

Modification of a Nutritional Questionnaire for Older Adults and the Ability of Its Knowledge and Attitude Evaluations to Predict Dietary Adequacy

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Abstract

This paper outlines the modification of the Nutritional Questionnaire for Older Adults (NQOA) to determine the extent to which knowledge and attitude can predict dietary adequacy. Aged adults (65 years or older) who participate in the Title III-C congregate meal program at a small community Senior Center in Alabama (n = 22) served as subjects for this study. Knowledge and attitude were shown to be weak predictors of dietary adequacy with regard to specific components, but were found to significantly predict adequate nutritional intake as measured by both RDA and by food group standards.

Article:

Health promotion directed to chronic disease prevention is cited as a major public health priority for the adult and aged populations (Kaufman, Heimendinger, Foerster, & Carroll, 1987; Miller & Stephenson, 1985; Speake, 1987; U.S. Department of Health, Education, and Welfare, 1979). Because nutrition has been implicated in several of the serious chronic diseases of adult life, including heart disease, hypertension, non-insulin dependent diabetes mellitus, and cancer and, because the consensus of the role of nutrition in health is clear (U.S. Department of Health and Human Services, 1988), professionals in nutrition education are challenged to disseminate to target populations information upon which diet modification can be based.

When listing behaviors that are important for good health, older adults consistently identify nutrition practices near the top (Brody, 1985; Ferraro, 1980; Harris & Guten, 1979; Maloney, Fallon, & Wittenberg, 1984). Yet, there remains several nutritional deficiencies that are commonly found in elderly populations. To combat this problem the Title III-C Nutrition Services Program was established to provide a daily hot meal to older adults. Later it was mandated that nutrition education interventions be conducted at each meal site. Only a few studies, however, have cited benefits from participation in such programs with regard to nutrition knowledge or to dietary intake of selected nutrients (Kohrs, Nordstrom, Plowman, O'Hanlon, Moore, Davis, Abrahams, & Eklund, 1980). Several authors (Caliendo & Batcher, 1980; Caliendo & Smith, 1981) found that neither dietary intake nor nutrition knowledge differ significantly with frequency of participation in congregate meal programs. LeClerc and Thornbury (1983) found no difference between those who participate in congregate meal programs (with regard to dietary intake and nutrition knowledge) and those who do not.

These findings reflect problems inherent in providing education programs as a means to change behaviors, specifically, problems of (1) identification of and ability to reach target populations, (2) eliciting behavior change, and (3) inappropriate and/or ineffective educational interventions. These findings may reflect generic problems in dealing with an aged population. Further data are needed to determine the extent to which nutrition education programs can elicit positive behavior change in the aged, and whether age-specific strategies must be employed with this older population in order to do so. To accumulate such data, assessment tools must be developed that can effectively describe specific needs of a target population.

This study served to pilot test a modified version of the Nutritional Questionnaire for Older Adults (NQOA) and to determine the extent to which knowledge and attitude, as measured by this tool, can predict dietary adequacy, as measured by a 24-hour dietary recall, in a group of older adults in Alabama.

METHOD

Subjects

A sample of convenience was drawn from a group of aged adults (65 years or older) who participate in the Title 111-C congregate meal program at a small community Senior Center in Alabama to serve as subjects (n = 31). Those who were present on the two days the data were collected were given an explanation of the purpose of the study and an informed consent form to sign.

Participation was voluntary. Six individuals did not wish to participate, two of the questionnaires were missing too much information to use, and one individual did not return to the center for the follow-up 24 hour dietary recall and could not be contacted for a home interview, yielding a final pool of 22 subjects.

Instrumentation

The Nutritional Questionnaire for Older Adults developed by Fanelli and Abernethy (1986) was modified for use in this study. It was chosen because it was developed and tested as a needs assessment tool for planning nutrition education interventions. The questionnaire consists of six sections: (a) demographic and personal information, (b) food resources, (c) food consumption patterns, (d) dietary practices related to health, (e) activity patterns, and (f) nutrition knowledge. Fanelli and Abernethy used this questionnaire in the interview format and followed with a 24-hour dietary recall of each participant in the study. The link between nutrition attitudes and behaviors (Betts & Vivian, 1985; Byrd-Bredbenner, O'Connell, Shannon, & Eddy, 1984; Iverson and Portney, 1977) warranted the modification of the NQOA to include an attitude section.

A review of the literature indicated that the attitude section of the questionnaire should focus on items in these four main categories: (a) importance of nutrition, (b) willingness to change behavior or comply with new behaviors, (c) perception of factors affecting food selection, and (d) food preferences. The section on food preferences was added to the attitude scale for the purpose of illiciting information on dietary intake, and part of the pilot testing procedure was to determine if this data would be strong enough to warrant the administration of the instrument without a follow-up 24-hour dietary recall. An original pool of 10 items on the importance of nutrition, 10 items on willingness to change, 13 items on perceptions of factors affecting selection, and 31 items on food preferences was generated.

This original set of items was given to a panel of judges (composed of two experts in health education and three experts in nutrition) for the selection of final items to make up the attitude section of the questionnaire. Judges were asked to consider each item as to its wording and its validity concerning the major category it represented.

The final attitude section of the questionnaire consisted of a five-point Likert-type scale with five items each for importance of nutrition, willingness to change, and perceptions of factors affecting selection, and 10 items for food preferences. The use of the panel of judges established the validity of this section. Reliability testing, measured through the SPSS* statistical package, indicated a Coefficient Alpha of 0.63.

Other modifications were made to the NQOA to ease data collection and computer analyses.

The final form of the Nutritional Questionnaire for Older Adults-Form B (NQOA-B) consisted of the six original sections (described previously) and nutrition attitudes. The knowledge section contained 20 statements to which respondents marked agree, disagree, not sure, or don't know. The attitude section contained 25 items of the Likert-type with a five-point scale ranging from strongly agree to disagree (see Figure 1).

Data Collection

The NQOA-B was used as a self administered tool for data collection. A trained assistant and the first author were present and available to answer questions by respondents, to clarify items and to encourage completion of the questionnaire. A follow-up interview was conducted at the meal site or the home of the participant in which a 24-hour dietary recall was taken to gain information on dietary intake. Visual aids were used to assist in judging amounts of food or liquid ingested.

Data Analysis

After the questionnaires had been completed, data were coded for computer entry. Total knowledge score was calculated on the basis of one point for each correct answer. Items marked not sure or don't know were collapsed together with incorrect responses. Total attitude score was calculated on the basis of the five-point Likert-type scale so that a minimum of 25 and a maximum of 125 was possible.

The items gathered by the 24-hour dietary recall were coded and entered into the computer for analysis, using the Dietary Analysis 111 Program prepared for the West Publishing Company. This furnished data on specific nutrients as a percent of the RDA for persons over 51 years of age (Food and Nutrition Board, 1980). Two methods were used to determine dietary adequacy. First, the dietary intake of the participants was calculated as adequate or inadequate based on the intake of a minimum of 213 of the RDA for at least six of eight selected nutrients (thiamin, riboflavin, niacin, vitamin C, iron, calcium, energy, and protein). A two was recorded for an adequate total nutrition score and a one for an inadequate- score. Other specific measures that were selected for analysis were consumption of total fat, saturated fat, and fiber. Total fat was reflected as percent of total energy intake, whereas saturated fat and fiber intake were recorded as total grams.

Secondly, data from 24-hour dietary recalls were coded for the number of servings consumed from six basic food groups (dairy products, meats/meat alternatives, fruits, vegetables, grains, and fats/oils) as described by Fanelli and Abernethy (1986). One point was allotted to the adequacy score for each food group in which the recommended number of servings was consumed. If less than the recommended servings was consumed in a food group, a percentage of one point was scored according to the proportion of servings ingested. Six points is the highest possible score using this procedure.

FIGURE 1. **NUTRITION KNOWLEDGE**

The following section of the questionnaire is not intended to be a test – but has been designed to help us get a better indication of adults' understanding of nutrition.

Read each statement and then respond in one of these four (4) ways:

If you believe the statement to be correct, respond AGREE

If you believe the statement to be wrong, respond DISAGREE

If you cannot firmly agree or disagree, respond NOT SURE

If you do not know about the item, respond DON'T KNOW

REMEMBER – This is not a test, so do not hesitate to respond NOT SURE or DON'T KNOW. It would be more beneficial to us if you do not guess.

Take time to think about each statement before responding. Circle the word(s) below each question that corresponds to your answer.

65. Vitamins and minerals provide no calories.
AGREE DISAGREE NOT SURE DON'T KNOW
66. Eating grapefruit before a meal will help you reduce body weight.
AGREE DISAGREE NOT SURE DON'T KNOW
67. Iron is one of the nutrients listed on the nutrition information labels of food packages.
AGREE DISAGREE NOT SURE DON'T KNOW
68. A source of vitamin C is required in the diet every day.
AGREE DISAGREE NOT SURE DON'T KNOW
69. Protein eaten in excess of bodily needs is stored in the body as fat.
AGREE DISAGREE NOT SURE DON'T KNOW
70. Head lettuce is an important dietary source of vitamin A.
AGREE DISAGREE NOT SURE DON'T KNOW
71. Gelatin dessert (Jell-O) is a good source of complete protein.
AGREE DISAGREE NOT SURE DON'T KNOW
72. The foods one eats has no effect on the risk of developing cancer.
AGREE DISAGREE NOT SURE DON'T KNOW
73. It could be harmful to health if a person took in too much vitamin A.
AGREE DISAGREE NOT SURE DON'T KNOW
74. Vitamin E slows down aging.
AGREE DISAGREE NOT SURE DON'T KNOW
75. A serving of red meat (that is; beef, lamb, veal) must be eaten every day to supply protein.
AGREE DISAGREE NOT SURE DON'T KNOW
76. Skim milk contains the same amounts of vitamins, minerals, and protein as whole milk.
AGREE DISAGREE NOT SURE DON'T KNOW
77. Corn oil is a good source of polyunsaturated fats.
AGREE DISAGREE NOT SURE DON'T KNOW
78. The taste for salt is a learned taste that is acquired over the years.
AGREE DISAGREE NOT SURE DON'T KNOW
79. Saturated fats, associated with coronary heart disease, are found in red meats, butter, and whole milk.
AGREE DISAGREE NOT SURE DON'T KNOW
80. Vitamin D can be produced by the body from sunshine.
AGREE DISAGREE NOT SURE DON'T KNOW
81. Whole grain breads are good sources of bran (or fiber) which helps prevent constipation.
AGREE DISAGREE NOT SURE DON'T KNOW

82. Vitamin C prevents the common cold.
 AGREE DISAGREE NOT SURE DON'T KNOW
83. Apples are a good source of vitamin C.
 AGREE DISAGREE NOT SURE DON'T KNOW
84. A calorie is a measure of the amount of energy provided by a food.
 AGREE DISAGREE NOT SURE DON'T KNOW

85. Where have you learned about nutrition? (* CIRCLE THOSE THAT APPLY)

Newspaper / magazine

Radio

Television

Books, like diet books / cook books

Food labels

Studied in school / Professional nutrition literature

Neighbors / friends / relatives / spouse

Home economist / Registered dietician / Nutritionist

Physician / Nurse

Other, please specify _____

NUTRITION ATTITUDES

The following section of the questionnaire is designed to help us get a better indication of adults' attitude toward nutrition and nutritional concerns.

Read each statement carefully and then circle the phrase that best expresses your feeling about the statement.

STRONGLY AGREE (SA)

AGREE (A)

UNDECIDED (U)

DISAGREE (D)

STRONGLY DISAGREE (SD)

Whenever possible, let your own personal experience determine your answer. Do not spend much time on any item. If in doubt, circle the phrase which seems most nearly to express your present feeling about the statement.

86. The foods I eat affect the way I feel

SA A U D SD

87. One reason I have lived as long as I have is because I have a healthy diet.

SA A U D SD

88. The way foods are prepared affects my health.

SA A U D SD

89. It is important for me to eat regular meals daily.

SA A U D SD

90. It is important for me to get a wide variety of foods in my diet.

SA A U D SD

91. If my doctor told me to reduce cholesterol in my diet, I would try to do so.

SA A U D SD

92. If I found out that food I really like was not good for me, I would continue to eat it anyway.

SA A U D SD

93. Good ole Southern cooking is too good to change, even for health reasons.

SA A U D SD

94. At a social gathering, if someone brought a food that I had never tried, I would taste it.

SA A U D SD

95. I would change my diet if it was too high in fat.

SA A U D SD

96. I eat less nutritious meals when I eat alone than when I eat with others.

SA A U D SD

97. Buying nutritious foods requires too much of my monthly income.

SA A U D SD

98. I often feel too tired to bother fixing a meal.

SA A U D SD

99. There are so many foods that I have given up because they just don't agree with me.

SA A U D SD

100. There are so many foods that I have given up because I cannot chew them well.

SA A U D SD

101. I would rather have bacon, eggs, and coffee for breakfast than cereal, whole wheat toast, and juice.

SA A U D SD

102. I would rather have white bread or rolls than whole wheat bread.

SA A U D SD

103. I drink milk almost every day.

SA A U D SD

104. I am more likely to snack on fresh fruits than sweets.

SA A U D SD

105. When buying canned items, I select "low sodium" or "no salt added" items, if they are available.

SA A U D SD

106. I eat raw vegetables, for example in a tossed salad, at least three (3) times a week.

SA A U D SD

107. I eat a lot of fried vegetables and meat.

SA A U D SD

108. I almost always add salt to my food.

SA A U D SD

109. I eat eggs no more than three (3) times a week.

SA A U D SD

110. I drink more than two (2) cups of coffee each day.

SA A U D SD

The information you have provided to the researchers is greatly appreciated and will help us to gain a better understanding of the nutritional knowledge, attitudes, and behaviors of the aged in Alabama. Thank you so much for your time and cooperation.

Results of these two dietary adequacy analyses were added as variables to the data base collected from the questionnaire. A simple item analysis was used to code demographic data. The Pearson product-moment correlation statistical test from the Statistical Analysis System (SAS) computer package was used to determine correlations between data elicited from the knowledge and attitude sections of the questionnaire. In addition, data from the 24- hour dietary recall were examined to determine the extent to which knowledge and attitude scores predicted dietary adequacy.

RESULTS

Descriptive data of the participants are presented in Table 1. The study group was primarily white females, although blacks were fairly well represented. Most were educated only through grade 12, and half of the subjects had monthly incomes of \$500 or less. This group of Title 111-C participants was found to be representative of participants in other studies (Calasanti & Hendricks, 1986).

Dietary intake data for selected components reveal that mean intakes were at or above the suggested RDA (using figures for women since 91% of this group were women) for all nutrients selected except for calcium and energy (see Table 2). The mean for total fat intake (35%) was above the recommended 30% of total energy, but mean saturated fat intake (18.9 grams) accounted for more of these fat kilo-calories than is recommended. Mean dietary fiber intake (17.0 grams) was not as high as recommended by the American Cancer Society, but was above the usual intake for Americans (Darnell, 1987).

Scores for the knowledge section ranged from 2 to 15 with a mean of 10. For this study group, attitude scores ranged from 92 to 137 with a mean of 115.

When data from the dietary analysis with regard to specific components were correlated with attitude and knowledge, the only significant correlations found were thiamin adequacy with knowledge, iron adequacy with attitude and knowledge and fiber with attitude (see Table 3). Attitude and knowledge scores were peak predictors of specific measures of dietary adequacy.

Total nutrition adequacy as measured by percentage of RDA for eight selected nutrients (RDA adequacy) revealed a mean score of 1.91 for this study group. The correlation of RDA adequacy with knowledge and attitude indicated a significant relationship between dietary adequacy and knowledge (see Table 4). Thus knowledge served as a predictor of nutrition adequacy, as measured by RDA standards, where attitude did not.

Total nutrition adequacy was also measured by intake of recommended servings in six food groups (food group adequacy), a procedure for which the total possible score was six. For this group scores ranged from 2.25 to 5.75 with a mean of 4.36. Food group adequacy scores were compared to attitude and knowledge. Significant correlations were found between total food group score and attitude as well as total food group score and knowledge. (See Table 4.) Both attitude and knowledge served as strong predictors of adequate dietary intake measured by food group totals. The two methods of describing the adequacy of the diet were significantly correlated, as was attitude with knowledge.

Section four (food preferences) was not found to be an adequate predictor of dietary adequacy using either method of determining adequate intake. Nor was the remaining part of the attitude measure found to be a strong predictor of dietary adequacy without this section. It appears that the entire attitude scale as devised with four sections is the best predictor of dietary adequacy.

DISCUSSION

This group of older adults from a small community in Alabama demonstrated an average level of nutrition knowledge, a positive attitude toward nutrition, and an adequate dietary intake. The level of nutrition knowledge for this group is similar to that in the Fanelli and Abernethy study (1986), in which the typical respondent correctly answered 11 of the 20 items. Interestingly, the demographic makeup of the two samples are similar as well, though the Fanelli and Abernethy group had more males and a slightly higher education level (information on income level was not reported).

As indicated previously, studies have shown that providing one hot meal a day for five days of the week does not assure total nutritional adequacy for participants of meal programs (Calasanti & Hendricks, 1986; Caliendo & Batcher, 1980; Caliendo & Smith, 1981; Kohrs et al., 1980; LeClerc & Thornbury, 1983). One reason for this finding is that dietary intake for the remainder of the day is left to the discretion of the individual. Even though total nutritional adequacy was rather high for this group of congregate meal site participants, analysis of the 24-hour dietary recalls revealed that those participants who had better diets ate adequate meals and snacks outside the senior center. Nutrition education intervention must be directed toward improving food selection and preparation at home.

TABLE 1. Description of Participants

	n ¹	%
<i>Age</i>		
65-69	9	40.9
70-74	3	13.6
75-79	4	18.2
80-84	3	13.6
85-89	3	13.6
<i>Sex</i>		
Male	2	9.1
Female	20	90.9
<i>Race</i>		
Black	5	22.7
White	17	77.3
<i>Years of Education²</i>		
< 8	6	27.3
9-12	8	36.4

13-16	4	18.2
> 16	0	0.0
Monthly Income²		
0-\$500	11	50.0
\$501-\$1,000	4	18.2
\$1,001-\$1,500	4	18.2
\$1,501-\$2,000	1	4.5
Live Alone?		
No	9	40.9
Yes	13	59.1

1 n = 22

2 Some missing data

TABLE 2. Selected Components of Dietary Intake for Participants

<i>Component</i>	<i>Dietary Intake of Participants (n = 22)</i>			
	<i>Minimum</i>	<i>Maximum</i>	<i>Mean</i>	<i>1980 RDA</i>
<i>Thiamin (mg)</i>	0.2	3.7	1.3	1.0
<i>Riboflavin (mg)</i>	0.4	5.7	1.7	1.2
<i>Niacin (mg)</i>	1.4*	39.5*	17.0*	13
<i>Vitamin C (mg)</i>	7	386	112	60
<i>Iron (mg)</i>	2	33	14	10
<i>Calcium (mg)</i>	168	1317	634	800
<i>Energy (kcal)</i>	351	2879	1625	1800
<i>Protein (g)</i>	11	86	53	53
<i>Total Fat (%)</i>	15	70	35	**
<i>Saturated Fat (g)</i>	3.3	41.2	18.9	**
<i>Fiber (g)</i>	2.7	35.0	17.0	**

* Value is for performed niacin rather than niacin equivalents

** No RDA for these nutrients

TABLE 3. Correlation of Selected Dietary Components with Attitude and Knowledge

<i>Component</i>	<i>Pearson r coefficient</i>	
	<i>Attitude</i>	<i>Knowledge</i>
<i>Thiamin</i>	.32	.51**
<i>Riboflavin</i>	.07	.23
<i>Niacin</i>	.36	.39

<i>Vitamin C</i>	.16	.02
<i>Iron</i>	.45*	.43*
<i>Calcium</i>	.04	.16
<i>Energy</i>	.28	.39
<i>Protein</i>	.07	.36
<i>Total Fat</i>	-.15	-.17
<i>Saturated Fat</i>	-.11	-.09
<i>Fiber</i>	.44*	.28

*p < .05

** p < .01

TABLE 4. Correlation Coefficients of Knowledge, Attitude, and Dietary Adequacy

	<i>Knowledge</i>	<i>Attitude</i>	<i>RDA Adequacy</i>	<i>Food Group Adequacy</i>
<i>Knowledge</i>	1.00	.43*	.57**	.55**
<i>Attitude</i>	.43*	1.00	.17	.56**
<i>RDA Adequacy</i>	.57**	.17	1.00	.68**
<i>Food Group Adequacy</i>	.55**	.56**	.68**	1.00

*p < .05

**p < .01

Results of the data analysis indicated that knowledge and attitudes were weak in predicting the specific measures of dietary intake such as individual nutrients and consumption of fat, saturated fat, and fiber. Those scores were, however, strong predictors of a general pattern of total nutritional adequacy. Fanelli and Abernethy (1986) found that the number of correct responses of knowledge items was associated with dietary adequacy scores as well. In their study of factors influencing the nutrition knowledge and dietary intake of participants in a Title 111-C meal program, Caliendo and Smith (1981) found the only specific nutrients that correlated with knowledge were calories and ascorbic acid. In this study, only thiamin and iron were found to correlate with knowledge. Though Caliendo and Smith did not calculate a total nutrition adequacy score to correlate with knowledge, their participants did self-rate their diet; the self-rated diet did significantly correlate with knowledge.

Smiciklas-Wright (1981) and Betts and Vivian (1985) found no significant relationship between nutrition knowledge and dietary intake. Grotkowski and Sims (1978) found no statistically significant association between nutritional knowledge and nutrient intakes, but did find that certain nutritional attitudes significantly correlated with nutrient intakes.

The finding that both knowledge and attitude were significant predictors of nutritional adequacy in this study deserves special note. The usual finding in behavior research is that attitude and behavior are directly related, but knowledge and behavior are not, and that positive attitudes are more likely to predict behavior than is knowledge (Byrd-Bredbenner et al., 1984; Iverson & Portney, 1977; Perkin, 1983; Shephard, Berridge, Montelpare, Daniel, and Flowers, 1987). Further research is needed in this area to determine if indeed an elderly

population is more motivated to develop positive attitudes and dietary practices with increased knowledge, or if positive attitudes and behaviors motivate this group of people to seek more knowledge. Studies with larger samples need to be conducted to investigate this possibility. Certainly this finding presents new potential for nutrition education research.

Results of this pilot study did demonstrate that measures of knowledge and attitude on the NQOA-B were able to predict dietary adequacy. However, due to the small number of subjects and the inability of the food preference section to predict adequacy independently, it is suggested that a 24-hour dietary recall be conducted along with the administration of this instrument. Because the food group method of determining dietary adequacy demonstrated the stronger correlations, it appears that this is the method of choice.

CONCLUSION

Practical implications for program development can be drawn from this study. In order to increase the effectiveness of education interventions at nutrition sites, sessions might address certain attitudes and beliefs about dietary intake, such as the importance of nutrition, the willingness to change behaviors or comply with new behaviors, and perceptions of factors that affect food selections. As these attitudes are developed, the older adult may be more receptive to specific knowledges that demonstrate what and how to prepare foods for nutritional adequacy. One way to do this using the NQOA-B might be to discuss each item on the food preference section and the implications of selecting the "healthy" versus the "unhealthy" choice. Further research is necessary to determine if this hypothesis will hold true. Because participants in meal-site programs represent lower income levels, specific information on how to select nutrient dense foods that are inexpensive should be included in a knowledge component, Emphasis on food selection outside the meal site must occur as well. Both an open and a direct approach to addressing ethnic practices should be made to allow minority participants (and in this case, lower income Southern participants) to investigate the relationship between lifelong dietary practices and nutritional concerns and to experiment with ways to make appropriate adjustments for improved dietary adequacy. Research data on the effectiveness of adjusting such practices through education intervention are needed.

From this study it appears unlikely that independent measures of nutrition knowledge and attitudes, from the Nutritional Questionnaire for Older Adults-Form B, are effective predictors of specific characteristics of dietary intake. In combination, knowledge and attitude do, however, predict strongly the general adequacy of dietary intake in a group of older adults. Specifically, results of this study demonstrated a significant relationship of high nutrition knowledge and a positive attitude toward nutrition with adequate dietary intake in a group of older adults.

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