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Methodology of a Survey on Meal Patterns in Private Senior Households

C. PFAU
Federal Research Centre for Nutrition, Institute of Nutritional Economics and Sociology

The methodology of a study on meal patterns is discussed. For data collection, menu records on the current diet over two periods of 6 weeks each and an additional self-administered questionnaire on various food related aspects were selected as instruments. Information is required concerning e.g. time, kind and frequency of meals during the day, kind and frequency of dishes consumed and the combination of these. The aim of the study is to obtain information about the nutritional behaviour of the elderly especially on meal patterns. These data are intended as the basis for menu plans reflecting actual nutritional habits in a diet, according to individual requirements, and not for assessing the participants' nutritional status.

Introduction

Methods used for nutritional surveys vary according to different purposes. Food frequency questionnaires (FFQ) usually employed in nutritional epidemiology, and recall and record methods, are primarily used to estimate the nutrient intake of a certain target group with regard to one or more food components (Sichert *et al.*, 1984; Winkler, 1992). They are intended to recognize and explain correlations between diet and health. Records on dietary intake are normally focused on food level by these methods.

The results of such studies are the basis of information on "desirable" nutritional behaviour and aids for nutritional counselling. However, such dietary advice is complied only when it is understandable and realistic. Advisors should, therefore, know the eating habits of the individuals addressed. Recommendations are often made without any support for their realization and with insufficient regard on nutritional behaviour.

In comparison to data on food composition and nutrient intake, there is less reliable data on actual complex nutritional behaviour and eating habits. Methods used to obtain information about the nutritional status of certain groups are not suitable in every case for determining eating habits and nutritional behaviour. One of the reasons is that the periods recorded are usually short in order to reduce stress to the participants. If behavioural data are recorded, e.g. in protocols, they are only seen as "important additional information" (Winkler, 1992, p. 18).

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Address correspondence to: Dr Cornelie Pfau, Federal Research Centre for Nutrition, Institute of Nutritional Economics and Sociology, Haid-und-Neu-Straße 9, D-76131 Karlsruhe, Germany.

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Knowledge on nutritional behaviour is required when modelling an optimal diet, which should represent reality as far as possible. In models of "optimal diets" (Karg & Piekarski, 1984; Leung *et al*., 1996; Steinel, 1993), the number of meals per day, menu compositions and numbers of courses are not based on empirical data, but on assumptions. The same applies to menu plans composed by dieticians for nutritional counselling, and to those serving as the basis on which the cost of diets according to individual requirements is calculated.

Existing methods should hence be modified, if possible, and new ones be developed in order to gain insight into the eating habits of certain groups, allowing those concerned to make dietary recommendations, compose menus and prepare menu plans which take into account actual eating habits and, therefore, have a greater chance of being accepted.

The aim of the study is to gain information on the nutritional behaviour of the elderly. The data are intended as the basis for menu plans reflecting actual nutritional habits in a diet according to individual requirements (Piekarski & Pfau, 1993) and not for assessing the participants' nutritional status. A meal is defined as intake of food and/or drink at a time determined. In regard to meal patterns,[1] information is required on the temporal structure of food and/or drink intake as well as on other structuring characteristics of the different meals. Data on kind and frequency of food and drinks consumed are also to be collected. Kind and frequency of the reported items are used to select those meals which are to be included in the meal plans, and for the development of the necessary standard recipes. The meal plans also have to indicate the cost of the meals, but optimization of these is not primarily required.

Developing Instruments

In the following, only the methodology—mainly for data collection—of this project is presented. Firstly results concerning meal patterns are published (Pfau & Piekarski 1997, 1998).

Information Required

The instruments selected depend on the kind and content of data to be collected, on the extent of stress to which the participants may be exposed and on the resources of the researchers. Information needed to compose menu plans and to identify meal patterns may be subdivided into the following categories:

- Information about meals, including kind of meal and the time of its intake (breakfast, lunch, dinner, snacks); frequencies of meals on the days of the week over a certain period; number of warm and cold meals and frequency and distribution of these; frequency of various courses (menu structures); kind and frequencies of meals eaten at home and meals eaten out.
- Information about the dishes, including kind and frequency of individual dishes; frequencies of the repetition of individual dishes or combinations of these; kind of the material used for food preparing (fresh, deep-frozen, sterilized, dried, fat content); combination of the dishes in a menu.

[1] See also the non-uniform use of the term meal pattern by Lennernäs, 1993.

- Additional information influencing the selection of dishes and the preparation of these, including constraints and their reasons; use of nutrient supplements; appliances available; frequencies of purchases of food depending on the material used; seasonal differences.

This information is necessary because the sequence of meals, differences in consumption between weekends and working days, and seasonal fluctuations, for instance, have been found to be important for nutritional physiology (Schlettwein-Gsell, 1995; Schlettwein-Gsell & Barclay, 1996; Winkler *et al.*, 1991, 1992). It should, furthermore, be possible to prepare the meals recommended from initial materials usually employed by seniors, and by means of appliances available in senior households (Piekarski & Pfau, 1996).

Reasons for Choosing the Instruments

(1) For the collection of data, the daily food had to be recorded in detail over a certain period (prospective qualitative recording). This method was selected for the following reasons:

- For seniors, recordings immediately after food intake seem to be most appropriate. They do not provide information, however, whether, and to what extent behaviour changes by the recordings, even if the participants were instructed very carefully.
- The whole spectrum of food and drinks consumed is to be determined. For this, (retrospective) FFQ methods are not suitable as they are primarily designed to ask for a selection of food and the frequency of consumption. The standardized form of the FFQs, furthermore, prevents the various characteristics of meal patterns from becoming evident.
- In the present project, in contrast to epidemiological studies, nutrients and food components ingested are not of primary importance. Information about portion sizes needed to calculate the nutrient supply is partly taken from empirical studies (Ulrich & Piekarski, 1990a, 1990b). That quantities consumed need not be indicated reduces the stress involved and increases the participants' readiness to participate.
- To learn about the frequency also of meals and dishes not so often or seldom served, the questioning takes 6 weeks. This length of time results from experience from a previous project in which 83 households recorded food intake over two periods of 6 weeks each. It was found, for instance, that fish was served for lunch (dinner) in 34% (22%) of the households only once in a fortnight, in 40% (40%) only once in 4 weeks, and in 10% (20%) never during the recording period. Collecting data on dishes consumed infrequently by a FFQ does not provide the same information for this question, because neither dependencies of time, kind of meals nor combinations of the different items are reported. It is also intended to list the variety of dishes that are established but eaten infrequently, so that dishes probably having a recomendable relation of nutrients can be considered in menu plans more frequently.
- A period of 6 weeks is regarded as the maximum of time and stress to which households can be exposed; this was confirmed by the fact that some households stopped recordings for 1–2 weeks (these interruptions are taken into account in the assessment). Recordings over 6 weeks would also allow to irregular behaviour to be identified.

1. Week

Monday,.....1994	What do you eat and drink?
Breakfast	(Time:.....)
Food in the morning	
Lunch	(Time:.....)
Coffee/tea in the afternoon	
Dinner	(Time:.....)
Food in the evening	

FIGURE 1. Form sheet for self-recording in a one-person household.

- To learn about seasonal influences, recording is repeated for another 6 weeks during a different season of the following year.

The form sheets to be filled in by the participants provide space for information about every food item and/or drink consumed by each person at the following times (Fig. 1): breakfast, additional food in the morning, lunch, additional food in the afternoon, dinner and additional food in the evening. If there is consumption before breakfast, this information (including the time), is also to be recorded in the space provided for breakfast.

The participants decided themselves what they regard as a traditional meal and what as a snack in between. Precise information as to times was requested for the traditional meals breakfast, lunch and dinner. The recordings should be as precise as possible, e.g. initial material used for food preparation had to be indicated as

well. An example in the form of a completed sheet, and instructions how to fill in the form sheets had also been added to the material.

(2) A self-administered questionnaire supplementing the records asked for age, gender and previous occupation of the household members, size of residence, net income and various food related aspects. The following aspects were also included: intake of supplements, conditions of food preparation, kind of material used for food preparation, cultivation, storage and preservation of fruit and vegetable, shopping behaviour and household appliances available. Moreover, information on one item corresponding to the daily records, namely the kind of meals per day on working days and on Saturdays and Sundays, was required. In this way information on one characteristic from the questionnaire can be compared with information recorded (validation of a characteristic by a second method).

Selection of Participants and Collection of Data

The target group should consist of men and women between 65 and 75 years who live in one- or two-person households (no agricultural households), are retired, cook their own meals and are not on a strict diet.

For the region selected, random sampling of participants would have involved unjustifiable expenses, because the necessary statistical data are not stored centrally, but at individual communities. In the present case, random sampling, furthermore, involves the risk that only a little of the material is returned, as not all persons addressed can be supposed to consent to daily records over two 6-week periods. Willingness to write down the requested information is an essential criterion for the selection of participants. It was therefore decided to win participants through food-related newspaper articles inviting seniors to participate in the survey planned. Persons interested were asked to call or write for further information. More than 250 were interested in participating. To increase acceptance, the participants were paid a small sum.

The participants were selected from this group according to age, gender and size and place of the household according to a quota method on the basis of the statistical distribution of this age group in Baden-Württemberg. Accordingly, 52.5% of this age group live in one-person, and 47.5% in two-person households. Nearly half of the households had to be selected from places of more than 20000 inhabitants, the rest from places of less than 20000.

To obtain sufficient information also about subgroups (gender, size of households and places), analysable information of not less than 150 households for both recording periods was required. As experience has shown that, in time-consuming undertakings of this kind, some participants can be expected to stop recordings, additional 30 households were recruited, leading to a total of 180 (see Table 1).

Data Collection

In autumn 1993 the material for the first period, a letter including exact information on the return date and a stamped return envelope was mailed. It was intended by the institute staff to make an appointment and visit the participants at the beginning of this period, to answer questions concerning the daily records and

TABLE 1
Number of households which received and returned the material, compared to the number required according to the statistical distribution

Household number						
desired number	150					
First period:						
(sent/returned)	183/181					
Second period:						
(sent/returned)	177/168					
Household size	One-person households				Two-person households	
Desired number	79				71	
First period:						
(sent/returned)	96/95				87/86	
Second period:						
(sent/returned)	94/89				83/79	
Gender	Men		Women			
Desired number	12		67		71	
First period:						
(sent/returned)	14/14		82/81		87/86	
Second period:						
(sent/returned)	14/13		80/76		83/79	
Analysable	10		73		73	
Size of place	1[a]	2[a]	1[a]	2[a]	1[a]	2[a]
Desired number	6	6	37	30	35	36
First period:						
(sent/returned)	10/10	4/4	64/63	18/18	56/55	31/31
Second period:						
(sent/returned)	10/9	4/4	62/58	18/18	54/51	29/28

[a]Size of place according to the number of inhabitants: 1 = ≥20000 inhabitants; 2 = <20000 inhabitants.

completion of the questionnaire. In spring 1994 form sheets and instructions for the second period were mailed, again with a stamped return envelope.

CONCLUSIONS

Sample

The statistics did not quite meet the requirements because some groups were underrepresented (Table 1). There were more urban households—both one- and two-person—than rural ones; since less rural households had responded to the call, more urban households had to be included to obtain the total of 180. The return figures showed, furthermore, that single men were also underrepresented.

Of the first 6-week period, 99% of the households returned the completed questionnaires and daily records, and of the second 92%. Reasons for stopping the recording were underestimation of expenditure and illness or death of participants. Analysable data of 156 households are available which met the statistical requirements for household sizes and gender (Table 1).

Implementation of the Study

In consideration of economical aspects and of the necessary high willingness to continuous recording, winning participants by newspaper articles seems to be a quite practicable procedure. There are no findings yet which support the apprehension that only people with high interest in nutrition take part in this kind of survey. Regarding this, however, precise statements are only possible after evaluation of the records. In addition, there are no findings as to what extent the payment may have influenced the willingness of participating in the survey.

As a whole, questionnaires as well as form sheets turned out to be successful. Further surveys in senior households should take the following into account:

- The form sheets should provide a separate space for food and/or drinks before breakfast, because in this survey this meal is consumed in 20% of the one-person households.
- The intention to visit all participants at home could be realized only partly; 40% of the households were visited, 60% refused the visit. The quota of visits should be increased in further surveys as visits contribute to the acceptance of the survey and the quality of the records could be improved by support at home.

References

Karg, G. & Piekarski, J. (1984). SERPHA—Programmsystem zur Ananlyse und Planung der Ernährung in privaten Haushalten. In L. Arab & G. Karg (Eds), *Entwicklung und Benutzung von Nährstoff-Datenbanken in der Bundesrepublik Deutschland*, (The development and use of nutrient data bases in the Federal Republic of Germany). Berichte der Bundesforschungsanstalt für Ernährung, BFE-R-84-04, Karlsruhe, Pp. 171–181.

Lennernäs, M. A.-C. (1993). Nutrition and shiftwork. The effect of work hours on dietary intake, meal patterns and nutritional status parameters, Uppsala, 14p.

Leung, P., Wanitprapha, K. & Quinn, L. A. (1996). A recipe-based, diet-planning modelling system. *British Journal of Nutrition*, *74*, 151–162.

Pfau, C. & Piekarski, J. (1996). Einkaufsgewohnheiten, Geräteausstattung und-nutzung im Ernährungsbereich von Haushalten älterer Menschen (Shopping habits, kitchen appliances and use of these in private senior households) (Abstract). *Zeitschrift für Ernährungswissenschaft 35*, 104.

Pfau, C. & Piekarski, J. (1997). Nutritional behaviour of elderly persons in private households: times of food consumption and food choice. *Supplement to The American Journal of Clinical Nutrition*, *65*, 1364S.

Pfau, C. & Piekarski, J. (1998). Meal patterns in households of the elderly. *European Journal of Clinical Nutrition*, *52*, S38.

Piekarski, J. & Pfau, C. (1993). Menüoptimierung mit dem Programmsystem "SERPHA". In G. Ulbricht, G. Karg & U. Oltersdorf (Eds), *Sozialökonomische Forschung zum Ernährungsverhalten in den alten und neuen Bundesländern-Stand, Entwicklung, Perspektiven*. Berichte der Bundesforschungsanstalt für Ernährung, BFE-R-93-02, Karlsruhe, Pp. 185–194.

Schlettwein-Gsell, D. (1995). Zur Bedeutung der Mahlzeitenfolge für die Physiologie der Ernährung (Importance of the meal pattern for nutrition physiology). *Ernährung/Nutrition*, *19*, 119–121.

Schlettwein-Gsell, D. & Barclay, D. (1996). Longitudinal changes in dietary habits and attitudes of elderly Europeans. *European Journal of Clinical Nutrition*, *50*, S56–S66.

Sichert, W., Oltersdorf, U., Winzen, U. & Leitzmann, C. (1984). *Ernährungs-Erhebungsmethoden (Nutrition-Assessment Methods)*. Methoden zur Charakterisierung der Nahrungsaufnahme des Menschen. Schriftenreihe der AGEV. Band 4: Beiheft der Zeitschrift Ernährungs-Umschau 31.

Steinel, M. (1993). Modelle zur Bestimmung einer optimalen Ernährung in privaten Haushalten (Models for the determination of an optimal nutrition in private households). *Zeitschrift für Ernährungswissenschaft*, *32*, 79–92.

Ulrich, H.-J., Piekarski, J. (1990a). Verzehrsmengen bei der Mittagsmahlzeit in der Gemeinschaftsverpflegung. 1. Mitteilung: Methoden und Meßergebnisse (Portion sizes at lunch. 1. message: methods and results). *Ernährungs-Umschau*, *37*, 284–290.

Ulrich, H.-J. & Piekarski, J. (1990b). Verzehrsmengen bei der Mittagsmahlzeit in der Gemeinschaftsverpflegung. 2. Mitteilung: Einflußgrößen und Verzehrsmengen (Portion sizes at lunch. 2. message: parameter and portion sizes). *Ernährungs-Umschau*, *37*, 318–322.

Winkler, G., Döring, A. & Keil, U. (1991). Unterschiede im Ernährungsverhalten zwischen Wochenenden und Werktagen: Ergebnisse der Ernährungserhebung 1984/85 des MONICA-Projektes Augsburg. *Zeitschrift für Ernährungswissenschaft*, *30*, 313–317.

Winkler, G., Döring, A. & Keil, U. (1992). Saisonale Schwankungen im Ernährungsverhalten: Ergebnisse der Ernährungserhebung 1984/85 des MONICA-Projektes Augsburg. *Zeitschrift für Ernährungswissenschaft*, *32*, 19–24.

Winkler, G. (1992). Validierung einer Food-Frequency-Erhebung. Dissertation. München.