of dietary assessment items. The shorter questionnaires used a 22-item FFQ without portion sizes,¹⁰ which was designed to measure changes in total fat and total fiber by measuring intake of major food groups containing these components. The longer questionnaires used an 88-item FFQ with portion sizes (176 items total),⁵ which was designed to measure changes in percentage of energy from fat, grams of fiber per 1000 kcal, and to a lesser degree changes in other nutrients such as vitamins A and C. Diet questionnaires were roughly in the middle of the surveys. Surveys were printed in booklet form, on both sides of the page, and ranged from 13 to 23 pages in length (Table 1).

The work reported here was supported by a Cooperative Agreement from the National Cancer Institute, grants No. U01 CA51671, U01 CA51686, U01 CA51687, U01 CA51688, and P01 CA50087.

Address for correspondence: Dr. Alan Kristal, Fred Hutchinson Cancer Research Center, 1124 Columbia MP-702, Seattle WA 98104; Tel: (206) 667-4686; Fax (206) 667-5977.

© 1994 SOCIETY FOR NUTRITION EDUCATION

Table 1. Site characteristics and survey methods.

Study Center	Region	Type(s) of Worksite	Administration Method	Number of Items		Number of Pages	
				Short	Long	Short	Long
1	New England	Manufacturing, majority male	Mailed, completion not on work time	194	348	14	19
2	New England	Manufacturing, majority female	Mailed, completion not on work time	174	328	13	18
3	South Central	Energy transmission companies, majority male	Group meetings, completion on company time	240	394	18	23
4	Southeast	Operating unit of a regional telecommunications corporation, majority female	Mailed, many completed on company time, at discretion of supervisor	199	353	15	20

Data collection and randomized experiment. Three study centers (numbers 1, 2, and 4 in Table 1) selected single worksites for the pilot survey and one (number 3 in Table 1) selected four small worksites. Within the study centers with single worksites, workers were randomly assigned to receive the short or long questionnaire; in the center with four worksites, two worksites were randomized to receive the long and two to receive the short questionnaires. All workers in each worksite received surveys. The survey booklets were similar in appearance so workers were not aware of the variation.

There were differences in both site characteristics and survey methods, as summarized in Table 1. Administration methods varied across worksites on two dimensions: (1) whether or not workers were given time during their normal work day to complete the survey ("company time"); and (2) whether the questionnaire was distributed via company mail or distributed at a group meeting. For mailed surveys, a follow-up mailing was sent to nonrespondents after approximately 2 weeks. These differences between sites were addressed in statistical analyses.

Statistical methods. We used chi-square statistics to test for differences in response rates to short and long questionnaires. We used log-linear models to examine the associations among administration methods, questionnaire length, and completion of at least 60% of dietary questionnaire items. The distribution of the mean percentage of dietary questionnaire items completed was not normal and could not be normalized using standard transformations. We therefore constructed confidence intervals around the mean percentage of items completed using 500 bootstrap samples

from each sample.¹⁶ We treated respondents from the four worksites at Study Center 3 as if they were randomized individually, because there were too few randomized worksites to model the between-worksites variance. This simplified the analyses but may lead to slightly inflated significance tests.

RESULTS

Response rates and completeness of dietary questionnaires. Table 2 gives the response rates by study center and questionnaire type. For all study centers combined, the response rate was 79.4% and was almost identical for the short and long forms. There was a significant difference in response rates between the short and long forms only in Study Center 2, where the response rate was 14 percentage points higher for the short questionnaire.

We assessed quality of response to dietary questionnaires with two indicators: the mean percentage of items completed and, as a rough index of what proportion of questionnaires could be analyzed, the percentage of questionnaires with 60% or more of items complete. There were no statistically significant associations of the percentage of dietary questionnaire items completed with total survey length (Table 3). There was, however, a trend for a higher percentage of items to be completed for the short questionnaires in the two worksites where completion was exclusively on personal time. For all study centers combined, the percentage of analyzable dietary questionnaires was slightly higher for the shorter questionnaires, but this reached statistical significance only for Study Center 1. Based on a

Table 2. Response rates to short and long surveys.

Study Center	Response Rates					
	Short Survey			Long Survey		
	Distributed	Returned		Distributed	Returned	
	<i>n</i>	<i>n</i>	%	<i>n</i>	<i>n</i>	%
1	100	63	63.0	100	63	63.0
2	80	67	83.8*	80	56	70.0
3	109	102	94.5	105	101	96.2
4	124	97	78.2	121	101	83.5
Total	413	329	79.7	406	321	79.1

**p* < .05, short vs long.

log-linear model that controls simultaneously for questionnaire length and method of administration, the percentage of analyzable questionnaires was higher for the shorter questionnaires (chi-square 3.84, *p* < .05) and where completion was on company time (chi-square 5.25, *p* < .02). Although the effect of questionnaire length was larger in those worksites where completion was on personal time, this interaction was not statistically significant.

Table 3. Completeness of responses to dietary questionnaires, by survey length.

Study Center	Dietary Survey Items Completed (%)		Dietary Survey with 60% or More Items Completed	
	Short Survey	Long Survey	Short Survey	Long Survey
	Mean	Mean		
1	94.2 (89.5, 97.5) ¹	90.1 (85.1, 94.6)	96.8*	87.3
2	95.1 (91.4, 98.0)	91.8 (87.0, 96.4)	95.5	89.1
3	94.9 (91.8, 97.7)	94.5 (91.5, 97.1)	96.1	94.1
4	98.3 (97.2, 99.3)	97.1 (94.4, 98.8)	97.9	98.0
Total	95.8	94.0	96.7	93.1

**p* < .05, short vs long.¹95% confidence interval, calculated using 500 bootstrap samples for each sample.

Respondent evaluation of questionnaire. There were few differences between responses to short and long versions of the survey on the 14 evaluation items (Table 4). Respondents to the long questionnaire were twice as likely to report that it was too long but were less likely to report that it had a confusing skip pattern. Respondents to the long survey were also more likely to report that the questionnaire included questions on "most foods I eat."

DISCUSSION

In a worksite setting, we found no evidence that substituting a 22-item dietary questionnaire for a 176-item food-frequency questionnaire would result in a higher response rate to a comprehensive health assessment survey. The overall response rate was considerably higher than those observed in most mailed surveys,⁷ likely due to the use of worksite channels to deliver and collect questionnaires. We did find two potentially important differences in participants' responses to short and long questionnaires. First, we found that the quality of response, measured as the completeness of dietary questionnaires, was better for the short questionnaire and where completion was on company time. Second, participants were more than twice as likely to report that the longer survey was "too long," although this was not related to their willingness to "fill out the survey again in a year." These findings suggest that using FFQs as part of health assessment surveys in worksites may not be a

Table 4. Participant evaluations of health survey, by survey length.

Item ¹	Agree and Strongly Agree (%)	
	Short Survey	Long Survey
Easy to understand	94.9	94.2
Skip patterns confusing	7.1	2.3*
Hard to read	3.2	2.3
Questions don't concern me	9.9	6.2
Too long	13.2	27.2*
Important	85.1	82.9
Interesting	66.4	64.6
Used words I don't come across	3.5	6.8
Easy to answer	92.4	90.3
Confusing	2.5	1.8
Included most foods I eat	41.7	70.8 [†]
Had to guess too often	4.1	6.2
Too personal	9.8	10.4
Willing to fill out again next year	83.8	78.7

**p* < .01; [†]*p* < .001.¹Exact text of items available from authors.

problem if workers are given company time to complete them.

The decision on which dietary assessment questionnaire to use in the Working Well Study was made by balancing the benefits of each. In addition to cost savings for coding and analysis, there was only weak evidence for improved response rates when using the short questionnaire. There were strong scientific motivations for using the comprehensive FFQ, most importantly that (1) the FFQ would allow analysis of more nutrients than simply fat and fiber; and (2) the FFQ would allow estimation of total energy intake, so that statistical adjustments requiring control of energy could be performed.^{17,18} The Working Well Study researchers thus decided to implement the study evaluation using the comprehensive FFQ.

The findings given here must be viewed with caution, given the limits of a single data collection occasion and the lack of a probability sample of sites. Also, although we have analyzed results stratified by whether completion was on personal or company time, this was not part of the experimental design. Thus, it is possible that results related to mode of administration could be explained by confounding variables such as sex or type of worksite. It is also important to note that the difference in total length between the long and short surveys in this study was proportionally small. Our results may not generalize to decisions about dietary questionnaires incorporated into short health surveys, for which the choice of dietary assessment method could easily double or triple total survey length. Overall, the experience in this pilot study suggests that in comprehensive health surveys it may not be necessary to sacrifice precision of dietary assessment to achieve high response rates.

REFERENCES

1. Aday LA. Designing and conducting health surveys: a comprehensive guide. San Francisco, CA: Jossey-Bass, 1989.
2. Wylie-Rossett J, Wassertheil-Smoller S, Elmer P. Assessing dietary intake for patient education planning and evaluation. *Pat Educ Couns* 1990; 15:217-27.
3. Medlin C, Skinner J. Individual dietary intake methodology: a fifty year review of progress. *J Am Diet Assoc* 1988; 88:1250-7.
4. Bazzare TL, Yuhas JA. Comparative evaluation of methods of collecting food intake data for cancer epidemiology studies. *Nutr Cancer* 1983; 5:201-14.
5. Block G, Hartman AM, Dresser CM, Carroll MD, Gannon J, Gardner L. A data-based approach to diet questionnaire design and testing. *Am J Epidemiol* 1986; 124:453-69.
6. Willett WC, Sampson L, Stampfer MJ, Rosner B, Bain C, Witschi J, Hennekens CH, Speizer FE. Reproducibility and validity of a semi-quantitative food frequency questionnaire. *Am J Epidemiol* 1985; 122:51-65.
7. Caan B, Hiatt RA, Owen AM. Mailed dietary surveys: response rates, error rates, and the effects of omitted data. *Epidemiology* 1991; 6:430-6.
8. Block G, Hartman AM, Naughton D. A reduced dietary questionnaire: development and validation. *Epidemiology* 1990; 1:58-64.
9. Hopkins PN, Williams RR, Kuida H, Stults BM, Hunt SC, Barlow GK, Ash KO. Predictive value of a short dietary questionnaire for changes in serum lipids in high-risk Utah families. *Am J Clin Nutr* 1989; 50:292-300.
10. Block G, Clifford C, Naughton MD, Henderson M, McAdams M. A brief dietary screen for high fat intake. *J Nutr Educ* 1989; 21:199-207.
11. Kristal AR, Shattuck AL, Henry HJ. Patterns of dietary behavior associated with selecting diets low in fat: reliability and validity of a behavioral approach to dietary assessment. *J Am Diet Assoc* 1990; 90:214-20.
12. Ammerman AS, Haines PS, DeVillis RF, Strogatz DS, Keyseling TC, Simpson RJ, Siscovick DS. A brief dietary assessment to guide cholesterol reduction in low-income individuals: design and evaluation. *J Am Diet Assoc* 1991; 91:1385-90.
13. Kristal AR, Shattuck AL, Henry JH, Fowler AS. Rapid assessment of dietary intake of fat, fiber, and saturated fat: validity of an instrument suitable for community intervention research and nutritional surveillance. *Am J Health Promotion* 1990; 4:288-95.
14. Kristal AR, Abrams BF, Thornquist MD, DiSogra L, Croyle R, Shattuck AL, Henry HJ. Development and validation of a food use checklist for evaluation of community nutrition interventions. *Am J Public Health* 1990; 80:1318-22.
15. Abrams DB, Boutwell WB, Grizzle J, Heimendinger J, Sorensen G, Varnes J. Cancer control at the workplace: The Working Well Trial. *Prev Med*, in press.
16. Efron B. The jackknife, the bootstrap and other resampling plans. Philadelphia, PA: Society of Industrial and Applied Mathematics, 1982.
17. Willett W. Nutritional epidemiology. New York: Oxford University Press, 1990.
18. Pike MC, Peters RK, Bernstein L. Re: "Total energy intake: implications for epidemiologic analyses." *Am J Epidemiol* 1993; 137:811-2.

Creating Healthy Menus for the Mainline October 26, 1994

A free national satellite seminar in the continuing series Managing Child Nutrition Programs to Teach Healthy Food Practices, which has been approved for ADA, AHEA, and ASFSA continuing education credit.

Please contact the National Food Service Management Institute at 1-800-321-3054.