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Original Article

What to ask in a self-administered dietary assessment website: The role of professional judgement

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Abstract

Professional judgement is a key component of questionnaire development, subjective in nature and rarely reported in this context. It is required in dietary questionnaires to delimit the size while retaining quality of the data. The objective of this study was to describe the nature and extent of professional judgement involved in developing a food database to include in a web-based self-administered dietary assessment. Professional judgement was applied in tandem with a stepwise statistical analysis of hierarchically reported foods in the Australian National Nutrition Survey (NNS95). Statistical analyses determined foods commonly consumed and eaten together and three different forms of cluster analysis were then used to group foods that were most similar in macronutrient content. Professional judgement was required to interpret these groupings and determine the most suitable clustering technique. Face validity of the resulting food groups was determined by recognition of the food name by experienced dietitians, as usually reported in a diet history interview. Applying professional judgement to differentiate between foods after the cluster analysis resulted in an increase from 370 to 501 food groups. A final three-level hierarchy of 19, 103 and 422 groups in the new database compared with 21, 106 and 370 groups of NNS95 was developed. The use of professional judgement in database development is an important step when they are to be used in self-administered assessments. It ensures foods are not only nutritionally appropriate but also conceptually appropriate for recognition by a layperson.

Keywords: Dietary assessment; Questionnaire development; Internet; Statistical analysis; Professional judgement

1. Introduction

The development of a database for nutrient analysis is a complex process involving vast amounts of data (Ireland et al., 2002). In Australia, for example, such databases can contain over 4500 individual food items (each with their own item codes) for which nutrient data are available (Australia New Zealand Food Authority, 1999). The methodology employed to organise these data into a useful format will also vary depending on the type of output required and the overall use of the database. Although the use of statistical analysis is a primary methodology in the development of food databases (Shai et al., 2004; Peterson and Dwyer, 2000; Akbaya et al., 2000). Many studies do not report the methods used in the database development (Ireland et al., 2002). Studies that do report the analysis vary widely. For example, Akbaya et al. (2000) utilised hierarchical cluster analysis to develop a composition database of lamb. The cluster analysis helped to determine the differences in the fat composition of lamb prepared using different methods.

Food composition databases, however, are vital to dietary assessment methodology. An automated diet history interview was developed in the Illawarra region of New South Wales, Australia allowing individuals with metabolic syndrome to self-report their usual dietary intake. The most recently reported data on Australian dietary intakes is provided in the National Nutrition Survey (NNS95) of 1995. This survey provides 24-h recall data for 13,858 individuals. In the study reported here, foods collected from the NNS95 were used, sorted into

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a database of four-level hierarchical food groups. Each level of the hierarchy varied in the level of detail about the food items with the broadest level containing 21 food groupings and the most detailed level containing more than 4500 individual food items. This format would allow for a multiple-pass format and allow users to log out of the assessment and return at a later time. In this project the NNS95 data underwent various phases of statistical analysis, between which professional interpretation of the results were required.

In this context, professional judgement, the application of knowledge, skills, values and experiences of qualified professionals to the interpretation of data, has not been widely reported. A Medline (New York, NY: Ovid Technologies, Columbia) search from 1966 to 2005 found that studies utilising professional judgment as a methodology either do not define the details or have been reported more than 10 years ago (Bentsen et al., 1988; Farand et al., 1995; Gilmore, 1992; Hepworth, 1989; Regan, 1981; Slavkin, 1972). The few recent studies describing such processes (Greaves and Grant, 2000; Coles, 2002; Lelie et al., 1999; Lo et al., 2005) do not commonly relate to the field of nutrition, and none to database development. The only nutrition paper found, described a comparison of professional judgement used by dietitians and dietetic technicians with an algorithm used for assessment of malnutrition in hospital patients. Finding differences between the level of experience and the reliability of the professional judgement, the inter-rater reliability of the algorithm was preferred (Lowery et al., 1998).

Therefore, the aim of this paper is to describe the nature and extent of dietetic professional judgement involved in developing a food database for inclusion in the user interface of the self-administered dietary assessment website.

2. Methods

Raw food and nutrient data from the NNS95, sorted by meals, was initially used to determine the degree of error associated with the use of individual food names representing groups of foods. The analysis revealed that grouping foods resulted in a 5–10% reporting error. Resultantly, a total of 370 foods listed in the second NNS95 level were selected as the starting point for analysis and database development rather than the 4500+ individual food items.

A list of foods commonly consumed per meal was established by determining those consumed by 99% of the population for both frequency of consumption and contribution to total energy. Foods eaten together (associated foods) were also assessed based on a 50% confidence level. The entire food list then underwent cluster analysis to group foods based on similarities in macronutrient composition.

Output data from statistical analysis of food intake data reported in the NNS95 (Burden et al., under review) was interpreted by an experienced dietitian upon completion of each analysis. The following outlines the professional judgement that was required. The interpretation of the data was based on recognition of foods by the dietitian as foods commonly reported during a diet history interview (due to the age of the nutrition survey data), or readily available to the general public in major retail outlets. Foods were included if they were identifiable in documentation from previously conducted diet history interviews from intervention studies (Martin, 2003; Tapsell, 2004) using a similar target population. Foods were excluded if they were unavailable to the general public or if they were aimed at population groups outside of the target group, for example, children or infants. Further, new foods were added to the database if the dietitian considered them to be consumed in greater quantities today than 10 years ago based on the intervention study data. Food eaten together and the composition of the food groups based on nutrient and conceptual similarities were then considered. This was important as not only did the user need to recognise the food items but also the groupings need to be useful to the dietitian who would receive the output data from the website. Finally, the devised food database was assessed by five dietitians for face validity and modified by consensus.

2.1. Common and associated foods

The item codes of the NNS95 food groups were used in the statistical analysis (Burden et al., under review). Names of the food groups were not included in the analysis; therefore, interpretation of the results began with naming of each of the item codes that emerged from the statistical analysis for each meal (breakfast, lunch, dinner and snacks). Each common food was then related back to the original food grouping from NNS95. The analysis resulted in a number of individual food names remaining that were not identified as commonly eaten, e.g., plain flour. This list of foods was then reviewed to determine the impact of their inclusion or exclusion within the food database for the study population (i.e., adults with metabolic syndrome).

The names of associated foods were to be used as probing questions in the web-based questionnaire via a questioning hierarchy. For example, if a user selects cereal for breakfast, the website would then automatically ask for foods that are eaten with the cereal such as milk or fruit. While food groups had been previously alphabetised in the NNS95, the associated food lists obtained from further statistical analysis of the NNS95 data, needed to be reviewed by the dietitian to determine their inclusion or exclusion within the question schedule for the automated dietary assessment. Food combinations were included if they were reported together in diet history interviews from intervention studies. Foods which did not appear in the output for associated foods statistical analysis but appeared regularly in the diet history documents from intervention studies were also added to the food list. Foods that were not commonly reported together were excluded from the associated foods listing, yet were still included in