Monitoring food-based dietary recommendations - a comparison of instruments

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Summary

The ability to monitor regularly, and effectively, the extent to which food-based dietary recommendations are being met by sub-groups within the Australian population is dependent on the availability and use of standard questions. Currently a number of different instruments are being used for this purpose. As a first step towards the development of standard instruments for use in population-based health surveys, this study compares the results obtained with three different instruments in comparable population-based samples.

Introduction

Australian dietary guidelines emphasize the need to include plenty of breads and cereals, vegetables and fruit as part of the basic diet (1). Target intakes for these foods are also provided either in terms of a given daily frequency of intake or as a specific number of serves (2). The existence of these recommendations, together with food and nutrition initiatives resulting from the implementation of the Food and Nutrition Policy (3), have led to the inclusion of questions about the intake of core cereals, vegetables and fruit in a number of state-based health surveys. Unfortunately, the questions used have differed from survey to survey and as a result it is usually not possible to compare the results from different surveys or to collate the data on an Australia-wide basis, in order to derive indicators of food intake for national nutrition monitoring. Two important differences in the design of questionnaire instruments are the length of the reference period used for assessing intake and whether the questions attempt to obtain information about serving size or simply about the frequency of intake. In order to provide some information on the effect of these particular differences in question format, on the results obtained, we have compared different question formats in the 1995 autumn and spring South Australian Omnibus Surveys (SAOS). In both of these surveys persons in the sample were randomly assigned to receive one of two instruments designed to obtain information about intake of the same kinds of food.

Methods

The design of the SAOS has been described in detail by Wilson et al (4). The survey was originally designed by the South Australian Health Commission and has been conducted every year, since its inception in 1990, by Harrison Health Research. The survey provides an opportunity for both government and non-government organisations to purchase specific questions about population health status. In addition to these questions, each participating organisation receives information for all respondents on age, sex, marital status, number of persons 15 years and over in the household, highest educational qualification obtained, occupation, country of birth, years of residence in Australia, household income and postcode.

The sampling design for the survey provides a clustered, self-weighting, multistage systematic area sample with a constant sampling fraction for both metropolitan and country areas. For both the 1995 autumn and spring SAOS an initial sample of 4200 households was selected. Response rates in the autumn and spring survey were 73.8% and 74.2% respectively, giving effective samples of 3001 and 3016 respondents.

In each selected household only one person was interviewed and where more than one person aged 15 or over resided in the household, the respondent was the person with the most recent birthday.In the autumn 1995 survey the comparison was between questions on core cereal, vegetable and fruit intake 'yesterday' and 'usually'. The questions used in this survey were based

on instruments developed by the National Center for Chronic Disease Prevention and Health Promotion for US Behavioral Risk Factor Surveys (5,6). Both these instruments ask only about the frequency of intake and not about serving size. The decision to use questions on frequency of eating rather than questions on the number of 'reference' serves consumed was made partly because this is an easier question for respondents to answer and partly because there is some evidence to indicate that frequency of consumption alone can distinguish between groups who meet and do not meet core food group recommendations for intake of cereals, vegetables and fruit (7).

In the spring 1995 survey, the comparison was between different questions on usual intake of vegetables and fruit. One of the instruments was the same as the frequency instrument for vegetable and fruit intake used in the autumn 1995 survey while the other instrument consisted of two questions on the number of serves of vegetables and fruit usually consumed per day. The latter instrument was used because it had been included as part of the 1995 National Nutrition Survey. Details of the questions used in both SAOS are available from the authors.

The field manager for Harrison Health Research examined all questionnaires prior to data input. In addition, approximately 5% of each interviewer's workload was selected at random and the respondents re-contacted to establish that they had in fact been interviewed and were the person in the household who had the most recent birthday at the time of interview. Subsequently the data were double punched and edited and where possible missing responses to questions followed up by telephone.

On receipt of the data file, by the authors, the integrity of the data was checked by comparison with the socio-demographic respondent profile provided by Harrison Health Research. Exploratory and statistical analysis of the data was carried out using SAS programs and procedures.

Results

As would be expected from the study design, the distributions of socio-demographic characteristics, for the respondents in both the autumn and spring SAOS, were comparable for those variables for which data were available. This was also the case for the two sub-samples within each survey.

The usual frequency of intake of vegetables was similar in the autumn and the spring survey (1.93 and 1.94), while the usual frequency of intake of fruit was slightly lower in spring than in autumn (1.06 and 1.09 respectively). The combined frequency of vegetable and fruit consumption was 3.02 in autumn and 3.00 in spring. None of these values, however, were statistically significantly different with season. Differences in the response patterns between the three instruments used in the two SAOS were thus unlikely to arise either because of socio-demographic or temporal differences between the survey samples.

Table 1. Mean and median frequency of intake per day.

	Yesterday		Usually	
Food group	Mean	Median	Mean	Median
Core cereals	2.45	2	2.47	2.3
Vegetables	1.85	2	1.93	1.7
Fruit (excluding juice)	1.10	1	1.09	1.0

Information on the frequency of intake can be expressed either as a summary measure, such as the mean or median for the group, or it can be expressed in terms of the proportion of the group who report a specific frequency of intake. The data from this study clearly indicated that, while both mean and median intake frequency were similar irrespective of whether the questions were asked about yesterday or about usual intake (Table 1), the proportion of the group reporting a given

frequency (1,2,3,4) of intake for a food differed considerably depending on whether the questions related to yesterday or to usual intake (Table 2).

Table 2. Percentage of each group reporting a given frequency of intake.

	Frequency yesterday				Usual frequency per day at least							
Food group	1	2	3	4	0.5	1	1.5	2	2.5	3	3.5	4
Core cereals	97.4	79.4	44.5	17.7	98.0	93.9	79.0	68.2	41.4	32.5	13.2	8.5
Vegetables	91.9	65.6	24.0	3.7	97.3	89.6	63.7	42.2	16.9	12.2	3.7	3.5
Fruit	70.5	31.0	8.9	0	66.6	58.9	23.7	23.7	9.5	9.5	1.7	1.7

One would expect to find a higher proportion of extreme values in the data based on one day than in the data based on usual intake. The proportion of the group who were 'non-consumers' was clearly much higher in the one day data (Table 3). However, this is not the only factor which influences the results obtained with the two different time periods. The type of food, the pattern of consumption and the degree of aggregation of food items also have an effect. For example the ratio of short-term to long-term non-consumers was only 2:1 for breakfast cereals but 40:1 for potatoes. The fact that intake yesterday can only be expressed in terms of integer values whereas usual intake is more likely to be a continuous variable also influences the characteristics of the distribution. In this study one-day data, generally gave higher proportions than the usual-intake data for frequencies at or above the population median except for the highest frequency.

Table 3. Percentage of group classified as non-consumers.

Foods/food group	None yesterday	Usually <1 per month
Bread	9.2	0.6
Breakfast cereal	54.4	23.4
Rice/pasta/noodles	67.9	8.8
All core cereals	2.6	0.1
Potatoes	39.9	1.0
Cooked vegetables (except potatoes)	40.4	1.6
Salad/raw vegetables	47.7	3.0
All vegetables	9.1	0
Fruit (except juice)	29.5	3.1

Because recommendations for core cereal, vegetable and fruit intake are frequently made in terms of specific amounts or serves, (2) questions relating to food intake in Australian surveys have generally been asked in terms of the number of serves consumed. In contrast, American behavioral risk factor surveys have used a frequency approach on the grounds that it avoids any problems that subjects may have with the definition of serving size (8). A comparison of the proportion reporting different levels of vegetable and fruit intake, in the same SAOS survey, with a frequency-based and with a serve-based instrument is shown in Table 4.

Table 4. Proportion of sample reporting different levels of intake of fruit and vegetables with a frequency-based and with a serve-based instrument.

	Category of usual intake				
Question type	<2 per day	2-3 per day	4-5 per day	≥ 6 per day	Dont know
Fruit:					
Serve-based	55.1	40.4	3.7	0.7	0.1
Frequency-based	77.9	20.2	1.7	0.2	0
Vegetables:					
Serve-based	33.5	50.8	13.6	1.8	0.3
Frequency-based	52.7	47.3	3.0	0.3	0

Not unexpectedly the results differ with the serve-based instrument estimating a lower proportion of the group in the lowest intake category compared with the frequency-based instrument. Again, however, the pattern of consumption of the food or foods in question also influences the relationship between the two measures. For example, less than 25% of the sample group reported usually consuming fruit at least twice a day but about 45% reported usually consuming at least two serves of fruit per day. For vegetables the difference was less, with just under 50% reporting usually eating vegetables at least twice a day, compared with about 65% reporting at least two serves per day.

Discussion

In order to be able to monitor effectively, in different sub-groups of the Australian population, both the level of compliance with current food based dietary recommendations and the extent to which this is changing over time, it is desirable that the results obtained both locally and nationally are comparable. This means that standard questionnaire instruments need to be developed and used. At the present time no such instruments exist. While questions about food intake appear to be relatively straightforward they can, and do, differ in a number of respects which may influence the response which is given. In this study we have compared only two such aspects; the reference period for intake and the way in which intake is quantified. In the case of the reference period for intake, while the results obtained are comparable for summary measures such as the mean or median, the distribution of one day data appears to have no consistent relationship with that for usual intake. In the case of quantitation, the results obtained clearly differ with the approach that is used both for summary measures and for distributional data. In this study we have not explored the effect of different reference serve sizes but this is also likely to lead to differences, as is the number of questions used for any given food group. Since it is important that instruments used in population-based studies are interpreted in the same way by all respondents, regardless of socio-demographic profile, the simplest instrument that gives valid information is the instrument of choice. At this point in time it is not possible to comment on the validity of the instruments used in this study, except to say that the results from the frequency instruments used in the autumn SAOS were generally consistent with data from other Australian sources in respect of socio-demographic differentials. Information on the validity of the serve-based instrument used in the spring SAOS will become available from other studies which are currently in progress.

References

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