

RESEARCH ON THE CONTINUING SURVEY OF FOOD INTAKES BY INDIVIDUALS

by Theresa J. DeMaio, Susan Ciochetto, and Wendy L. Davis
U. S. Bureau of the Census

Food and nutrition surveys are a vehicle that has long been used by nutritionists to monitor the nation's dietary status. While there are several methods of collecting dietary information (e.g., food frequency, dietary recall), the one that collects the most complete and detailed information on a large scale is the 24-hour dietary recall questionnaire.

The Census Bureau recently undertook a research effort to revise the Individual Intake Questionnaire for the Continuing Survey of Food Intakes by Individuals (CSFII) sponsored by the Human Nutrition Information Service of the U. S. Department of Agriculture. One of the major tasks of the CSFII is to collect a complete listing of all foods and drinks eaten by the respondent the previous day, along with specific information about each food eaten, including a detailed description, how much was consumed, and when. The survey also collects information about how much water was consumed and other health-related information.

The major redesign emphasis involved the dietary recall portion of the questionnaire. This paper reports on the results of the research. In the next section we outline the research methods used. Then we describe three types of changes we made to the questionnaire: (1) restructuring the dietary recall questions to improve their flow; (2) revising the strategy for having respondents

recall the foods eaten the previous day; and (3) changing the wording of questions and response categories.

METHODOLOGY

Our first step in approaching the redesign effort was to conduct an expert appraisal, using our own expertise to evaluate problems in the questionnaire. Additionally, we conducted cognitive interviews to elicit respondents' thoughts while providing a dietary intake. Interviews were conducted using the concurrent think-aloud technique in which participants are instructed to verbalize their thoughts as they form their response to the interviewer's questions, in addition to simply reporting their answers. This technique is used to look at the questionnaire response task from the respondent's point of view--to better understand how respondents are interpreting the questions, how they understand concepts, and what cognitive strategies they use to formulate answers to survey questions.

A total of 17 interviews were conducted with respondents who were local day care center instructors, military personnel from a local Air Force base, college students, and students and teachers from a local high school. Three interviews were conducted with teenagers, and the remaining fourteen were conducted with adults over the age of twenty-one. Six considered themselves to be main meal preparers and eight considered themselves not to be main meal preparers. However, the respondents' reported meal preparer status did not necessarily reflect whether or not they had actually prepared meals on the day before the interview. Interviews ranged from one hour and fifteen minutes to two hours in length.

The interviews were conducted in two phases, with six interviews conducted during the first phase and eleven in the second. Conducting the interviews in two phases allowed us to test the questionnaire once, make revisions according to results of the first set of interviews, then try out our revisions. Interviews were taped with the respondent's permission, and written summaries of each one were prepared.

RESULTS

In this section, we describe the initial version of the questionnaire, the problems we discovered, and our questionnaire revisions. The questionnaire improvements fall into three main categories: (1) the organization of the dietary recall section; (2) the structure of the food recall questions; and (3) the wording of questions and response categories.

Organization of the Dietary Recall Section

One of the major tasks of the CSFII is to collect a complete listing of all foods the respondent ate during the previous day and details about these foods. The individual intake portion of the 1991 questionnaire began by first asking the respondent the time he/she ate or drank something, the name of the eating occasion, and finally, what the respondent had to eat or drink on that occasion (Appendix 1 contains these questions from the 1991 questionnaire).

Following this opening series (Questions 1-4), respondents were asked to give detailed information about each food they consumed the previous day, including how much they ate or drank (Questions 5-6). Next they were asked a question about the source of the food, which was designed to determine whether the food item was ever in the respondent's home (Question 7).

Responses to this question determine whether the food item was part of the "home food supply," which has been an important variable in the analysis of the data. The final questions in the intake portion of the questionnaire were structured to depend on the respondent's answer to the food source item. Respondents who said the food was in their home at some point (either it was eaten at home or brought into the home but later eaten away from home) were asked where the food came from (i.e., from a fast food or carryout place, from Meals on Wheels, or from some other place) (Question 8). If these respondents had also been previously identified as the main meal planner/preparers (that is, the persons who are mainly responsible for planning and preparing food), they were also asked questions about whether salt and fat were used in preparing the food eaten the previous day (Questions 9-10). Respondents who reported that their food items were never brought into their home were asked where they obtained the food item as a follow-up question (Question 11).

There were several aspects of the question order that we felt were problematic. First, the opening sequence focused the respondent's attention on time as a trigger for recalling foods eaten the previous day, rather than allowing them to use other cues which might yield increased reports of food and beverage items (see the next section for a discussion of this question series). Furthermore, it is difficult to ask someone "what time did you begin eating or drinking this" before you have determined exactly what "this" is. Second, the use of two questions asking respondents where they got the food that they ate (one asking about foods eaten at home, and the other asking about foods that had never been brought into the home) was confusing. It made for very awkward skip patterns. While the questions are asked on an item-by-item basis, the skip instructions seem to be based on eating occasions.

Third, the skip instruction about the main meal planner/preparer produced a very confusing skip pattern and we felt that asking the questions relating to the preparation of the food only of one "main" meal preparer was too confining. "Main meal planner/preparer" seemed to us to be an outdated concept, because fewer meals are actually being prepared at home, and in many households there is more than one person who does the cooking.

Our approach to revising the structure of the dietary recall section was to improve the flow. At the same time, we also had to incorporate changes to the question content requested by the sponsor. First, new response categories were suggested for the question about where foods that were part of the home food supply came from, and second, a new question was proposed to determine if carryout foods eaten at home were delivered by the food establishment (as opposed to being carried out by a household member). (Appendix 2 contains the revised question series.)

Our changes to the opening sequence of questions are detailed in the next section. Basically, we reversed the order to ask first about the foods that were eaten and then about the time they were eaten and the name of the eating occasion. In our early interviews, we tried to elicit all three pieces of information during a single review of the day by the respondent, but we found that this hindered recall. Respondents usually provided either the time or the name of the eating occasion in addition to the name of the food item (depending on what recall strategy they were using), but not both. When the interviewers probed to get the additional information, the respondents lost their train of thought. This led to our development of the question series that is described in the next section.

Following this opening question sequence, we maintained the same order of Questions 5-6, which requested the respondent to describe the food item (e.g., provide information about

whether the food was frozen, canned, or fresh, low-fat or regular, fortified with vitamins) and provide portion size estimates. The questions about food description are contained in a separate document called the Food Instruction Booklet, which contains questions specific to each food item.

We did additional re-arranging of subsequent items (Questions 7-11 in Appendix 1). Question 7, which determines whether a food was part of the home food supply, was moved to the end of the series. Question 8, which asks about the source of foods in the home food supply, was combined with Question 11, which asks about the source of foods for items that are not part of the home food supply. This became Question 7 in the revised version (Appendix 2). This merger was possible because the sponsors proposed an expanded set of response categories (not shown) for the home food supply question. The expanded list was fairly similar to the response categories for Question 11. Asking a single question about where respondents obtained their food eliminated some of the awkward wording in the question for food eaten away from home.

Our final change regarding the organization of the dietary intake section involves the placement of the question that determined whether the food item was part of the home food supply (Question 7 in Appendix 1). Originally this question was asked immediately after the portion size question and served as a screener for the two questions about where food was obtained. Since we combined the two food source questions into one, the home food supply question was no longer needed as a screener. Furthermore, the sponsor proposed adding a new question about delivery of food, and this was logically related to the food supply question since it was only asked when foods were eaten at home. Our approach here was to move the home food supply question to Question 8 (Appendix 2), following the question about where food was

obtained. We also revised the wording of the home food supply question to eliminate the awkward and confusing verbiage (changes to the home food supply question are discussed in the section on question wording changes). Then we inserted the delivery question after the home food supply question, as the last item in the dietary intake series (Question 9). Since the food delivery question was contingent both on whether the food was eaten at home and where the food originally came from (i.e., a restaurant, cafeteria, or carryout place are the only relevant answers here), a complicated skip instruction was required to add it to the questionnaire. The final question order for this series was to ask the source of the food immediately after the portion size estimate; then the question about whether the food was from the home food supply; and finally whether the food was delivered to the home.

The 1991 questionnaire contained additional questions about the use of salt and fat in preparing foods, which were asked only of the main meal planner/preparer. This concept was encountered in the intake questionnaire¹ in an interviewer instruction before Question 9. As noted previously, we felt this was an outdated concept, and its use in the dietary recall section necessitated awkward skip patterns. We dealt with the problem of requiring the meal planner/preparer to answer questions about the preparation of food by eliminating the concept entirely. We had several respondents in our interviews who said they considered themselves to be the main meal planner/preparer, but who did not prepare any meals the previous day. We felt that the same amount and level of information could be obtained by asking all respondents whether they had prepared the food they were reporting. If the respondents had prepared the food, whether or not they were the main meal preparers, they could provide more in-depth information about the food than respondents who did not prepare the food. Before listing a food or beverage

item in the Detailed List, the interviewer could ask respondents if they made the item.

Respondents who prepared the item could be asked about each individual ingredient, while respondents who did not prepare the food/drink could be asked about the entire food/drink as a single item. We then moved the questions about whether salt and fat were used in preparing the food (Questions 9-10 in Appendix 1) off of the questionnaire and into the Food Instruction Booklet, where they could be inserted for appropriate food items. This approach eliminated the complicated skip patterns concerning the main meal planner/preparer.

Structure of the Food Recall Questions

As noted previously, the CSFII collects a complete listing of all foods the respondent ate during the previous day and details about these foods. The individual intake portion of the 1991 questionnaire obtained this listing by first asking the respondent the time he/she ate or drank something, the name of the eating occasion, and finally, what the respondent had to eat or drink on that occasion (see Appendix 1). Once all of the foods were listed, the questionnaire captured details about each food and the amount actually eaten. This method of listing the foods eaten has three major problems. First, chronological order is not necessarily the best recall strategy. Second, respondents do not always think in terms of "eating occasions." Third, the questionnaire asks the respondent to perform this fairly complex task of recalling all food eaten only once, which probably is not sufficient. Research has shown that questioning respondents multiple times is useful in generating more recall, provided the question is asked in different forms or probed in different manners.

To address these problems, we revised the questionnaire to use a multi-step approach, designed to initially obtain as complete a list as possible. This approach consisted of developing several food lists, which required different levels of detail in the foods reported. (Appendix 2 contains a copy of the revised questions.) The first was a "Quick List," for which respondents would use any recall method they desired to report all food and beverages they could remember. The question read: "Think about everything you ate or drank yesterday, from midnight to midnight. Include everything eaten at home or away - even snacks, coffee breaks, or alcoholic beverages." The idea here was to stimulate a free recall of the food and beverages consumed the previous day. After that, interviewers obtained a "Detailed List" designed to discover additions to foods (such as cream in coffee), beverages, and any other items initially forgotten. This was accomplished by referring to the foods reported in the Quick List, and asking about additional foods or drinks consumed at each eating occasion. Following that, interviewers asked two probing questions which required respondents to review the previous day for the third time. One of these questions was designed to stimulate reports of certain types of eating occasions, while the other asked about any additional foods or beverages. Thus, at three separate points in the questionnaire, respondents would be asked to perform different cognitive tasks related to food and drink consumption, and probed each time for anything previously forgotten.

This revised approach had several advantages. First, it allowed the respondent his/her own cognitive strategy. Respondents could use any cognitive method desired for recall, either recalling events during the day, recalling meals, or anything else. It did not insist on beginning with the first eating occasion.

Second, it changed the question order, asking what the respondent ate or drank before asking when it was eaten. This avoided imposing a recall strategy based on time, and allowed the respondent much more cognitive freedom in answering.

Third, it provided more explicit reminders of items most likely to be wrongly omitted. It provided specific instructions that call for the inclusion of snacks, alcoholic beverages, and coffee breaks. It also instructs the respondent to think about foods eaten away from home in addition to foods eaten at home.

Fourth, as noted previously, it provided multiple cues and allowed respondents several opportunities to recall food and beverage items.

Our cognitive interviews revealed that, for the most part, the Quick List seemed to work very well. Respondents did in fact use a variety of recall methods to respond, and the Quick List accommodated them: while most respondents reported their foods and beverages in chronological order, they did so by thinking of events during their day, which then triggered memories of eating or drinking something. Other respondents thought primarily in terms of meals, and reported in terms of "meals" and then "snacks."

We tried two different ways to elicit the Detailed List: one with a general question ("For your (label), you had (food items). Did you have anything else with your (food items)?") and another with a specific set of probes (Questions 4a-4c in Appendix 2). We found that the first version caused confusion because respondents had difficulty interpreting what was to be included as something "with" the food. This question was successful in eliciting whole food items (e.g., potato chips with a sandwich) but not additions (e.g., mayonnaise on the sandwich). For this

reason, the more detailed set of probes shown in Appendix 2 (Questions 4a-4c), which could be tailored to the specific food item on the Quick List, was developed.

These probes for the Detailed List were designed to increase reports of foods eaten during eating occasions that had already been reported. An additional probe (Question 4d in Appendix 2) was developed based on input from respondents early in our testing and focused on additional eating occasions in a particular time period. We discovered that the food preparation process frequently provided opportunity/temptation for food consumption, and we developed a question to systematically remind respondents to probe their memory for this time period. This question was successful in our later interviews in stimulating reports of additional foods.

Wording of Questions and Response Categories

We made a number of changes to the question wording and response categories. In this paper, we discuss two of them: the question about where food was obtained, and the food supply question.

Where Food Was Obtained

As noted previously, two questions were used to obtain information about where each individual food item was obtained. The question about the source of food that was eaten at home (Question 8 in Appendix 1) has an awkward set of response categories, with the most frequently reported response (i.e., from the grocery store) being relegated to "some other place." The question about food eaten away from home (Question 11 in Appendix 1) used the phrase "home

food supplies." This is a phrase that is unfamiliar to respondents, has not been defined for them during the course of the interview, and is really unnecessary for them to encounter. Although the concept has meaning in terms of data analysis, the terminology just causes confusion in the minds of respondents.

We noted a number of problems with the list of response categories in the "away from home" question. First, the responses are not all at the same level of association to the food obtained:

1) Some of the categories are places where food is actually purchased or otherwise obtained--restaurants, stores, and feeding programs are examples of this. However, other categories (e.g., school and recreation/entertainment facility) are places where food may be consumed, but they do not imply a particular method of obtaining the food. At an amusement park, food could be obtained at either a restaurant or a fast food facility, for example.

2) The vending machine category also seems problematic because additional information about the location of the vending machine is sought. However, only a few of the many places where vending machines are available are included as response categories.

A second problem with the response categories is that for places where food is obtained, there are only a few categories and they are extremely specific. This means that there are lots of places that are not covered except under the general heading "some other place." For example, the 1991 questionnaire distinguishes between convenience stores and grocery stores/delis. However, other types of food stores such as bakeries are not included.

And finally, there are some sources of food that are missing altogether, such as vegetables grown in your own garden.

We made changes to address these problems (Question 7 in Appendix 2). First of all, as noted previously, we combined them into one question. We revised the wording to "Where did you obtain this (food item)?" Early in our interviews we tried "where did you get this (food item)?" but we found that it invited answers such as "in the refrigerator" for foods that were in the home. For some unknown reason, using the word "obtain" seemed to convey to respondents that we were seeking the household's source of the food item (that is, the store) rather than the immediate source (that is, the refrigerator). We also changed the procedures for answering the item, which in the 1991 questionnaire required interviewers to code the respondents' open-ended answers. We felt that this introduced a potentially serious interviewer bias into the results, so we included the response categories on a flashcard for respondents to examine before giving a response.

We also made some changes to the response categories for this item. First, we eliminated from the list places such as amusement parks that were not specifically food vendors. Second, we eliminated vending machines. Third, we assumed that all kinds of stores that sell food were of equal interest, and we created a single "food store" category, which included grocery stores, convenience stores, and specialty stores as well as drug stores. Fourth, we added a category "grown or caught by you or someone you know." This category served two purposes: 1) it captured information about a category of food that we thought was missing (home grown vegetables); and 2) it captured new information about fish that was not commercially purchased that the sponsor was interested in collecting.

Our cognitive interviews revealed that these response categories generally worked, and the flashcard helped respondents to see the level of detail that was required. There were a couple

of kinds of food stores that respondents did not immediately associate with the response categories in our early interviews. These were food warehouses (such as Price Club, Murray's), commissaries on military bases, and roadside produce stands. We added these to our final version.

In general, respondents were able to differentiate among restaurants, cafeterias, and fast food places. However, there were some situations that caused confusion, such as answering incorrectly based on a specific eating occasion rather than the characteristics of an establishment. (One respondent had carried out a pizza from a place with sit-down service. Since she did not eat there, she classified it as a fast food place; she said she would have called it a restaurant if she had eaten there.) We reworded the response categories to focus on the type of establishment, and to make the differences between the categories more salient. However, we still think that there is overlap between the "cafeteria" and "fast food establishment" categories, and that reporting of them is subject to misclassification errors. Our primary suggestion for dealing with this is to combine these two into a single category, but our more realistic one (recognizing the sponsor's needs) was to place the terms "cafeteria" and "fast food place" at the beginning of their respective categories to catch respondents' attention as they read through the list.

Home Food Supply (Where Food Was Eaten)

Although the item that asks where a food item was eaten has a relatively simple purpose (i.e., to determine whether an item was part of the home food supply), the 1991 version of the

question (Question 7 in Appendix 1) is quite awkward. The focus of the question is never made clear to respondents, who are simply asked a series of phrases about eating and bringing food to different places. "Brought into your home, but later eaten away from home" is particularly confusing terminology.

In revising the question, we first attempted a direct question that addressed the basic home food supply concept: "Was this (food item) ever brought into your home?" However, this wording was ambiguous to respondents. While some respondents understood the intended meaning, others thought the question referred to the type of food item (e.g., Kool Aid in general rather than this particular container of Kool Aid). They thought the question was asking either whether they usually buy this kind of food or whether this kind of food had ever been in the house before.

Our next approach was more successful. We created two questions instead of one. If respondents had eaten at home, this automatically made the food part of the home food supply. So we first asked directly whether they had eaten the food at home. Then, respondents who answered "no" were asked, "Was this (food item) ever in your home?" This question needed some fine tuning to address two problems: (1) there was still some ambiguity about whether the question meant "this particular food item" or the food in general; and (2) the fact that leftovers from a restaurant are only considered part of the home food supply if they are eaten after they are brought home from the restaurant. Our final wording (Question 8 in Appendix 2) used the two-question approach but revised the second question to ask whether the particular food item was in the respondent's home before he/she ate or drank it.

Conclusion

This paper presents the results of exploratory research conducted to improve reporting on the CSFII. In this research, we demonstrated that respondents use different recall strategies to approach the task of providing a list of foods and beverages consumed during the previous 24-hour period. We revised the structure of the questionnaire and incorporated multiple cues to let respondents review their day several times and allow them the opportunity to remember additional food items. We also used input from respondents in cognitive interviews to revise the question wordings and response categories to create questions that minimize confusion and misinterpretation.

In general, our cognitive interviews suggest that our revisions were successful. Since this was exploratory research, we have not conducted a split-panel test to evaluate the effects of our changes. However, we feel that, based on this research, we have recommended changes that will improve the quality of data collected in the CSFII.

NOTES

¹ The meal planner/preparer concept was introduced in the 1991 household questionnaire, which was administered prior to the individual intake questionnaire.

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