Comparison of short questions with weighed dietary records

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This publication is part of the National Food and Nutrition Monitoring and Surveillance Project, funded by the Commonwealth Department of Health and Aged Care

This publication is one in a series of reports to be released from the National Food and Nutrition Monitoring and Surveillance Project, funded by the Commonwealth Department of Health and Aged Care.

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ISBN 0 642 82047 3

Publication Approval Number: 3062

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Data Collection

Acknowledgment to the National Health and Medical Research Council (Project Funding), Menzies Centre for Population Health Research, University of Tasmania (Institution responsible for data collection), Professor Terry Dwyer, Ingrid Coles-Rutishauser (co-investigators), Katrina Currie, Heather Donaldson, Marilyn Smiley (data collectors). Thanks also to the many hundreds of volunteers participating in the study.

Abbreviations

AUSNUT The composition of foods database underlying the 1995 NNS

BMI Body mass index

BMR Basal metabolic rate

EI Energy intake

NNS National Nutrition Survey

SEIFA Socio-economic Index for Areas

SQ Short Question

WHO World Health Organisation

WR Weighed Record

WR-SQ A variable calculated by subtracting the response to the short question from the appropriate frequency observed in the weighed dietary record.

Executive Summary

The individual performance of sixteen short dietary questions, which formed part of a 67-item face-to-face administered questionnaire, was assessed in an adult Tasmanian population. Subjects for this study were aged 20 to 65 years and selected at random from the electoral roll. The response to short questions was compared to 3 day weighed dietary records for 794 subjects. The overall response rate for the questionnaire was 75.2%, and for the weighed dietary records 62.9%.

The short questions examined were well understood by the target population and less than 2% of subjects were unwilling or unable to provide an answer to any of the questions.

Thirteen of the short questions related to the usual frequency of intake of specific foods or food categories. The other three questions related to the usual amount of milk consumed daily, the usual frequency of eating breakfast and to running out of food.

Where possible, this evaluation compared the same information (frequency of intake) obtained by short question and from three-day dietary records. Other data compared with the short question frequency responses included mean intake of food by weight and mean nutrient intake.

In addition to assessing the performance of each short question in the study population as a whole, their performance was also examined for sub-groups categorised by sex, age, region of residence, body mass index, relative social disadvantage and season of administration.

The short questions relating to usual frequency of intake and the response format used were found to provide useful information at a group level for the range of target foods and food categories examined. The performance of some questions varied between sub-groups, but the differences in performance were generally small. Questions about the usual frequency of intake and amounts of foods (milk) appear useful for collecting data on usual food intake of population groups.

In this evaluation the frequency response categories to the short question on the usual frequency of eating breakfast could only be compared with the frequency of having any food before 10am in the three-day records. While this may be a different concept from that used by subjects to respond to the short question on breakfast, the performance was consistent with the evaluation using data from the 1995 National Nutrition Survey (Rutishauser et al 2001).

The performance of the short question related to food security was also consistent with the evaluation based on data from the 1995 National Nutrition Survey (Rutishauser et al 2001). Additional data from this evaluation, however, suggest that ‘yes’ responses represent both ‘accidental’ and ‘real’ difficulties with access to food.

This evaluation was directed toward the use of short questions to measure usual food intake and food habits in a population. The capacity of short questions to measure change in food intake and food habits over time within individuals was not evaluated here, and is a priority for future evaluation.

Chapter 1: Objectives of this evaluation of short dietary questions and the methodology used

1.1 Introduction

This analysis examines the performance of 16 short dietary questions in a population of Australian adults that is predominantly Anglo-Celtic. The questions address usual food intake over the preceding three months and include questions on intake of bread and cereals, vegetables and fruit, meat and milk and dairy foods.

The questions are examined in relation to intake from the food categories to which they refer, and also in relation to key nutrients. The key nutrients include total fat, saturated fat, iron, calcium, vitamin C, folate, thiamine and zinc. They were selected for multiple reasons. Some nutrients have a direct relationship to dietary goals and targets for Australians, and others were included because the foods that are the subjects of the selected short questions are major sources of these nutrients.

This analysis includes two questions that are identical to specific questions in the 1995 National Nutrition Survey. These two questions focus on food security and frequency of eating breakfast. The reason for including an analysis of these questions is to complement the assessment presented in *Evaluation of short dietary questions from the 1995 National Nutrition Survey* (Rutishauser et al 2001) and to extend the analysis of these questions to a different survey with a different method of collecting comparison data.

The utility of the short questions to represent food and nutrient intake is considered for single questions only. Most of the questions are directed towards obtaining information about the usual frequency of intake of the target food categories – given that people often have many food categories at an occasion of eating, frequency responses are not easily combined to represent a useful indication of frequency of intake of the combined foods.

A focus for this analysis is whether the performance of the short dietary questions differs in an important way between groups categorised according to various characteristics including socio-demographic characteristics and body mass index status. Differences in performance arising from the season of administration of the questions are also examined.

1.2 Background

In the latter two decades of the 20th century there was growing interest in the application of questionnaire instruments that measured aspects of dietary intake and that did not take a long time to administer. The increasing importance of comprehensive food frequency questionnaires and development of analytical techniques to evaluate their performance (Willett 1990) led in turn to interest in the evaluation of shorter questionnaires to measure intake of particular nutrients (Angus et al 1989, Dobson et al 1993). Increasingly, various health surveys around Australia at the time were including short dietary questions and it was realised that investigation into the performance of the questions had been very limited. The Australian Institute of Health and Welfare produced a review of instruments and short dietary questions (Coles-Rutishauser 1996) that summarised what was known about the performance of dietary questions. In 1998, the NSW Health Department (NSW Health 1998) compiled a set of

interim recommendations for modules of dietary questions to be administered simultaneously, while acknowledging the need for extensive evaluation of the questions and modules. In the mid-1990s the National Health and Medical Research Council funded a research project designed to evaluate a set of short dietary questions. The funding for this project was sufficient to collect the necessary data and partially analyse it – this took place from 1996 to 1998. Completion of the data analysis and preliminary evaluation of the results was made possible by funding from the Australian Food and Nutrition Monitoring Unit in 1999-2001.

1.3 Objectives

The objectives of this analysis are to:

A. Determine the extent to which selected short dietary questions measure the specific dietary variable they seek to measure in an Australian adult population.

B. Determine whether particular demographic characteristics modify the performance of short dietary questions in an Australian adult population.

C. Investigate whether selected simple dietary questions can usefully act as an indicator of specific nutrient intake for an Australian adult population, and to determine whether their performance is improved if used in combination.

D. Compare the performance of short dietary questions in order to draw inferences about short question design.

1.4 Methods: Analysis of short questions compared to weighed dietary records

1.4.1 Subjects included in this analysis

In this analysis, short questions about usual dietary intake are compared to dietary information derived from three days of weighed dietary records. The methodology for collection of the data is outlined in chapter 2. In summary, subjects were adult residents of Tasmania aged 20 to 65 years and selected from the electoral roll.

For this analysis, only those subjects who completed at least three days of weighed dietary records were included. This consisted of 790 people who completed three days of records and four people (0.5%) who completed four days of records.

In relation to the analysis of specific short questions, only those subjects who were able to provide an answer to the question were included in the analysis. This resulted in the exclusion of data from up to three subjects for most of the short questions – the subjects were not the same for each question. The exception was a short question on usual daily volume of milk intake where nine subjects were unable to provide an answer, leaving 785 subjects for the analysis of this question.

Information was available for each subject for all of the covariates considered in this analysis with the exception of body mass index. Anthropometric measurement was not a requirement for participation in the study although it was strongly encouraged. Of the 794 subjects with at least three days of weighed dietary records, weight and height measurements were available for 766 subjects (96.5%). These were required for the calculation of body mass index, therefore in analyses that considered body mass index, only 766 subjects were included.

1.4.2 Weighed dietary record

A method to determine the usual dietary intake of free-living individuals within very small limits of error with an acceptable degree of respondent burden is not known – there is no 'gold standard' in measurement of usual dietary intake. Dietary recording is often used as a comparison method to assess various types of dietary questionnaires because it is a distinctly different method requiring different skills.

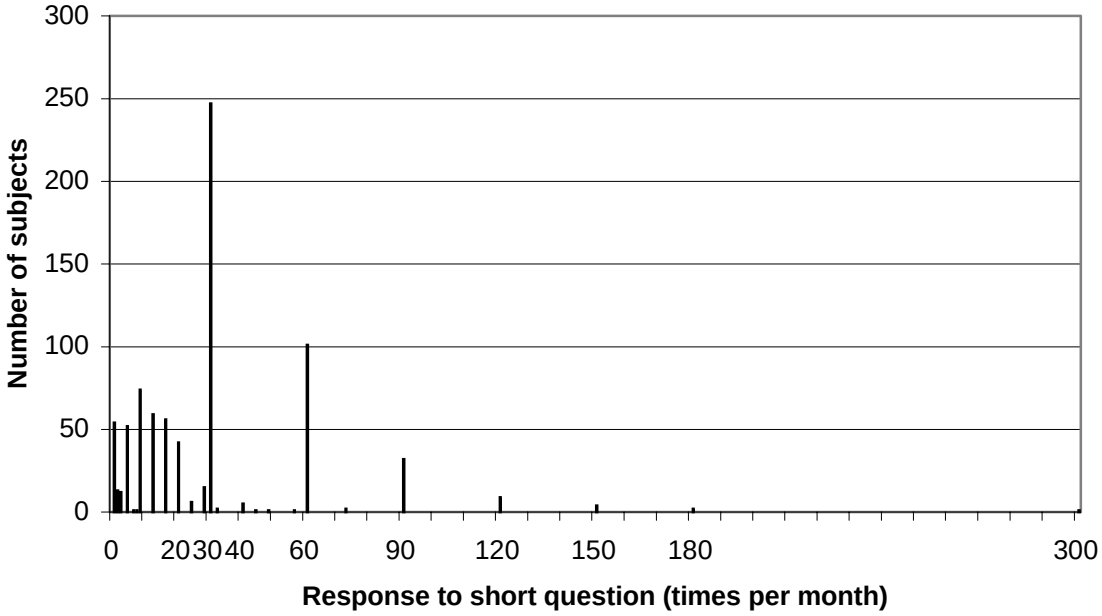
Measurement of daily dietary intake by weighed portions is labour intensive for the respondents and requires a degree of skill on their part (Margetts and Nelson 1991). It is likely that the requirement to weigh all food consumed will result in an alteration to usual dietary intake, but the extent to which this occurs is unknown. It is apparent that some population sub-groups (eg people who are obese) under-report dietary intake when measured by weighed dietary record and other dietary intake measurement methods. It is recognised that a short period of recording of dietary intake will not accurately estimate the usual dietary intake of an individual, and that the extent of the error will vary from food to food (and by extension, nutrient to nutrient). The advantages of the weighed dietary intake methodology are compelling. It involves a direct observation of dietary intake - it does not rely on memory or recall. It allows daily variation in food intake to be described and gives an accurate measurement of portion or serving size of foods. It requires each food to be individually described, whereas some methods have relatively few descriptions available for total diet. This allows the capacity for more accurate and investigator driven matching of consumed foods with an appropriate food description in food composition databases The weighed dietary intake method is flexible enough to be used for all eating occasions, and can retain detail about dietary structure – when and how foods were eaten throughout the day in addition to the order they were eaten within a meal. The level of detail available from weighed dietary records is very high in contrast to the information from short dietary questions. The conceptual and cognitive difficulties required to keep a weighed dietary record are substantially different to those required to answer a short question – in theory, this will result in the errors by each method being largely independent of each other. This is a desirable feature in selection of a method against which to assess the performance of the short dietary questions.

For each subject, an estimated mean daily nutrient intake was calculated from the entire weighed dietary records using the AUSNUT nutrient composition database. Each food in the weighed record was manually assigned a food code from the AUSNUT data. The weighed record database was structured to retain individual foods (coded) and the time and day on which they were eaten. This allowed food categories to be constructed, eating occasions to be identified and the mean daily weight and frequency of consumption of the food categories calculated for each individual.

1.4.3 Questions about frequency of intake

Most of the short dietary questions evaluated here were directed toward frequency of intake, rather than food type or quantity. Subjects could elect to nominate a frequency per day, a frequency per week, a frequency per month, or to state that their frequency was 'rarely or never'. Subjects were required to respond in whole numbers. The resulting responses were converted to a frequency per month by using assigned conversion factors of 30 (times per day to times per month) and four (times per week to times per month). Thus, the distributions of responses for many food categories (particularly those which were eaten frequently) were not smooth, and tended to 'clump' at monthly frequencies that represented an intake of a (whole) number per day (see figure 1.4.1). The most frequent response is 30 times per month (ie once a day) followed by 60 times per month (ie twice a day).

Figure 1.4.1: Histogram of responses to the short question on fruit intake



For comparison between the short questions and the weighed record, a definition of the foods referred to in the short question was developed for application to the weighed record. This definition was a precise listing of the appropriate AUSNUT food codes and required case-by-case consideration of the list of food codes used in the weighed dietary records. For example, 'salad' was defined as being consumed when at least two from a list of 34 food codes were consumed on the same occasion of eating.

In order to calculate frequency of consumption of food categories from the food records, occasions of eating separated by less than 30 minutes were considered to be the same occasion. When more than one food from the target category was eaten at the same occasion, it was treated as if one food only were eaten – ie the frequency for that day increased by one.

A 'reported daily frequency' was calculated for an individual by dividing the response to the short dietary question (SQ) by 30 to convert from monthly intake to daily intake. A recorded daily frequency was calculated by summing the number of 'occasions of eating' for the food category from the food records (WR) and dividing by the number of days of observation.

1.4.4 General assessment of short question performance

For consistency with an earlier report (Rutishauser et al 2001), the term 'relative validity – direct' has been used for analyses where the response to the short question was compared to a variable directly related to the target food category (either frequency or weight) and the term 'relative validity – indirect' has been used for analyses where the response to short questions is compared to a variable not directly derived from the target food category (nutrient intake, for example).

An initial approach to assessing the performance of the short dietary questions was to categorise the response to the question and to observe the pattern of mean values of various parameters for each category. The central interest was to determine whether subjects belonging to each short question response category were different to other categories for appropriate key variables and to assess whether the response to the short question was behaving in the way one would expect if it were a useful and valid question.

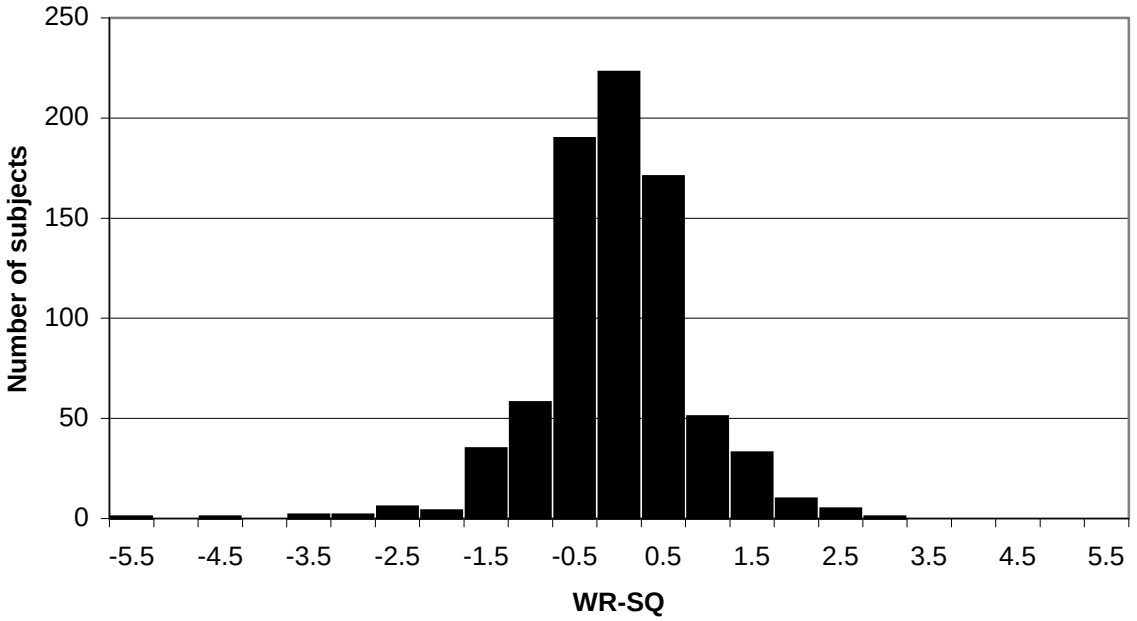
As far as possible, question responses were compared to the variable being sought by the question. For most of the questions evaluated in this report, the relevant variable was frequency of intake of a food category. Also of interest is whether the frequency of intake of a food category paralleled the weight of food consumed – ie whether a question that measures frequency of intake of a food can be used as a surrogate for the amount of food consumed without asking about portion size. The amount of food consumed depends on the frequency with which it is consumed and the portion eaten on each occasion. It would be a substantial simplification of short dietary questions if it were possible to obtain valid information on amount of food eaten without having to ask about portion size. Finally, because an important reason for obtaining information about usual food intake is to make inferences about usual nutrient intake, the categories of short question responses were examined for variation in mean intake of selected appropriate nutrients.

For short questions with a frequency response it is possible to calculate a reported daily frequency of intake (as described above). It was therefore possible to examine the correlation of the question responses with continuous variables of interest. The correlations examined were between the question responses and the appropriate frequency of intake estimated from the weighed records and the correlation between the question responses and selected nutrient estimates from the weighed dietary records.

1.4.5 An alternative measure of short question performance

The difference between the recorded frequency of intake from the weighed records and the reported frequency of intake from the short question (ie recorded – reported) provides a direct measure of the performance of the short dietary question. This variable (denoted WR-SQ) was normally distributed (see figure 1.4.2). The mean is –0.05 (95% Confidence interval: –0.10 to 0.01).

Figure 1.4.2: Histogram of the WR-SQ variable for Fruit Consumption for all subjects



If the period of food recording is a close approximation to 'usual intake over the previous three months' (the subject of the short dietary questions), then we would expect the WR-SQ variable to approximate zero when the response to the short question is a good estimate of usual intake. While three days of dietary intake may not approximate usual dietary intake, it is expected that the difference between observed intake over a short period and usual intake over a longer period will be randomly distributed above and below zero – that is, that the error in estimating usual frequency of intake from a three day weighed record will be non-differential with respect to usual intake. The implication of this is that while the value of the WR-SQ variable for an individual may not be particularly useful, the mean value for groups of subjects can be interpreted as a reflection of the performance of the questions about usual dietary intake for that group. The closer the mean is to zero, the better the short question represents usual dietary intake.

The mean of the WR-SQ variable has been used in this analysis for comparisons between sub-groups of subjects in the study.

1.4.6 Categorisation of the study population for comparison of short question performance

The performance of the short questions was examined for the total group, and for the study population categorised by sex, age, body mass index (BMI), region of residence, season of completion of the short question and relative social disadvantage.

Age categories (20 to 44 and 45 to 65 years) were chosen to match the analysis of short questions from the National Nutrition Survey (Rutishauser et al 2001).

Body mass index was categorised into three groups – less than 25 kg/m^2, 25 to less than 30 kg/m^2 and 30 kg/m^2 or greater - consistent with classification of overweight and obesity adopted by the World Health Organisation (WHO 2000) while maintaining a reasonable number of subjects in each category.

Region of residence categories were based on postcodes after examination of a postcode map of Tasmania. The three categories were capital city (Hobart), other large urban centre (Launceston) and other (smaller town and rural).

Relative social disadvantage was also categorised based on postcode using the 1994 Index of Relative Social Disadvantage (SEIFA) developed by the Australian Bureau of Statistics. SEIFA 3, the highest relative social disadvantage category, represents the least disadvantaged. The categorisation cut-offs were not selected on the basis of quantiles of the ranking index either for Tasmania or for Australia but rather on the basis of local advice as to what should be considered 'advantaged suburbs' and what should be considered 'disadvantaged suburbs'. In this case the middle category (SEIFA 2) is much larger than either of the other categories.

For the short question analysis, season was defined by the calendar month in which the question was answered. Summer was defined as December, January or February; autumn as March, April, or May; winter as June, July or August; and spring as September, October or November.

Statistical analysis

Responses to the short questions were mainly categorised into 4 or 5 groups according to the distribution of responses, in order to retain a reasonable number of subjects in each of the groups. Whenever possible the same categorisation was used for different questions.

Group means and a 95% confidence interval for the mean were calculated for all categories and variables under consideration. The percentage of subjects who had zero intake for a target food category over the dietary recording period was noted – since these subjects reduced the mean of the variable under consideration. One-way analysis of variance was used to examine evidence for a difference in means between groups. Exact p values were noted, or $p<0.001$.

Statistical assessments of the difference of the mean of the WR-SQ variable and zero were conducted using one-sample t-tests and for correlations Spearman's correlation coefficient was used.

Assessment of the statistical significance of differences between groups for the mean of the WR-SQ variable were conducted using independent t-tests for comparison of the mean between two groups and one-way ANOVA for assessment of multiple means when there were more than two groups. The criterion for statistical significance was set according to convention at $p<0.05$.

No adjustment was made for multiple comparisons.

All estimates are unadjusted and not weighted to reflect the age and sex distribution of Tasmanians aged 20 to 65 years.

Chapter 2: Design and methodology of dietary data collection of the 1996 NHMRC dietary key indicators study

2.1 Introduction

The data collection described here forms the basis for the analysis presented in this report. It was the result of a successful funding application by the Menzies Centre for Population Health Research (University of Tasmania) to the Public Health Research and Development Committee of the National Health and Medical Research Council. The chief investigators for the project were Malcolm Riley, Ingrid Rutishauser and Professor Terry Dwyer and funding was provided for data collection in 1996 and 1997.

2.2 Background

Population

The study population was Tasmanian residents aged 20 to 64 years on January 1st 1996. Eligibility was restricted to subjects who were not resident in institutions (gaols, nursing homes), on Bass Strait islands or in the remote West Coast District. The geographical restrictions accounted for only 4% of the total population of Tasmania. The sampling frame for the survey was the Tasmanian electoral roll of 1996 and names were selected from it at random. After exclusion of ineligible subjects, 1288 people were sought to participate in the survey.

Response rate

The response rate of eligible subjects who completed the administered questionnaire was 75.2% (Riley and Rutishauser 1998). This response rate varied from 70.3% in the lowest SEIFA category, to 80.2% in the most advantaged SEIFA category and from 73.5% in urban areas to 78.1% in rural areas. It was not different by age or sex. For subjects who also completed a weighed dietary record, the overall response rate was 62.9%. This rate varied from 53.2% in the lowest SEIFA category to 69.5% in the most advantaged SEIFA category. The rate was 60.5% in urban areas and 66.9% in rural areas. The rate was not different by age or by sex. The difference in response rate by relative social disadvantage and by place of residence was not explained by the refusal rate (which did not differ by these factors). The difference was due to a greater difficulty in locating selected subjects in the lower SEIFA categories and in urban areas.

Broad design

Subjects participating in the survey were to be administered a questionnaire, followed by simple measurements of their weight, height and waist circumference. They were then instructed in how to keep a weighed dietary record and given materials and equipment to assist them. The dietary record was to be kept for three consecutive days starting on a day allocated to them by their interviewer. A starting day for each subject was allocated systematically by an investigator and communicated to the interviewer. In all cases, subjects were administered the dietary questions before they kept the dietary record to minimise the possibility that they would become unusually aware of their dietary intake by the attention given to keeping the weighed record.

The interviewers were trained to use appropriate prompt cards showing the form of the response required for each question. They were instructed not to assist the subject in providing their response. If asked for clarification of any dietary question, they were instructed to say: 'For the purposes of standardising this survey, I am unable to give you any further information on the question. Please respond to the question as best you can'.

Specific data collection protocols and issues

Before reading the section of short questions on frequency of food intake to the subject, a preamble was read to them. The wording was as follows: "The next few questions ask about foods. For each type of food I would like you to tell me about how often you usually eat the food at this time of year. For example over the last three months have you eaten a particular food, once a day, twice a week, three times a month – whichever is easier. Think about all the food you eat – both at home and away from home".

Each of the questions was read to the subjects and the response recorded by the interviewer on standard forms. The interviewers were instructed to allow only one answer for each question and as far as possible to ensure that every question was completed.

To assist in keeping weighed dietary records, subjects were given dietary recording booklets and loaned digital scales. The Soehnle scales were rated to measure up to 2kg (0 to 128 g in 2g increments; 130 to 2000g in 5g increments). Subjects were required to record the date and time of consumption of food, a full description of the food and where it was obtained, the recipe for the food if it was prepared at home, the weight of the food and the weight of any portion that was not consumed. For foods eaten away from home or in situations where weighing food was not practical, subjects were requested to describe in detail the nature and serving size of each component food. Subjects were supplied with grid paper to record the size of their food serves.

Research assistants reviewed the record of weighed dietary intake when the recording booklet was collected. Further details about foods eaten were obtained if required, and recorded in the recording booklet. The detailed data from the recording booklets were entered onto a computer database, with each line of data recording a single food consumed. Each food consumed was assigned a food code from the AUSNUT nutrient composition database. The details recorded were the subject identification, the date, day and time of consumption, the source of the food, the mass of food consumed and the code for that food. The estimated daily intake of any particular nutrient for an individual was determined by summing the nutrient contribution from all foods consumed over the recording period and dividing the sum by the number of days of recording.

Subjects were weighed using stand-on Tanita bathroom scales placed on a rigid, level surface. Height was measured using a flexible metal measuring tape graduated in millimetres with a headpiece that included a built-in spirit level. For height measurement, subjects were asked to stand tall, with heels together and feet flat on the ground, against a vertical surface (such as a vertical wall). Height and weight were measured without shoes, and in light clothing.

Basal metabolic rate (BMR) per 24 hours was calculated for each subject using formulae based on age and sex (Schofield 1985, as reproduced in Australian Bureau of Statistics 1998). The estimated daily energy intake (EI) was derived from the weighed dietary records. The EI/BMR ratio provides an indication of whether the reported energy intake is consistent with the energy intake required for a person to live a normal (not bed-bound) life-style. An EI/BMR of 1.3 represents only very sedentary activity for adults, while an EI/BMR of 1.6 for women and 1.7 for men is consistent with light to moderate activity (Australian Bureau of Statistics 1998).

Chapter 3: The performance of short dietary questions relating to usual frequency of food intake – bread and cereal foods

3.1 Short question about bread intake

How often do you eat bread? (include bread rolls, flat breads, crumpets, bagels, English or bread type muffins)

__times per day

__times per week

__times per month

__rarely or never

__I don't know /can't say

3.1.1 Introduction

The short question about bread requests a frequency of bread intake without reference to serving size consumed. The food codes defined as 'bread' in the analysis of this question were codes beginning with 1221 (except 12219201 and 12219301 which denoted breadcrumbs), 1222 to 1226, 1241 to 1244, 1353 and 1354. This grouping included bread, bread rolls, muffins, crumpets, flatbreads, fancy breads, sandwiches and hamburgers.

3.1.2 Results

Pattern of response

The response for this question was grouped into 4 categories: rarely or never to less than 1/day, 1/day to less than 2/day, 2/day to less than 3/day and 3/day or more.

Bread is eaten on a frequent basis by most of the study population. Unlike other food groups, it was not practical to have a frequency category of 'rarely or never consumed' because of the very few subjects who would fall into this category (only 0.5% of the sample used for study here). Only 15% of the study population stated that they consumed bread less than once a day. Conversely, only approximately 8% of subjects stated that they consumed bread three times a day or more. In general, the response to the short question on bread consumption was distributed in a similar way in the population subgroups examined (table 3.1.1).

Relative validity – direct

The low percentage of the study population who did not consume bread at all during the dietary recording period is shown in table 3.1.2. In the category with the lowest reported frequency of consumption, only 15.3% did not record bread intake in their dietary records although this percentage was higher for women than for men (19.7% vs 8.5%). In other categories where subjects reported consuming bread at least daily, the percentage who didn't consume bread over the three day recording period was very low (close to 1%) or 1 individual.

The average daily weight of bread consumed increased as reported frequency of consumption increased. Within reported frequency categories men had a higher average daily weight of bread intake than women. This may be related to men having a larger serving size of bread at any particular frequency of intake.

The mean daily frequency of bread intake noted from the dietary records also increased across the frequency categories reported by short question (table 3.1.3). The Spearman correlation coefficient for response to the short question on frequency of bread intake and the frequency of intake observed from at least three days of dietary records was 0.53 for men and 0.45 for women. It is apparent that bread intake is over-estimated by short question at the higher estimates of intake. In the highest two frequency categories, the expected daily frequency is at least 2.0 and 3.0 respectively compared to an observed frequency of approximately 1.7 and 1.9 (table 3.1.3). It is likely that frequency of intake is under-estimated at the lowest estimates of intake although this is not obvious from the table.

On average, subjects responding to a short question tended to over-report their frequency of having bread by a small amount (by approximately one occasion every 10 days). While the magnitude of this difference was statistically significant, the difference does not appear to be of public health importance. There is no evidence that the extent of error in reporting bread frequency by short question varied by sex, age, rural/urban residence, body mass index, SEIFA category or season of administration of the question (table 3.1.4).

Relative validity – indirect

When response to the short question on frequency of bread intake was categorised, mean daily energy intake from the dietary records increased with increasing frequency of bread intake (table 3.1.5). The positive relationship of dietary fibre, thiamin and carbohydrate intake with increasing frequency of bread intake may be explained by the tendency of these nutrients to increase when energy intake increases. However, the thiamin density also appeared to increase marginally with frequency of bread intake, suggesting that people who report a higher frequency of bread intake have a diet that is relatively enriched in thiamin (table 3.1.5). The Spearman correlation coefficients for the relationship between response to the short question on frequency of bread intake and average daily nutrient intake were modest (table 3.1.6).

Table 3.1.1: Percentage of population groups categorised according to frequency of consumption of bread by short question

Population Subgroup		Rarely or never to less than 1/day	1/day to less than 2/day	2/day to less than 3/day	3/ day or more
All	20 to 65 years (n=794)	14.9	38.9	37.9	8.3
Gender	Males (n=368)	12.8	38.6	37.5	11.1
	Females (n=426)	16.7	39.2	38.3	5.9
Age	20-44.9 years (n=476)	14.7	40.8	36.6	8.0
	45-65 years (n=318)	15.1	36.2	39.9	8.8
Region	Hobart (n=342)	15.5	40.6	36.3	7.6
	Launceston (n=226)	16.4	33.6	41.6	8.4
	Rural (n=226)	12.4	41.6	36.7	9.3
BMI	<25 (n=345)	15.9	39.4	36.2	8.4
	25 to <30 (n=278)	15.1	41.7	35.6	7.6
	30 or more (n=143)	14.0	33.6	44.1	8.4
SEIFA category	SEIFA 1 (n=57)	14.0	42.1	36.8	7.0
	SEIFA 2 (n=613)	14.7	38.2	38.2	9.0
	SEIFA 3 (n=124)	16.1	41.1	37.1	5.6
Season	Summer (n=247)	15.4	36.4	40.1	8.1
	Autumn (n=126)	8.31	36.5	37.3	7.9
	Winter (n=219)	14.2	39.7	37.4	8.7
	Spring (n=202)	12.9	42.6	36.1	8.4

Table 3.1.2: Mean daily intake of bread consumed (in grams) categorised by response to a short dietary question on bread intake

Population Subgroup	Rarely or never to less than 1/day	1/day to less than 2/day	2/day to less than 3/day	3/ day or more	p
All	69.0	108.7	135.3	161.4	<0.001
	(57.9-80.1)†	(100.9-116.6)	(125.5-145.0)	(138.5-184.3)	
	n=118	n=309	n=301	n=66	
	(15.3% no intake)	(1.0% no intake)	(1.0% no intake)	(1.5% no intake)	
Males	80.2	126.2	157.4	191.7	<0.001
	(61.1-99.3)	(113.2-139.2)	(144.8-170.1)	(161.5-221.8)	
	n=47	n=142	n=138	n=41	
	(8.5% no intake)	(1.4% no intake)	(0.7% no intake)	(0.0% no intake)	
Females	61.6	93.9	116.5	111.8	<0.001
	(48.0-75.2)	(85.0-102.9)	(102.4-130.5)	(85.2-138.5)	
	n=71	n=167	n=163	n=25	
	(19.7% no intake)	(0.6% no intake)	(1.2% no intake)	(4.0% no intake)	

† 95% confidence interval for mean

Table 3.1.3: Mean daily frequency of bread consumed categorised by response to a short dietary question on bread intake

Population Subgroup	Rarely or never to less than 1/day	1/day to less than 2/day	2/day to less than 3/day	3/ day or more	p
	Daily freq. <1.0	**Daily freq. 1.0 to<2.0**	**Daily freq. 2.0 to <3.0**	**Daily freq. 3.0 or more**	
All	0.81	1.24	1.69	1.88	<0.001
	(0.71-0.91)†	(1.18-1.29)	(1.62-1.76)	(1.67-2.09)	
Males	0.87	1.23	1.75	1.99	<0.001
	(0.69-1.05)	(1.15-1.32)	(1.65-1.85)	(1.76-2.23)	
Females	0.77	1.24	1.63	1.71	<0.001
	(0.64-0.89)	(1.16-1.31)	(1.54-1.73)	(1.29-2.12)	

† 95% confidence interval for mean

Table 3.1.4: WR-SQ variable† for bread intake

		n	Mean WR-SQ	95% CI	p for difference*
All		794	- 0.09**	(-0.14 to -0.04)	
Gender	Males	368	-0.10**	(-0.18 to -0.02)	
	Females	426	-0.07**	(-0.14 to -0.005)	0.61
Age	20–44.9 yrs	476	-0.12**	(-0.19 to -0.05)	
	45–65 yrs	318	-0.04	(-0.12 to 0.04)	0.13
Region	Hobart	342	-0.07	(-0.15 to 0.01)	
	Launceston	226	-0.11**	(-0.20 to -0.02)	
	Other	226	-0.09	(-0.19 to 0.01)	0.82
BMI	<25	345	-0.09**	(-0.16 to -0.01)	
	25 to <30	278	-0.03	(-0.12 to 0.05)	
	30 or more	143	-0.17**	(-0.31 to -0.04)	0.17
SEIFA category	SEIFA 1	57	-0.10	(-0.27 to 0.08)	
	SEIFA 2	613	-0.09**	(-0.15 to -0.03)	
	SEIFA 3	124	-0.05	(-0.18 to 0.08)	0.82
Season	Summer	247	-0.05	(-0.14 to 0.05)	
	Autumn	126	-0.05	(-0.18 to 0.07)	
	Winter	219	-0.15**	(-0.25 to -0.05)	
	Spring	202	-0.09	(-0.19 to 0.009)	0.45

† WR-SQ is the recorded mean daily frequency of bread intake from the weighed records minus the reported daily frequency of bread intake from the short question

* significance testing is by independent samples t-test or one-way ANOVA

** significantly different to 0.0 ($p<0.05$)

Table 3.1.5: Mean daily nutrient and energy intake by weighed record categorised by response to a short dietary question on bread intake

Dietary factor	Rarely or never to less than 1/day	1/day to less than 2/day	2/day to less than 3/day	3/ day or more	p
Fibre (g)	18.8	21.0	21.6	24.9	<0.001
	(17.0-20.6)†	(19.9-22.0)	(20.6-22.6)	(22.5-27.3)	
Thiamin (mg)	1.3	1.6	1.7	1.9	<0.001
	(1.2-1.4)	(1.5-1.6)	(1.6-1.8)	(1.7-2.1)	
Carbohydrate (g)	209.2	225.5	234.7	256.0	0.002
	(192.3-226.2)	(216.4-234.5)	(225.7-243.7)	(231.9-280.0)	
Energy (kJ)	7,830	8,428	8,549	9,584	0.002
	(7,301-8,360)	(8,090-8,765)	(8,253-8,845)	(8,632-10,537)	
Carbohydrate (% kJ)	45.5	46.1	46.9	46.1	0.42
	(43.7-47.2)	(45.1-47.0)	(46.0-47.8)	(44.0-48.2)	
Thiamin density	0.17	0.19	0.20	0.20	0.005
(mg/1000 kJ)	(0.16-0.18)	(0.18-0.20)	(0.19-0.21)	(0.18-0.22)	
Fibre density	2.58	2.60	2.60	2.75	0.76
(g/1000 kJ)	(2.25-2.90)	(2.48-2.72)	(2.50-2.71)	(2.52-2.98)	

† 95% confidence interval for mean

Table 3.1.6: Correlation of response to a short dietary question on bread intake with mean daily energy and nutrient intake (Spearman's correlation coefficient)

	Males	Females	Total
Fibre	0.12	0.19	0.18
Thiamin	0.16	0.23	0.21
Carbohydrate	ns	0.17	0.15
Energy	ns	0.15	0.13
Carbohydrate (% kJ)	ns	ns	ns
Thiamin density	0.14	0.15	0.14
Fibre density	0.10	0.12	0.10

ns – not statistically different to 0

3.2 Short question about cooked cereal intake

How often do you eat pasta, rice, noodles or other cooked cereals? (not including cooked breakfast cereal)

__times per day

__times per week

__times per month

__rarely or never

__I don't know /can't say

3.2.1 Introduction

The short question about cooked cereals requests a frequency of intake of cooked cereal without reference to a serving size. The question focuses attention on three widely consumed cooked cereal products and includes a general statement that other cooked cereals should be included.

The food codes defined 'cooked cereals' in this analysis were codes beginning with 1211, 1251 to 1261, 1263, 1357, 1358, 1563, 1566, 1874 and 1892 up to code 18923400. Codes 12111801 (semolina) and 12111901 (wheatgerm) were excluded. This categorisation included pasta, rice, noodles and other cooked cereals, rice dishes (but not rice cakes or biscuits) and pasta dishes. Noodle soups were not included.

3.2.2 Results

Pattern of response

The response to this question was grouped into 4 categories: rarely or never, 1/month to less than 2/ week, 2/week to less than 1/day, 1/day or more.

Cooked cereals are eaten much less frequently by the study population than bread. This is reflected in the categorisation of the response to the short question with three frequency categories covered by the lowest frequency category for the short question on bread frequency. About 8% of the study population reported that they never or rarely ate cooked cereals and about 6% reported that they ate cooked cereals once a day or more. In general, the distribution of the response to the short question on cooked cereals was similar in the population subgroups examined (table 3.2.1) although there appeared to be a trend to lower reported consumption in the older age group, in the group with higher body mass index and in groups of lower socio-economic status.

Relative validity – direct

The percentage of the study population who did not consume cooked cereals during the dietary recording period is shown in table 3.2.2. In the highest frequency category – those who reported eating cooked cereals once a day or more – almost 30% did not eat cooked cereals during the three day period. Of those who reported they ate cooked cereals 'rarely or never', 22.7% in fact did eat cooked cereals during the recording period.

The average daily weight of cooked cereals consumed increased as the reported frequency of consumption increased. Because of the high proportion who did not eat cooked cereals, the average weight of cooked cereals in all categories is substantially less than the weight of cooked cereals consumed on average by consumers. Within frequency categories, men generally had a higher average intake of cooked cereals than women.

The mean daily frequency of cooked cereals from the dietary records increased across the frequency categories reported by short question (table 3.2.3). There was no substantial difference between men and women in the frequency of cooked cereal intake within response categories to the short question. The Spearman correlation coefficient for the frequency response to the short question and the frequency of intake from at least 3 days of dietary records was 0.39 for men and 0.33 for women. The recorded frequency of intake from the weighed records for subjects who reported a frequency of once a day or greater was less than half the expected frequency, while for those in the lowest frequency category by short question the recorded frequency of intake was greater than expected.

On average, subjects responding to a short question on frequency of intake of cooked cereal reported a frequency consistent with that recorded by dietary record. There is no evidence that the reporting of cooked cereals frequency by short question varied with sex, age, rural/urban residence, body mass index or SEIFA category (table 3.2.4). There was a tendency for subjects to report eating cooked cereals less frequently in summer than winter (table 3.2.1). It appears that this is in response to a true seasonal difference in food consumption but the response to the short question does not fully compensate for the actual eating behaviour change.

Relative validity – indirect

Mean daily energy intake from the dietary records was not significantly related to increasing frequency of cooked cereal intake (tables 3.2.5 and 3.2.6). There was however a positive relationship between the response to the short question on cooked cereal intake and total carbohydrate and fibre intake in grams per day and as a percentage of energy intake. Total thiamin intake may have increased marginally with reported increased frequency of intake of cooked cereal but thiamin density did not show this relationship. In general, the Spearman correlation coefficients for the relationship between response to the short question on frequency of cooked cereal intake and average daily nutrient intake were modest (table 3.2.6).

Table 3.2.1: Percentage of population groups categorised according to frequency of consumption of cooked cereals by short question

Population Subgroup		Rarely or never	1/month to less than 2/week	2/week to less than once a day	Once a day or more
All	20 to 65 years (n=794)	8.3	32.9	52.6	6.2
Gender	Males (n=368)	10.1	34.8	49.7	5.4
	Females (n=426)	6.8	31.2	55.2	6.8
Age	20-44.9 years (n=476)	6.5	31.7	53.8	8.0
	45-65 years (n=318)	11.0	34.6	50.9	3.5
Region	Hobart (n=342)	6.1	30.4	55.6	7.9
	Launceston (n=226)	10.2	32.7	52.2	4.9
	Rural (n=226)	9.7	36.7	48.7	4.9
BMI	<25 (n=345)	6.4	32.8	52.2	8.7
	25 to <30 (n=278)	9.0	33.1	53.2	4.7
	30 or more (n=143)	11.9	32.2	52.4	3.5
SEIFA category	SEIFA 1 (n=57)	12.3	38.6	43.9	5.3
	SEIFA 2 (n=613)	8.8	33.6	51.9	5.7
	SEIFA 3 (n=124)	4.0	26.6	60.5	8.9
Season	Summer (n=247)	10.5	34.4	49.8	5.3
	Autumn (n=126)	7.9	34.9	46.0	11.1
	Winter (n=219)	5.5	30.6	58.0	5.9
	Spring (n=202)	8.9	32.2	54.5	4.5

Table 3.2.2: Mean daily intake of cooked cereals consumed (in grams) categorised by response to a short dietary question on cooked cereals intake

Population Subgroup	Rarely or never	1/month to less than 2/week	2/week to less than once a day	Once a day or more	p
All	22.5	45.9	74.5	98.5	<0.001
	(5.7-39.3)†	(36.2-55.5)	(66.1-82.9)	(69.8-127.2)	
	n=66	n=261	n=418	n=49	
	(77.3% no intake)	(58.2% no intake)	(33.0% no intake)	(28.6% no intake)	
Males	17.9	50.9	83.6	125.1	<0.001
	(1.1-34.7)	(35.1-66.7)	(68.8-98.3)	(76.4-173.9)	
	n=37	n=128	n=183	n=20	
	(81.1% no intake)	(59.4% no intake)	(33.9% no intake)	(20.0% no intake)	
Females	28.4	41.0	67.4	80.1	0.001
	(0-61.4)	(29.7-52.3)	(57.9-77.0)	(44.3-115.9)	
	n=29	n=133	n=235	n=29	
	(72.4% no intake)	(57.1% no intake)	(32.3% no intake)	(34.5% no intake)	

† 95% confidence interval for mean

Table 3.2.3: Mean daily frequency of cooked cereals consumed categorised by response to a short dietary question on cooked cereals intake

Population Subgroup	Rarely or never	1/month to less than 2/week	2/week to less than once a day	Once a day or more	p
	Daily freq. <0.03	**Daily freq. 0.03 to <0.28**	**Daily freq. 0.28 to <1.0**	**Daily freq. 1.0 or more**	
All	0.09	0.20	0.36	0.46	<0.001
	(0.04-0.13)†	(0.16-0.23)	(0.32-0.39)	(0.33-0.59)	
Males	0.07	0.19	0.36	0.43	<0.001
	(0.02-0.13)	(0.14-0.23)	(0.31-0.41)	(0.28-0.59)	
Females	0.10	0.21	0.35	0.48	<0.001
	(0.03-0.17)	(0.16-0.25)	(0.31-0.39)	(0.28-0.68)	

† 95% confidence interval for mean

Table 3.2.4: WR-SQ† variable for cooked cereals intake

		n	Mean WR-SQ	95% CI	p for difference*
All		794	-0.02	(-0.04 to 0.01)	
Gender	Males	368	-0.01	(-0.06 to 0.03)	
	Females	426	-0.02	(-0.05 to 0.02)	0.93
Age	20–44.9 yrs	476	-0.03	(-0.06 to 0.01)	
	45–65 yrs	318	-0.0003	(-0.04 to 0.04)	0.35
Region	Hobart	342	-0.03	(-0.08 to 0.01)	
	Launceston	226	0.01	(-0.04 to 0.06)	
	Other	226	-0.02	(-0.05 to 0.02)	0.42
BMI	<25	345	-0.01	(-0.06 to 0.03)	
	25 to <30	278	-0.02	(-0.06 to 0.02)	
	30 or more	143	-0.01	(-0.07 to 0.05)	0.94
SEIFA category	SEIFA 1	57	-0.01	(-0.09 to 0.06)	
	SEIFA 2	613	-0.01	(-0.04 to 0.02)	
	SEIFA 3	124	-0.05	(-0.13 to 0.03)	0.60
Season	Summer	247	-0.08**	(-0.12 to -0.04)	
	Autumn	126	-0.01	(-0.11 to 0.08)	
	Winter	219	0.03	(-0.02 to 0.08)	
	Spring	202	0.01	(-0.04 to 0.07)	0.01

† WR-SQ is the recorded mean daily frequency of cooked cereals intake from weighed records minus the reported daily frequency of cooked cereals intake from short question

* significance testing is by independent samples t-test or one-way ANOVA

** significantly different to 0.0 ($p<0.05$)

Table 3.2.5: Mean daily nutrient and energy intake by weighed record categorised by response to a short dietary question on cooked cereals intake

Dietary factor	Rarely or never	1/month to less than 2/week	2/week to less than once a day	Once a day or more	p
Fibre (g)	18.4	19.7	22.3	23.4	<0.001
	(15.7-21.1)†	(18.7-20.7)	(21.5-23.2)	(20.5-26.3)	
Thiamin (mg)	1.49	1.49	1.66	1.56	0.03
	(1.29-1.68)	(1.41-1.58)	(1.58-1.73)	(1.38-1.75)	
Carbohydrate (g)	213.3	221.2	235.1	241.4	0.05
	(189.9-236.7)	(211.0-231.3)	(227.2-242.9)	(13.2-15.5)	
Energy (kJ)	8,352	8,262	8,633	8,521	0.45
	(7,616-9,089)	(7,915-8,610)	(8,348-8,918)	(7,553-9,489)	
Carbohydrate (% kJ)	43.4	45.7	46.7	49.0	0.002
	(40.7-46.1)	(44.7-46.8)	(46.0-47.5)	(46.5-51.6)	
Thiamin density	0.19	0.19	0.20	0.20	0.50
(mg/1000 kJ)	(0.16-0.21)	(0.18-0.20)	(0.19-0.20)	(0.17-0.22)	
Fibre density	2.42	2.48	2.69	2.91	0.015
(g/1000 kJ)	(1.88-2.97)	(2.36-2.59)	(2.59-2.78)	(2.59-3.22)	

† 95% confidence interval for mean

Table 3.2.6: Correlation of response to a short dietary question on cooked cereals intake with mean daily energy and nutrient intake (Spearman's correlation coefficient)

	Males	Females	Total
Fibre	0.24	0.22	0.20
Thiamin	0.10	0.16	0.10
Carbohydrate	0.14	0.18	0.12
Energy	ns	0.13	ns
Carbohydrate (% kJ)	0.11	0.17	0.15
Thiamin density	ns	ns	ns
Fibre density	0.20	0.15	0.18

ns – not statistically different to 0

3.3 Short question about breakfast cereal intake

How often do you eat breakfast cereal? (ready-made, home-made or cooked)

__times per day __times per week

__times per month __rarely or never

__I don't know /can't say

3.3.1 Introduction

The short question about breakfast cereals requests a frequency of intake of breakfast cereal without reference to a serving size.

The food codes defined as 'breakfast cereals' in this analysis were those codes beginning with 1232 to 1235, 1271 to 1276, and 1281. This categorisation included ready-made breakfast cereals, muesli and cooked oats. It does not include breakfast bars or muesli bars.

3.3.2 Results

Pattern of response

The response to this question was grouped into four categories: rarely or never, 1/month to less than 2/ week, 2/week to less than 1/day, 1/day or more.

Breakfast cereal was reported once a day or more by 38% of the study population and rarely or never by almost 28% (table 3.3.1). Older people were less likely to report eating breakfast cereal infrequently while people with a high body mass index were more likely than others to report eating breakfast infrequently. The percentage reporting breakfast cereal once a day or more was highest in the highest SEIFA category and lowest in the lowest SEIFA category. Conversely, the percentage reporting eating breakfast cereal rarely or never was highest in the lowest SEIFA category and lowest in the highest SEIFA category (table 3.3.1).

Relative validity – direct

Close to 90% of the subjects reporting breakfast cereal rarely or never did not have breakfast cereal during the dietary recording period. Conversely, only about 4% of subjects who reported eating breakfast cereal at least once a day did not record eating breakfast cereal during the dietary recording period (table 3.3.2). These percentages were similar in women and men.

The average weight of breakfast cereal consumed increased as the reported frequency of consumption increased (table 3.3.2).

The mean daily frequency of breakfast cereal intake from the dietary records also increased across the short question frequency categories in both men and women. The Spearman correlation coefficient for response to the short question and the frequency of intake observed from at least 3 days of dietary records was 0.80 for men and 0.81 for women. Although breakfast cereal intake is over-estimated by short question at higher frequencies of intake and underestimated at lower frequencies of intake, this may occur to a lesser extent than for cooked cereals (table 3.3.3).

On average, subjects responding to the short question tended to report a similar frequency of breakfast cereal to that observed by dietary recording. There is no evidence that the extent of error in reporting breakfast cereal frequency by short question varied by sex, age, rural/urban residence, body mass index or SEIFA category (table 3.3.4). There was an indication of variation in performance of the question by season of administration but examination of the differences did not provide enlightenment as to why this might occur (table 3.3.4). Mean frequency of breakfast cereal consumption measured by weighed record was quite uniform across the seasons –however frequency response to the short question varied with a relatively low mean frequency estimate in summer and a high mean frequency estimate in autumn. The reason for this is not apparent.

Relative validity – indirect

The mean daily energy intake from the dietary records did not vary across frequency categories based on answers to the short question (table 3.3.5). There was a positive relationship of dietary fibre, thiamin and carbohydrate intake, in grams per day and as a percentage of energy, with increasing frequency of breakfast cereal intake. Consistent with these observations, the correlations between response to the short question and frequency of intake from the dietary records were generally fair with most correlation coefficients greater than 0.3 (table 3.3.6).

Table 3.3.1: Percentage of population groups categorised according to frequency of consumption of breakfast cereal by short question

Population Subgroup		Rarely or never	1/month to less than 2/week	2/week to less than once a day	Once a day or more
All	20 to 65 years (n=793)	27.9	10.1	24.1	38.0
Gender	Males (n=367)	26.2	10.4	25.3	38.1
	Females (n=426)	29.3	9.9	23.0	37.8
Age	20-44.9 years (n=475)	30.1	11.2	24.8	33.9
	45-65 years (n=318)	24.5	8.5	23.0	44.0
Region	Hobart (n=342)	25.7	11.1	25.1	38.0
	Launceston (n=226)	29.6	8.8	22.1	39.4
	Rural (n=225)	29.3	9.8	24.4	36.4
BMI	<25 (n=345)	27.2	8.7	22.9	41.2
	25 to <30 (n=277)	25.6	12.3	24.2	37.9
	30 or more (n=143)	31.5	9.1	28.7	30.8
SEIFA category	SEIFA 1 (n=57)	40.4	15.8	22.8	21.1
	SEIFA 2 (n=612)	28.3	9.2	24.2	38.4
	SEIFA 3 (n=124)	20.2	12.1	24.2	43.5
Season	Summer (n=247)	32.8	11.3	22.7	33.2
	Autumn (n=126)	22.2	8.7	30.2	38.9
	Winter (n=218)	23.4	9.6	22.9	44.0
	Spring (n=202)	30.2	9.9	23.3	36.6

Table 3.3.2: Mean daily intake of breakfast cereal consumed (in grams) categorised by response to a short dietary question on breakfast cereal intake

Population Subgroup	Rarely or never	1/month to less than 2/week	2/week to less than once a day	Once a day or more	p
All	2.9	10.4	36.3	62.7	<0.001
	(1.4-4.4)†	(6.7-14.1)	(28.4-44.1)	(56.1-69.2)	
	n=221	n=80	n=191	n=301	
	(89.1% no intake)	(57.5% no intake)	(21.5% no intake)	(4.0% no intake)	
Males	4.4 (1.2-7.6)	9.7 (5.0-14.5)	39.0 (27.2-50.8)	72.0 (61.2-82.7)	<0.001
	n=96	n=38	n=93	n=140	
	(88.5% no intake)	(60.5% no intake)	(25.8% no intake)	(2.9% no intake)	
Females	1.7	11.0	33.7	54.6	<0.001
	(0.7-2.8)	(5.2-16.8)	(23.0-44.4)	(46.8-62.3)	
	n=125	n=42	n=98	n=161	
	(89.6% no intake)	(54.8% no intake)	(17.3% no intake)	(5.0% no intake)	

† 95% confidence interval for mean

Table 3.3.3: Mean daily frequency of breakfast cereal consumed categorised by response to a short dietary question on breakfast cereal intake

Population Subgroup	Rarely or never	1/month to less than 2/week	2/week to less than once a day	Once a day or more	p
	Daily freq. <0.03	**Daily freq. 0.03 to<0.28**	**Daily freq. 0.28 to <1.0**	**Daily freq. 1.0 or more**	
All	0.04	0.19	0.50	0.88	<0.001
	(0.03-0.06)†	(0.13-0.24)	(0.45-0.55)	(0.85-0.91)	
Males	0.06	0.18	0.47	0.89	<0.001
	(0.02-0.09)	(0.10-0.25)	(0.40-0.55)	(0.84-0.94)	
Females	0.04	0.20	0.52	0.87	<0.001
	(0.02-0.06)	(0.12-0.28)	(0.45-0.59)	(0.82-0.92)	

† 95% confidence interval for mean

Table 3.3.4: WR-SQ† variable for breakfast cereal intake

		n	Mean WR-SQ	95% CI	p for difference*
All		793	-0.04	(-0.07 to 0.01)	
Gender	Males	367	-0.05	(-0.10 to 0.002)	
	Females	426	-0.03	(-0.07 to 0.004)	0.65
Age	20–44.9 yrs	475	-0.03	(-0.06 to 0.001)	
	45–65 yrs	318	-0.06	(-0.12 to 0.005)	0.40
Region	Hobart	342	-0.02	(-0.07 to 0.03)	
	Launceston	226	-0.07**	(-0.13 to -0.006)	
	Other	225	-0.05	(-0.11 to 0.01)	0.47
BMI	<25	345	-0.06**	(-0.11 to -0.01)	
	25 to <30	277	-0.03	(-0.10 to 0.04)	
	30 or more	143	-0.001	(-0.04 to 0.04)	0.39
SEIFA category	SEIFA 1	57	-0.02	(-0.08 to 0.03)	
	SEIFA 2	612	-0.04**	(-0.08 to -0.006)	
	SEIFA 3	124	-0.04	(-0.14 to 0.05)	0.95
Season	Summer	247	0.04**	(0.008 to 0.07)	
	Autumn	126	-0.17**	(-0.31 to -0.02)	
	Winter	218	-0.03	(-0.06 to 0.01)	
	Spring	202	-0.08**	(-0.14 to -0.01)	<0.001

† WR-SQ is the recorded mean daily frequency of breakfast cereal intake from weighed records minus the reported daily frequency of breakfast cereal intake from short question

* significance testing is by independent samples t-test or one-way ANOVA

** significantly different to 0.0 ($p<0.05$)

Table 3.3.5: Mean daily nutrient and energy intake by weighed record categorised by response to a short dietary question on breakfast cereal intake

Dietary factor	Rarely or never	1/month to less than 2/week	2/week to less than once a day	Once a day or more	p
Fibre (g)	17.4	18.1	21.4	24.8	<0.001
	(16.2-18.6)†	(16.7-19.6)	(20.2-22.5)	(23.7-25.8)	
Thiamin (mg)	1.29	1.44	1.64	1.81	<0.001
	(1.20-1.39)	(1.26-1.62)	(1.54-1.73)	(1.72-1.90)	
Carbohydrate (g)	203.3	218.5	239.5	244.3	<0.001
	(192.2-214.4)	(201.7-235.3)	(226.7-252.4)	(235.4-253.3)	
Energy (kJ)	8,124	8,308	8,660	8,678	0.13
	(7,686-8,563)	(7,601-9,014)	(8,250-9,071)	(8,377-8,979)	
Carbohydrate (% kJ)	43.1	45.8	47.1	48.3	<0.001
	(41.9-44.2)	(43.9-47.8)	(45.9-48.2)	(47.4-49.2)	
Thiamin density	0.17	0.18	0.20	0.22	<0.001
(mg/1000 kJ)	(0.15-0.18)	(0.16-0.19)	(0.19-0.21)	(0.21-0.23)	
Fibre density	2.27	2.31	2.57	2.96	<0.001
(g/1000 kJ)	(2.09-2.46)	(2.13-2.48)	(2.43-2.71)	(2.85-3.08)	

† 95% confidence interval for mean

Table 3.3.6: Correlation of response to a short dietary question on breakfast cereal intake with mean daily energy and nutrient intake (Spearman's correlation coefficient)

	Males	Females	Total
Fibre	0.33	0.43	0.37
Thiamin	0.36	0.33	0.32
Carbohydrate	0.23	0.20	0.21
Energy	ns	0.11	0.10
Carbohydrate (% kJ)	0.29	0.21	0.24
Thiamin density	0.35	0.29	0.32
Fibre density	0.32	0.38	0.35

ns – not statistically different to 0

3.4 Summary of performance evaluation of short questions on cereal intake

The food categories that were the subject of these short questions ranged from foods which were frequently consumed by most of the study population (bread) to foods which were infrequently consumed by most of the study population (cooked cereals).

When the responses to the questions were grouped, all questions provided good discrimination between groups on the basis of recorded intake of the target food categories by mean daily frequency of intake and also by mean daily weight of food consumed.

Examination of the correlation between the response to the short question and the appropriate frequency of intake from the diet record showed the highest correlation for the question on breakfast cereal followed by bread and cooked cereals. In general the correlation coefficients were similar for men and women.

The responses for each of the three questions were positively correlated with mean daily intake of dietary fibre, thiamin and carbohydrate. The strongest relationship was shown by the question on frequency of breakfast cereal intake. This question also showed the strongest positive relationship with nutrient density for dietary fibre, thiamin and to a lesser extent, carbohydrate. In all cases, the correlation coefficients did not indicate a strong relationship between the question responses and average nutrient intakes and in many cases the observed correlation, although significant, was very weak.

The utility of the short questions as a measure of the mean frequency of intake of food categories for groups was satisfactory for each of the short questions and there were no substantial differences in the performance of the questions between population groups.

Season had a small effect on performance of the question regarding cooked cereals intake and the question regarding breakfast cereal intake. The effect was not considered to be large enough to be of public health importance except possibly for the difference in performance of the question on breakfast cereal intake. While this appears likely to be a chance finding, investigators using the breakfast cereal question in different seasons should be aware of this possibility.

Chapter 4: The performance of short dietary questions relating to usual frequency of food intake - vegetables

4.1 Short question about fried potato

How often do you eat chips, French fries, wedges, fried potatoes or crisps?

__times per day __times per week

__times per month __rarely or never

__I don't know /can't say

4.1.1 Introduction

The short question about 'fried potato' requests a frequency of intake of hot or cold fried potato products without reference to a serving size. The question states five specific food types to which it refers.

The food codes defining 'fried potato' in the analysis of this question were codes from 23111022 to 23112391, 23120001 to 23120651 and all codes starting with 2511. This included hot potato chips, commercial fried potato products and potato crisps.

4.1.2 Results

Pattern of response

The number of distinct food codes present in the records of the subjects analysed for this question was nine. The most frequently recorded code of those selected was 'potato chips, hot, regular, deep fried, commercial'.

The response for this question was grouped into five categories: rarely or never, 1/month to less than 1/week, 1/week to 2/week, 3/week to less than 1/day, 1/day or more.

The percentage of subjects reporting that they ate fried potato once a day or more was small (3%) while the proportion reporting rarely or never eating fried potato was 14% (table 4.1.1). Older people reported less frequent fried potato intake than younger people and women reported an intake somewhat less than men. The reported frequency of intake was distributed similarly across the other groupings of the study population (table 4.1.1).

Relative validity – direct

Of those subjects reporting they ate fried potatoes once a day or more, 37.5% had no intake over three days. For subjects reporting 'rarely or never' eating fried potato, 19.8% ate fried potato at least once during the three day recording period (table 4.1.2). The average daily weight of fried potato consumed increased with reported frequency of intake category (table 4.1.2). In general the average weight of fried potato for males was greater than for females for any frequency of eating category (table 4.1.2). The recorded average frequency of intake of fried potato also increased with reported frequency of intake category (table 4.1.3). In general, the mean daily frequency of intake of fried potato was similar for males and females within each frequency of eating category (table 4.1.3). The Spearman correlation coefficient between recorded daily frequency of intake and reported daily frequency of intake of fried potato was 0.29 for men and 0.34 for women.

As a group, subjects responding to a short question on the frequency of intake of fried potato reported close to their actual frequency of intake (table 4.1.4). There was a suggestion of a difference in performance of the question between men and women with women tending to under-report their intake of fried potato (by about one occasion in every 33 days). Similarly, there appeared to be a difference in performance of the short question by body mass index: – those with the highest body mass index under-reported their intake of fried potato by about 1 occasion in every 12 days. There did not appear to be a linear trend in performance with increasing body mass index and this difference in performance may have been a chance occurrence. There was no apparent variation in question performance by age, rural/urban residence, relative social disadvantage or season (table 4.1.4).

Relative validity – indirect

Mean daily energy intake increases with reported frequency of fried potato intake, as does mean daily fat intake and saturated fat intake (table 4.1.5). Mean provitamin A intake decreases with reported frequency of fried potato intake. A similar negative relationship is seen for mean vitamin C intake and mean folate intake however the difference between reported frequency categories (table 4.1.5) is not statistically significant. When the relationship between the variables is examined using correlation analysis (table 4.1.6), the negative relationship between the micronutrients (provitamin A, vitamin C, and folate) and reported frequency of fried potato intake is modest but statistically significant for both men and women. Although the positive relationship between saturated fat intake and reported frequency of fried potato intake is significant for men and women, the corresponding relationship for total fat and energy was only significant for women.

Table 4.1.1: Percentage of population groups categorised according to frequency of consumption of fried potato by short question

Population Subgroup		Rarely or never	1/month to less than 1/week	1/week to 2/week	3/week to less than once a day	Once a day or more
All	20 to 65 years (n=792)	14.0	26.1	31.9	24.9	3.0
Gender	Males (n=366)	12.6	21.6	33.1	30.1	2.7
	Females (n=424)	15.3	30.0	31.0	20.4	3.3
Age	20-44.9 years (n=475)	10.1	22.9	33.5	29.5	4.0
	45-65 years (n=317)	19.9	30.9	29.7	18.0	1.6
Region	Hobart (n=341)	12.9	26.7	29.9	27.6	2.9
	Launceston (n=225)	15.1	23.1	32.9	25.8	3.1
	Rural (n=226)	14.6	28.3	34.1	19.9	3.1
BMI	<25 (n=345)	17.7	25.5	28.4	24.9	3.5
	25 to <30 (n=277)	10.1	27.1	36.1	24.9	1.8
	30 or more (n=142)	14.1	25.4	29.6	26.8	4.2
SEIFA category	SEIFA 1 (n=56)	15.8	12.3	40.4	31.6	0
	SEIFA 2 (n=613)	13.6	27.8	31.2	24.2	3.3
	SEIFA 3 (n=123)	15.4	24.4	31.7	25.2	3.3
Season	Summer (n=247)	15.4	23.5	29.1	26.7	5.3
	Autumn (n=126)	11.1	28.6	36.5	22.2	1.6
	Winter (n=218)	15.1	27.5	31.2	23.9	2.3
	Spring (n=201)	12.9	26.4	33.3	25.4	2.0

Table 4.1.2: Mean daily intake of fried potato consumed (in grams) categorised by response to a short dietary question on fried potato intake

Population Subgroup	Rarely or never	1/month to less than 1/week	1/week to 2/week	3/week to less than once a day	Once a day or more	p
All	25.0	42.7	75.1	103.1	166.5	<0.001
	(12.2-37.8)†	(29.4-56.0)	(58.2-92.0)	(83.9-122.3)	(67.8-264.4)	
	n=111	n=207	n=253	n=197	n=24	
	(80.2% no intake)	(71.0% no intake)	(56.1% no intake)	(40.1% no intake)	(37.5% no intake)	
Males	16.1	60.1	77.2	109.2	207.8	<0.001
	(0.6-31.5)	(31.3-88.8)	(49.5-104.9)	(79.7-138.7)	(14.3-401.3)	
	n=46	n=79	n=121	n=110	n=10	
	(89.1% no intake)	(67.1% no intake)	(61.2% no intake)	(42.7% no intake)	(40.0% no intake)	
Females	31.3	32.0	73.2	95.4	137.1	<0.001
	(12.1-50.4)	(19.8-44.2)	(52.7-93.8)	(72.5-118.4)	(18.6-255.5)	
	n=65	n=128	n=132	n=87	n=14	
	(73.8% no intake)	(73.4% no intake)	(51.5% no intake)	(36.8% no intake)	(35.7% no intake)	

† 95% confidence interval for mean

Table 4.1.3: Mean daily frequency of fried potato consumed categorised by response to a short dietary question on fried potato intake

Population Subgroup	Rarely or never	1/month to less than 1/week	1/week to 2/week	3/week to less than once a day	Once a day or more	p
	Daily freq. <0.03	**Daily freq. 0.03 to<0.14**	**Daily freq. 0.14 to 0.28**	**Daily freq. 0.42 to >=1.0**	**Daily freq. 1.0 or more**	
All	0.08	0.12	0.19	0.30	0.41	<0.001
	(0.05-0.12)†	(0.09-0.15)	(0.16-0.23)	(0.26-0.35)	(0.23-0.59)	
Males	0.04 (0.004-0.08)	0.14 (0.09-0.19)	0.17 (0.13-0.22)	0.28 (0.22-0.34)	0.35 (0.07-0.63)	<0.001
Females	0.11	0.11	0.22	0.33	0.45	<0.001
	(0.06-0.17)	(0.08-0.15)	(0.17-0.26)	(0.26-0.41)	(0.20-0.71)	

† 95% confidence interval for mean

Table 4.1.4: WR-SQ† variable for fried potato intake

		n	Mean WR-SQ	95% CI	p for difference*
All		792	0.012	(-0.006 to 0.04)	
Gender	Males	366	-0.008	(-0.04 to 0.02)	
	Females	426	0.03**	(0.007 to 0.06)	0.04
Age	20– 44.9 yrs	475	0.03	(-0.002 to 0.06)	
	45–65 yrs	317	-0.003	(-0.03 to 0.03)	0.16
Region	Hobart	341	-2.3E-17	(-0.03 to 0.03)	
	Launceston	225	0.03	(-0.01 to 0.07)	
	Other	226	0.02	(-0.01 to 0.06)	0.44
BMI	<25	345	0.02	(-0.01 to 0.05)	
	25 to <30	277	-0.03	(-0.06 to 0.01)	
	30 or more	142	0.08**	(0.02 to 0.13)	0.003
SEIFA category	SEIFA 1	57	0.02	(-0.06 to 0.10)	
	SEIFA 2	612	0.02	(-0.005 to 0.05)	
	SEIFA 3	123	-0.01	(-0.06 to 0.04)	0.69
Season	Summer	247	0.003	(-0.04 to 0.04)	
	Autumn	126	0.04	(-0.02 to 0.09)	
	Winter	218	0.003	(-0.03 to 0.04)	
	Spring	201	0.03	(-0.01 to 0.07)	0.60

† WR-SQ is the recorded mean daily frequency of fried potato intake from weighed records minus the reported daily frequency of fried potato intake from short question

* significance testing is by independent samples t-test or one-way ANOVA

** significantly different to 0.0 (p<0.05)

Table 4.1.5: Mean daily nutrient and energy intake by weighed record categorised by response to a short dietary question on fried potato intake

Dietary factor	Rarely or never	1/month to less than 1/week	1/week to 2/week	3/week to less than once a day	Once a day or more	p
Provitamin A (mg)	4.2 (3.3-5.0)†	3.3 (3.0-3.6)	2.9 (2.7-3.2)	2.5 (2.3-2.8)	1.8 (1.2-2.5)	<0.001
Vitamin C (mg)	114.9 (100.6-129.3)	111.7 (101.1-122.3)	103.3 (94.4-112.5)	97.0 (86.9-107.1)	82.9 (51.7-114.1)	0.09
Folate (µg)	248 (227-268)	249 (237-262)	237 (227-248)	233 (220-247)	197 (161-233)	0.06
Energy (kJ)	7,424 (6,918-7,930)	8,328 (7,967-8,689)	8,602 (8,248-8,955)	9,037 (8,566-9,507)	8,864 (7,465-10,263)	<0.001
Fat (g)	65.3 (60.0-70.6)	76.2 (72.2-80.2)	78.0 (74.4-81.6)	84.4 (78.8-90.0)	82.9 (64.0-101.8)	<0.001
Saturated Fat (g)	26.0 (23.6-28.4)	31.6 (29.7-33.5)	32.9 (31.2-34.6)	35.9 (33.3-38.6)	36.6 (28.7-44.5)	<0.001

† 95% confidence interval for mean

Table 4.1.6: Correlation of response to a short dietary question on fried potato intake with mean daily energy and nutrient intake (Spearman's correlation coefficient)

	Males	Females	Total
Provitamin A	-0.17	-0.19	-0.17
Vitamin C	-0.12	-0.16	-0.12
Folate	-0.16	-0.14	-0.10
Energy	ns	0.13	0.15
Fat	ns	0.14	0.15
Saturated Fat	0.15	0.17	0.19

ns – not statistically different to 0

4.2 Short question about potato other than chips

How often do you eat potatoes? (not including chips, French fries, wedges, fried potatoes or crisps)

__times per day __times per week

__times per month __rarely or never

__I don't know /can't say

4.2.1 Introduction

The short question about 'other potato' requests a frequency of potato intake without reference to a serving size. The question states a number of food types to be excluded from the response to the question and does not include prompts about what specific types or forms of potato to include.

The food codes defined as covering the category 'other potato' in this analysis were those codes from 23110002 to 23111001 and 23112402 to 23113151. This included potato baked, boiled, canned, mashed and raw; and excluded potato chips or other forms of fried potato.

4.2.2 Results

Pattern of response

The number of distinct food codes present in the records of the sample analysed for this question was seven. The most frequently recorded code in this category was that for 'potato, boiled, without skin (peeled), not specified as to added fat'.

The response to this question was grouped into four categories: rarely or never to less than 1/week, 1/ week to 2/week, 3/week to less than 1/day, 1/day or more. There were too few subjects reporting they ate potato 'rarely or never' to form a separate category for them.

More than 20% of subjects reported eating ‘other potato’ at least once a day, and only 5.5% reported eating it less than once a week. In general, older subjects reported eating ‘other potato’ more often than younger subjects, subjects living outside the capital city more often than those living in the capital city and people in the lowest SEIFA category more often than people in the highest SEIFA category (table 4.2.1). There was no substantial difference in pattern of response by sex, body mass index category or season.

Relative validity – direct

For those subjects who reported they ate ‘other potato’ once a day or more, only 11.8% had no intake over three days. For subjects who reported they ate ‘other potato’ less than once a week, 36.4% ate ‘other potato’ at least once during the three-day recording period (table 4.2.2). The average daily weight of ‘other potato’ consumed increased with reported frequency of intake category with the average weight of ‘other potato’ for males being greater than for females for any frequency of eating category (table 4.2.2). The recorded average frequency of intake of ‘other potato’ also increased with reported frequency of intake category (table 4.2.3). In general, the mean daily frequency of intake of other potato was similar for males and females within each frequency of eating category (table 4.2.3). The Spearman correlation coefficient between recorded daily frequency of intake and reported daily frequency of intake of ‘other potato’ was 0.36 for men and 0.46 for women.

As a group, subjects responding to a short question on the frequency of intake of other potato over-reported their actual frequency of intake (table 4.2.4). The magnitude of the over-reporting (0.16 occasions per day) is approximately equivalent to one occasion every six days. There was a statistically significant difference in over-reporting for subjects living in Hobart compared to people living outside the capital city. For subjects living in Hobart, the magnitude of the over-reporting was equivalent to about one occasion every 8 days, while subjects outside the capital city were over-reporting by about one occasion every 5 days. There was no apparent variation in question performance by any of the other variables examined (table 4.2.4).

Relative validity – indirect

Mean daily energy intake varied by category of reported frequency of other potato intake however this was not a consistent linear relationship. The category of highest reported frequency of intake had the lowest mean energy intake estimated from the dietary records (table 4.2.5). Furthermore, the correlation analysis (table 4.2.6) indicates a weak negative relationship between reported frequency of intake of ‘other potato’ for women only and no significant correlation for men. For the micronutrients, intake of provitamin A generally increased with category of ‘other potato’ intake – a relationship supported by the correlation analysis (table 4.2.6). However, while mean vitamin C intake showed a significant difference across categories of other potato intake (table 4.2.5), it was not a consistent linear trend and no statistically significant correlation was seen between vitamin C intake and reported frequency of intake of ‘other potato’ (table 4.2.6). There was no apparent relationship with folate intake either by correlation analysis or the mean level by category of ‘other potato’ intake.

Table 4.2.1: Percentage of population groups categorised according to frequency of consumption of 'other potato' by short question

Population	Subgroup	Rarely or never to less than 1/week	1/week to 2/week	3/week to less than once a day	Once a day or more
All	20 to 65 years (n=794)	5.5	18.5	52.5	23.4
Gender	Males (n=368)	6.0	17.4	54.3	22.3
	Females (n=426)	5.2	19.5	50.9	24.4
Age	20-44.9 years (n=476)	7.4	21.8	52.9	17.9
	45-65 years (n=318)	2.8	13.5	51.9	31.8
Region	Hobart (n=342)	7.3	23.1	55.6	14.0
	Launceston (n=226)	4.4	17.3	48.7	29.6
	Rural (n=226)	4.0	12.8	51.8	31.4
BMI	<25 (n=345)	7.8	22.6	48.4	21.2
	25 to <30 (n=278)	2.9	15.5	57.2	24.5
	30 or more (n=143)	5.6	16.1	53.8	24.5
SEIFA category	SEIFA 1 (n=57)	0.0	15.8	57.9	26.3
	SEIFA 2 (n=613)	5.5	18.3	51.2	25.0
	SEIFA 3 (n=124)	8.1	21.0	56.5	14.5
Season	Summer (n=247)	5.3	17.4	56.3	21.1
	Autumn (n=126)	9.5	18.3	53.2	19.0
	Winter (n=219)	6.8	19.2	47.5	26.5
	Spring (n=202)	2.0	19.3	53.0	25.7

Table 4.2.2: Mean daily intake of 'other potato' consumed (in grams) categorised by response to a short dietary question on 'other potato' intake

Population Subgroup	Rarely or never to less than 1/week	1/week to 2/week	3/week to less than once a day	Once a day or more	p
All	26.2	32.4	63.7	87.7	<0.001
	(13.4-39.0)†	(24.5-40.2)	(58.0-69.3)	(77.0-98.4)	
	n=44	n=147	n=417	n=186	
	(63.6% no intake)	(51.7% no intake)	(23.3% no intake)	(11.8% no intake)	
Males	30.6	41.7	76.4	99.6	<0.001
	(8.6-52.5)	(27.0-56.5)	(67.5-85.3)	(81.0-118.2)	
	n=22	n=64	n=200	n=82	
	(63.6% no intake)	(48.4% no intake)	(23.0% no intake)	(13.4% no intake)	
Females	21.8	25.1	51.9	78.3	<0.001
	(6.7-36.9)	(17.2-33.0)	(45.2-58.6)	(66.0-90.7)	
	n=22	n=83	n=217	n=104	
	(63.6% no intake)	(54.2% no intake)	(23.5% no intake)	(10.6% no intake)	

† 95% confidence interval for mean

Table 4.2.3: Mean daily frequency of 'other potato' consumed categorised by response to a short dietary question on 'other potato' intake

Population Subgroup	Rarely or never to less than 1/week	1/week to 2/week	3/week to less than once a day	Once a day or more	p
	Daily freq. <0.14	**Daily freq. 0.14 to 0.28**	**Daily freq. 0.42 to <1.0**	**Daily freq. 1.0 or more**	
All	0.17	0.22	0.43	0.62	<0.001
	(0.09-0.25)†	(0.18-0.26)	(0.40-0.46)	(0.57-0.68)	
Males	0.17	0.24	0.44	0.58	<0.001
	(0.05-0.29)	(0.18-0.31)	(0.40-0.49)	(0.49-0.66)	
Females	0.18	0.20	0.41	0.66	<0.001
	(0.06-0.30)	(0.15-0.26)	(0.37-0.45)	(0.58-0.73)	

† 95% confidence interval for mean

Table 4.2.4: WR-SQ† variable for 'other potato' intake

		n	Mean WR-SQ	95% CI	p for difference*
All		794	- 0.16**	(-0.18 to -0.13)	
Gender	Males	368	-0.15**	(-0.19 to -0.11)	
	Females	426	-0.16**	(-0.20 to -0.12)	0.73
Age	20– 44.9 yrs	476	-0.17**	(-0.20 to -0.14)	
	45–65 yrs	318	-0.14**	(-0.18 to -0.10)	0.22
Region	Hobart	342	-0.12**	(-0.16 to -0.08)	
	Launceston	226	-0.19**	(-0.24 to -0.14)	
	Other	226	-0.18**	(-0.23 to -0.11)	0.03
BMI	<25	345	-0.13**	(-0.17 to -0.09)	
	25 to <30	278	-0.16**	(-0.20 to -0.11)	
	30 or more	143	-0.17**	(-0.23 to -0.11)	0.56
SEIFA category	SEIFA 1	57	-0.20**	(-0.32 to -0.08)	
	SEIFA 2	613	-0.16**	(-0.19 to -0.13)	
	SEIFA 3	124	-0.13**	(-0.20 to -0.06)	0.54
Season	Summer	247	-0.16**	(-0.20 to -0.11	
	Autumn	126	-0.15**	(-0.22 to -0.07)	
	Winter	219	-0.15**	(-0.20 to -0.11)	
	Spring	202	-0.17**	(-0.22 to -0.12)	0.96

† WR-SQ is the recorded mean daily frequency of intake of 'other potato' from weighed records minus the reported daily frequency of 'other potato' intake from short question

* significance testing is by independent samples t-test or one-way ANOVA

** significantly different to 0.0 ($p<0.05$)

Table 4.2.5: Mean daily nutrient and energy intake by weighed record categorised by response to a short dietary question on 'other potato' intake

Dietary factor	Rarely or never to less than 1/week	1/week to 2/week	3/week to less than once a day	Once a day or more	p
Provitamin A (mg)	2.7	2.6	3.0	3.7	0.001
	(1.9-3.6)†	(2.3-2.9)	(2.7-3.2)	(3.2-4.2)	
Vitamin C (mg)	117.6	115.5	97.3	110.5	0.02
	(85.6-149.6)	(101.5-129.5)	(91.0-103.6)	(99.3-121.6)	
Folate (µg)	246	242	236	243	0.78
	(211-282)	(228-256)	(228-245)	(228-258)	
Energy (kJ)	8,386	8,900	8,576	7,958	0.03
	(7,372-9,400)	(8,356-9,445)	(8,307-8,844)	(7,543-8,372)	

† 95% confidence interval for mean

Table 4.2.6: Correlation of response to a short dietary question on 'other potato' intake with mean daily energy and nutrient intake (Spearman's correlation coefficient)

	Males	Females	Total
Provitamin A	0.13	0.10	0.11
Vitamin C	ns	ns	ns
Folate	ns	ns	ns
Energy	ns	-0.10	ns

ns – not statistically different to 0

4.3 Short question about salad

How often do you eat salad? (salad includes mixed green salad and other mixtures of raw vegetables)

__times per day __times per week

__times per month __rarely or never

__I don't know /can't say

4.3.1 Introduction

The short question about salad requests a frequency of intake of salad without reference to a serving size. The question includes a simple definition of what constitutes a salad. The question does not provide guidance regarding what might constitute a salad in regard to context – ie whether salad in a sandwich is as much a salad as salad in a side dish.

The food codes that could have formed a component of 'salad' were those that described raw vegetables (various codes within the category 'vegetables'). A salad was defined as having been consumed whenever 2 different raw vegetables were consumed at the same eating occasion. Those food codes that described prepared salads (ie codes beginning with 2383) were included in the definition of salad.

4.3.2 Results

Pattern of response

The number of distinct food codes which may have formed part of a salad and which were present in the records of the subjects analysed for this question was 35. The most frequently recorded code of those selected was 'tomato, raw' followed by 'lettuce, common, raw'.

The response for this question was grouped into five categories: rarely or never, 1/month to less than 1/week, 1/week to 2/week, 3/week to less than 1/day, 1/day or more.

The percentage of subjects reporting that they 'rarely or never' ate salad was 18.3%; the percentage reporting they ate it once a day or more was 12.3% (table 4.3.1). The pattern of response varied by sex and by SEIFA category. Women generally reported eating salad more frequently than men and subjects in the lowest SEIFA category reported eating salad less frequently than those in the middle or highest SEIFA category. In summer subjects generally reported eating salad more frequently than the other seasons. There did not appear to be substantial differences in pattern of response by age, rural/urban residence, or body mass index.

Relative validity – direct

Of the subjects who reported rarely or never eating salad, 20.7% actually did eat salad at least once during three days of dietary records. Of the subjects who reported eating salad once a day or more, 16.5% were not noted to have eaten salad during the three days of diet records. These percentages did not differ substantially by sex (table 4.3.2).

The mean weight of salad consumed for each category increased with increasing frequency of reported salad intake. The mean weight of salad did not vary substantially between men and women within a category (table 4.3.2).

The mean frequency of salad intake in each category also increased with reported salad frequency – there was little difference between men and women in the mean frequency of intake in each category. The Spearman correlation coefficient for response to the short question on frequency of salad intake compared to the frequency of salad intake from dietary records was 0.49 for men and 0.48 for women.

Overall, when responding to a short question on salad intake, subjects over-reported their intake by 0.03 occasions a day (table 4.3.4). This is equivalent to about one occasion every 33 days and unlikely to be of importance to people measuring salad intake by short questions in populations. There was a difference in performance of the short salad question between men and women – women over-reported their frequency of salad intake by about one occasion in every 14 days, while men reported close to their actual frequency of intake. There were no statistical differences in the short question performance by age, urban/rural residence, body mass index, SEIFA category or season (table 4.3.4). When people were asked the short question about frequency of salad intake in autumn, they over-estimated their intake by about one occasion in every 12 days. Because frequency of consumption of salad is higher in summer, the response to the short question in autumn may have been somewhat influenced by the food consumption patterns in the preceding season.

Relative validity – indirect

Mean daily energy intake did not vary by category of reported frequency of salad intake (table 4.3.5) although correlation analysis indicated a very weak negative relationship (table 4.3.6). Provitamin A intake was not related to reported frequency of salad intake either as a ranked variable or when categorised. Vitamin C and folate was weakly correlated with reported frequency of salad intake (table 4.3.6), however there was no significant difference in mean vitamin C or folate intake by category of reported frequency of salad consumption (table 4.3.5).

Table 4.3.1: Percentage of population groups categorised according to frequency of consumption of salad by short question

Population Subgroup		Rarely or never	1/month to less than 1/week	1/week to 2/week	3/week to less than once a day	Once a day or more
All	20 to 65 years (n=791)	18.3	11.0	30.6	27.8	12.3
Gender	Males (n=366)	21.0	10.9	34.4	24.0	9.6
	Females (n=425)	16.0	11.1	27.3	31.1	14.6
Age	20-44.9 years (n=474)	20.3	11.4	30.8	26.2	11.4
	45-65 years (n=317)	15.5	10.4	30.3	30.3	13.6
Region	Hobart (n=339)	13.0	12.1	31.3	31.3	12.4
	Launceston (n=226)	23.0	8.8	32.2	26.1	9.7
	Rural (n=226)	21.7	11.5	27.9	24.3	14.6
BMI	<25 (n=343)	16.3	12.5	28.6	27.4	15.2
	25 to <30 (n=278)	20.9	8.6	31.7	28.4	10.4
	30 or more (n=142)	19.7	12.0	33.1	26.8	8.5
SEIFA category	SEIFA 1 (n=57)	33.3	5.3	38.6	15.8	7.0
	SEIFA 2 (n=610)	18.5	11.6	29.5	27.5	12.8
	SEIFA 3 (n=124)	10.5	10.5	32.3	34.7	12.1
Season	Summer (n=247)	8.1	7.7	32.0	38.1	14.2
	Autumn (n=125)	17.6	10.4	28.8	27.2	16.0
	Winter (n=219)	26.5	15.5	31.1	18.7	8.2
	Spring (n=200)	22.5	10.5	29.5	25.5	12.0

Table 4.3.2: Mean daily intake of salad consumed (in grams) categorised by response to a short dietary question on salad intake

Population Subgroup	Rarely or never	1/month to less than 1/week	1/week to 2/week	3/week to less than once a day	Once a day or more	p
All	9.3	13.1	24.1	48.5	76.0	<0.001
	(4.9-13.8)†	(6.8-19.3)	(19.7-28.4)	(41.3-55.8)	(60.7-91.4)	
	n=145	n=87	n=242	n=220	n=97	
	(79.3% no intake)	(71.3% no intake)	(50.0% no intake)	(30.5% no intake)	(16.5% no intake)	
Males	7.5	14.5	27.8	50.1	89.1	<0.001
	(2.0-13.0)	(3.4-25.7)	(21.0-34.6)	(40.1-60.2)	(55.5-122.7)	
	n=77	n=40	n=126	n=88	n=35	
	(80.5% no intake)	(72.5% no intake)	(46.0% no intake)	(25.0% no intake)	(17.1% no intake)	
Females	11.4	11.8	20.0	47.5	68.7	<0.001
	(4.2-18.7)	(4.7-18.9)	(14.6-25.4)	(37.4-57.6)	(53.4-84.0)	
	n=68	n=47	n=116	n=132	n=62	
	(77.9% no intake)	(70.2% no intake)	(54.3% no intake)	(34.1% no intake)	(16.1% no intake)	

† 95% confidence interval for mean

Table 4.3.3: Mean daily frequency of salad consumed categorised by response to a short dietary question on salad intake

Population Subgroup	Rarely or never	1/month to less than 1/week	1/week to 2/week	3/week to less than once a day	Once a day or more	p
	Daily freq. <0.03	**Daily freq. 0.03 to<0.14**	**Daily freq.8 0.14 to 0.2**	**Daily freq. 0.42 to <1.0**	**Daily freq. 1.0 or more**	
All	0.09	0.13	0.26	0.46	0.64	<0.001
	(0.06-0.13)†	(0.08-0.17)	(0.22-0.29)	(0.40-0.51)	(0.54-0.74)	
Males	0.08	0.12	0.29	0.47	0.72	<0.001
	(0.04-0.12)	(0.05-0.20)	(0.23-0.35)	(0.38-0.56)	(0.52-0.92)	
Females	0.10	0.13	0.22	0.45	0.60	<0.001
	(0.05-0.16)	(0.06-0.19)	(0.17-0.27)	(0.38-0.52)	(0.49-0.70)	

† 95% confidence interval for mean

Table 4.3.4: WR-SQ† variable for salad intake

		n	Mean WR-SQ	95% CI	p for difference*
All		791	-0.03**	(-0.06 to -0.001)	
Gender	Males	366	0.013	(-0.02 to 0.05)	
	Females	425	-0.07**	(-0.12 to -0.02)	0.007
Age	20–44.9 yrs	474	-0.05	(-0.09 to 0.04)	
	45–65 yrs	317	-0.01	(-0.06 to 0.03)	0.28
Region	Hobart	339	-0.04**	(-0.08 to -0.001)	
	Launceston	226	0.02	(-0.03 to 0.07)	
	Other	226	-0.07	(-0.14 to 0.01)	0.12
BMI	<25	343	-0.05	(-0.10 to 0.005)	
	25 to <30	278	-0.02	(-0.07 to 0.02)	
	30 or more	142	-0.03	(-0.10 to 0.04)	0.79
SEIFA category	SEIFA 1	57	-0.04	(-0.13 to 0.05)	
	SEIFA 2	610	-0.03	(-0.07 to 0.004)	
	SEIFA 3	124	-0.03	(-0.09 to 0.04)	0.98
Season	Summer	247	-0.01	(-0.06 to 0.04)	
	Autumn	125	-0.08**	(-0.16 to -0.01)	
	Winter	219	-0.02	(-0.06 to 0.03)	
	Spring	200	-0.04	(-0.12 to 0.04)	0.46

† WR-SQ is the recorded mean daily frequency of salad intake from weighed records minus the reported daily frequency of salad intake from short question

* significance testing is by independent samples t-test or one-way ANOVA

** significantly different to 0.0 ($p<0.05$)

Table 4.3.5: Mean daily nutrient and energy intake by weighed record categorised by response to a short dietary question on salad intake

Dietary factor	Rarely or never	1/month to less than 1/week	1/week to 2/week	3/week to less than once a day	Once a day or more	p
Provitamin A	2.9	2.9	3.1	2.9	3.5	0.37
(mg)	(2.4-3.4)†	(2.4-3.4)	(2.8-3.4)	(2.6-3.2)	(2.8-4.3)	
Vitamin C	94.1	114.1	99.3	108.9	116.9	0.07
(mg)	(82.6-105.6)	(93.6-134.6)	(90.8-107.8)	(99.0-118.8)	(100.8-132.9)	
Folate (µg)	233	227	233	245	261	0.06
	(215-250)	(209-246)	(222-244)	(233-257)	(242-280)	
Energy (kJ)	8,698	8,834	8,510	8,321	8,008	0.26
	(8,181-9,215)	(8,233-9,436)	(8,130-8,890)	(8,555-9,188)	(7,339-8,676)	

† 95% confidence interval for mean

Table 4.3.6: Correlation of response to a short dietary question on salad intake with mean daily energy and nutrient intake (Spearman's correlation coefficient)

	Males	Females	Total
Provitamin A	ns	ns	ns
Vitamin C	0.17	ns	0.09
Folate	0.18	0.15	0.10
Energy	ns	ns	-0.08

ns – not statistically different to 0

4.4 Short question about cooked vegetables

Not counting potatoes and salad, how often do you eat cooked vegetables?

__times per day __times per week

__times per month __rarely or never

__I don't know /can't say

4.4.1 Introduction

The short question about 'cooked vegetables' requests a frequency of cooked vegetable intake without reference to a serving size. The question specifically requests that potatoes and salad not be counted – this is further highlighted by the fact that the frequency of intake of these foods was the subject of previous questions. No prompt is given regarding what specific types or forms of vegetables to include.

The food codes defined to cover the category cooked vegetables in this analysis were those codes starting with 2321 to 2392 provided they described cooked vegetables rather than raw vegetables or salad. These codes included cooked and canned vegetables and dishes where cooked vegetables other than potato are the major component.

4.4.2 Results

Pattern of response

The number of distinct food codes present in the records of the subjects analysed for this question was 69. The most frequently recorded code in this category was that for 'carrot, cooked, fat not added in cooking'.

The response to this question was grouped into four categories: rarely or never to less than 1/week, 1/ week to 2/week, 3/week to less than 1/day, 1/day or more.

The percentage of subjects reporting they ate cooked vegetables less than once a week was 1.9% with 34% reporting they ate cooked vegetables once a day or more. More than 50% of the subjects reported consuming cooked vegetables between three and six times a week. Women were more likely to report a higher frequency of intake than males and to some extent, older people were more likely to report a

higher frequency of intake than younger people. People living outside the capital city were more likely to report a higher frequency of cooked vegetables than people living in the capital city (table 4.4.1). The pattern of response did not differ much by body mass index, SEIFA category or season.

Relative validity – direct

Of subjects reporting eating cooked vegetables once a day or more, 10.4% did not eat any during the three day diet recording period while 33.3% of those who reported eating cooked vegetables less than once a week had cooked vegetables at least once during the three day diet recording period (table 4.4.2).

The mean daily weight of cooked vegetables increased by category of reported frequency of cooked vegetable intake (table 4.2.2). The weight of cooked vegetable intake within each frequency category was somewhat higher for men than for women.

The mean frequency of cooked vegetable intake from the dietary records increased with reported frequency categories from the short question (table 4.4.3) for both men and women. The mean frequency of intake from the diet records was about the same for men and women within the same category of reported frequency of intake of cooked vegetables. The Spearman correlation coefficient between frequency of cooked vegetable intake from the dietary record and frequency from the short question was 0.19 for men and 0.24 for women.

As a group, the response to the short question on cooked vegetables intake over-estimated the frequency of intake (table 4.4.4). The magnitude of over-estimation was 0.14 occasions per day; equivalent to approximately one occasion of eating cooked vegetables a week. The performance of the question differed by age. Younger people overestimated cooked vegetable intake by approximately one occasion every five days while older people overestimated by approximately one occasion every 14 days. The performance of the short question also differed by whether the subject lived in the capital city or not. Subjects living in Hobart overestimated their cooked vegetable intake by about one occasion in every 11 days while people living outside Hobart overestimated their intake by about one occasion in every five days. There was no apparent difference in the performance of the short question by body mass index, SEIFA category or season. However, while the difference in question performance by SEIFA category is not statistically significant, there appears to be a trend in question performance from greater overestimation for lower SEIFA category to less overestimation for higher SEIFA category. The estimate for overestimation for the lowest SEIFA category (0.20 occasions per day) is high, but the number of subjects in this category is low resulting in a wide confidence interval for this estimate. The pattern of response to the short question on cooked vegetables seemed to indicate a somewhat lower reported frequency of intake in this group, therefore fact that even this pattern of response may be an overestimate takes on more importance.

Relative validity – indirect

Mean energy intake, mean vitamin C intake and mean folate intake does not vary by category of reported frequency of cooked vegetable intake (table 4.4.5). Mean provitamin A intake increases significantly by category of reported frequency of cooked vegetable intake. Correlation analysis (table 4.4.6) indicates a weak correlation between vitamin C intake and reported frequency of intake of cooked vegetables for women and between folate intake and reported frequency of intake of cooked vegetables. The correlation between provitamin A intake and reported frequency of consumption of cooked vegetables was higher but still a weak correlation (table 4.4.6).

Table 4.4.1: Percentage of population groups categorised according to frequency of consumption of cooked vegetables by short question

Population Subgroup		Rarely or never to less than 1/week	1/week to 2/week	3/week to less than once a day	Once a day or more
All	20 to 65 years (n=794)	1.9	8.7	55.4	34.0
Gender	Males (n=368)	1.6	11.1	56.5	30.7
	Females (n=426)	2.1	6.6	54.5	36.9
Age	20-44.9 years (n=476)	1.7	9.7	58.2	30.5
	45-65 years (n=318)	2.2	7.2	51.3	39.3
Region	Hobart (n=342)	1.8	10.2	59.9	28.1
	Launceston (n=226)	2.2	8.8	50.0	38.9
	Rural (n=226)	1.8	6.2	54.0	38.1
BMI	<25 (n=345)	2.0	8.4	53.9	35.7
	25 to <30 (n=278)	1.4	9.0	57.9	31.7
	30 or more (n=143)	2.1	7.7	54.5	35.7
SEIFA category	SEIFA 1 (n=57)	1.8	7.0	59.6	31.6
	SEIFA 2 (n=613)	2.1	8.3	56.1	33.4
	SEIFA 3 (n=124)	0.8	11.3	50.0	37.9
Season	Summer (n=247)	2.4	13.0	58.7	25.9
	Autumn (n=126)	0.8	10.3	52.4	36.5
	Winter (n=219)	1.4	7.8	51.6	39.3
	Spring (n=202)	2.5	3.5	57.4	36.6

Table 4.4.2: Mean daily intake of cooked vegetable consumed (in grams) categorised by response to a short dietary question on cooked vegetable intake

Population Subgroup	Rarely or never to less than 1/week	1/week to 2/week	3/week to less than once a day	Once a day or more	p
All	12.8	49.8	73.9	102.7	<0.001
	(0-27.1)†	(35.7-63.9)	(67.9-79.8)	(89.7-115.8)	
	n=15	n=69	n=440	n=270	
	(66.7% no intake)	(29.0% no intake)	(17.0% no intake)	(10.4% no intake)	
Males	15.5	55.8	84.8	110.9	0.004
	(0-44.5)	(34.5-77.1)	(74.7-94.2)	(83.7-138.1)	
	n=6	n=41	n=208	n=113	
	(66.7% no intake)	(31.7% no intake)	(14.9% no intake)	(12.4% no intake)	
Females	11.1	41.0	64.4	96.9	<0.001
	(0-31.1)	(24.7-57.4)	(57.4-71.4)	(85.5-108.3)	
	n=9	n=28	n=232	n=157	
	(66.7% no intake)	(25.0% no intake)	(19.0% no intake)	(8.9% no intake)	

† 95% confidence interval for mean

Table 4.4.3: Mean daily frequency of cooked vegetables consumed categorised by response to a short dietary question on cooked vegetable intake

Population Subgroup	Rarely or never to less than 1/week	1/week to 2/week	3/week to less than once a day	Once a day or more	p
	Daily freq. <0.14	**Daily freq. 0.14 to 0.28**	**Daily freq. 0.42 to <1.0**	**Daily freq. 1.0 or more**	
All	0.13	0.42	0.53	0.63	<0.001
	(0.02-0.25)†	(0.32-0.51)	(0.50-0.56)	(0.59-0.68)	
Males	0.17	0.37	0.56	0.60	<0.001
	(0-0.46)	(0.27-0.48)	(0.51-0.61)	(0.53-0.67)	
Females	0.11	0.48	0.50	0.65	<0.001
	(0-0.24)	(0.31-0.64)	(0.46-0.55)	(0.59-0.71)	

† 95% confidence interval for mean

Table 4.4.4: WR-SQ† variable for cooked vegetable intake

		n	Mean WR-SQ	95% CI	p for difference*
All		794	- 0.14**	(-0.18 to -0.11)	
Gender	Males	368	-0.12**	(-0.17 to -0.08)	
	Females	426	-0.16**	(-0.21 to -0.12)	0.22
Age	20–44.9 yrs	476	-0.19**	(-0.24 to -0.15)	
	45–65 yrs	318	-0.07**	(-0.12 to -0.03)	<0.001
Region	Hobart	342	-0.09**	(-0.14 to -0.04)	
	Launceston	226	-0.19**	(-0.25 to -0.13)	
	Other	226	-0.19**	(-0.25 to -0.12)	0.01
BMI	<25	345	-0.16**	(-0.22 to -0.11)	
	25 to <30	278	-0.11**	(-0.16 to -0.06)	
	30 or more	143	-0.14**	(-0.20 to -0.07)	0.37
SEIFA category	SEIFA 1	57	-0.20**	(-0.30 to -0.10)	
	SEIFA 2	613	-0.15**	(-0.19 to -0.11)	
	SEIFA 3	124	-0.09**	(-0.16 to -0.01)	0.24
Season	Summer	247	-0.08**	(-0.14 to -0.03)	
	Autumn	126	-0.13**	(-0.21 to -0.06)	
	Winter	219	-0.19**	(-0.26 to -0.12)	
	Spring	202	-0.18**	(-0.24 to -0.12)	0.06

† WR-SQ is the recorded mean daily frequency of cooked vegetable intake from weighed records minus the reported daily frequency of cooked vegetable intake from short question

* significance testing is by independent samples t-test or one-way ANOVA

** significantly different to 0.0 ($p<0.05$)

Table 4.4.5: Mean daily nutrient and energy intake by weighed record categorised by response to a short dietary question on cooked vegetable intake

Dietary factor	Rarely or never to less than 1/week	1/week to 2/week	3/week to less than once a day	Once a day or more	p
Provitamin A (mg)	1.0	2.4	2.8	3.7	<0.001
	(0.5-1.5)†	(1.5-3.3)	(2.6-3.0)	(3.3-4.1)	
Vitamin C (mg)	101.0	104.1	99.7	113.8	0.11
	(13.3-188.6)	(81.7-126.5)	(93.3-106.1)	(105.0-122.6)	
Folate (µg)	192	239	236	248	0.08
	(149-235)	(213-264)	(228-245)	(237-260)	
Energy (kJ)	8,876	8,973	8,614	8,116	0.07
	(6,650-11,103)	(8,022-9,924)	(8,354-8,874)	(7,773-8,458)	

† 95% confidence interval for mean

Table 4.4.6: Correlation of response to a short dietary question on cooked vegetable intake with mean daily energy and nutrient intake (Spearman's correlation coefficient)

	Males	Females	Total
Provitamin A	0.20	0.30	0.25
Vitamin C	ns	0.17	0.12
Folate	0.13	0.13	0.11
Energy	ns	ns	ns

ns – not statistically different to 0

4.5 Summary of performance evaluation of short questions on vegetable intake

When the responses to the questions were grouped, each of the questions provided good discrimination between groups on the basis of recorded intake of the target food categories by mean daily frequency of intake and also by mean daily weight of food consumed.

Examination of the correlation between the response to the short question and the appropriate frequency of intake from diet record showed correlations that varied from weak to fair and that were similar for men and women.

The overall utility of the short questions as a measure of the mean frequency of intake of food categories for groups was satisfactory for all of the short questions. The frequency of intake was over-reported to a small extent when using short questions for ‘other potato’, cooked vegetables and salad. The performance of the question on frequency of fried potato intake varied by sex and body mass index, that of ‘other potato’ by region of residence and the question on frequency of intake of cooked vegetables by age and region of residence.

In general, the responses to the questions were not strongly related with mean daily energy intake. Response to the question on fried potato intake was negatively related to provitamin A, vitamin C and folate intake and positively related to saturated fat intake. It was also positively related to total fat and energy intake in women. Response to the question on ‘other potato’ intake was positively related to provitamin A intake, and negatively related to energy intake (women only). Response to the question on salad intake was positively related to folate and to vitamin C (men only). Finally, the question relating to cooked vegetable intake was related to provitamin A intake, folate intake and vitamin C intake (men only). None of the correlations of responses to the short questions with nutrients were strong.

Chapter 5: The performance of short dietary questions relating to usual frequency of food intake – fruit and fruit juice

5.1 Short question about fruit juice

How often do you eat fruit juices such as orange, grapefruit or tomato?

__times per day __times per week

__times per month __rarely or never

__I don't know /can't say

5.1.1 Introduction

The short question about fruit juice requests a frequency of fruit juice intake without reference to a serving size. The question gives examples of juices that should be included in the category, including juices used commonly and uncommonly. The question does not include prompts or specifications about whether fruit juice drinks (ie diluted fruit juice) or cordial should be included in this category.

The food codes defined as covering the category 'fruit juice' in the analysis of this question were codes beginning with 1131, 1132, 1133, 1136 but not codes beginning with 1134 and 1135. This included fruit and vegetables juices and fruit juice drinks but excluded cordials, cordial bases and drinks made up from powder.

5.1.2 Results

Pattern of response

The number of distinct food codes present in the records of the sample analysed for this question was 16. 'Commercial orange juice, non-sweetened' was the most frequently recorded code of those selected.

The response for this question was grouped into five categories: rarely or never, 1/month to less than 1/week, 1/week to 2/week, 3/week to less than 1/day, 1/day or more.

The percentage of subjects who reported that they consumed fruit juice at least once a day was 25.4%. The percentage that reported they consumed fruit juice rarely or never was 38.1%. The pattern of reported consumption of fruit juice varied by SEIFA category. Those in the lowest SEIFA category reported consuming fruit juice less frequently and those in the highest SEIFA category more frequently than those in the middle SEIFA category. The pattern of response to the short question on fruit juice did not vary substantially by sex, age, rural/urban residence, body mass index or season (table 5.1.1).

Relative validity – direct

Of subjects who reported consuming fruit juice daily or more frequently, 23.4% did not consume fruit juice during the three day dietary recording period. Conversely, 15.6% of subjects who reported consuming fruit juice rarely or never consumed it on at least one occasion during the three day period. These percentages were similar for men and women (table 5.1.2).

The mean daily weight of fruit juice consumed increased with reported frequency of intake for both men and women (table 5.1.2). Within categories of reported frequency of intake, the mean weight consumed was generally higher for men than women.

The mean frequency of fruit juice consumption from the diet records also increased with reported frequency of fruit juice intake (table 5.1.3). The mean frequency of intake within categories of reported frequency of intake were similar for men and women. The Spearman correlation coefficient between response to the short question on fruit juice intake and the recorded frequency of intake was 0.51 for men and 0.58 for women.

Overall, in their response to a short question the study population over-reported frequency of fruit juice intake by 0.12 occasions of consumption per day (table 5.1.4). This is equivalent to about one occasion of consumption every eight days. There were no statistically significant differences in the performance of the short question by sex, age, region of residence or season of question administration. There was a difference by body mass index and by SEIFA category. Subjects in the most overweight category of body mass index did not over-report their frequency of fruit juice intake by short question while subjects with a body mass index of less than 25 kg/m^2 over-reported their frequency of intake by about one occasion of consumption every six days. Similarly, subjects in the lowest SEIFA category did not over-report their frequency of fruit juice intake but subjects in the highest SEIFA category over-reported their intake by about one occasion of consumption every four days (table 5.1.4).

Relative validity – indirect

The relationship of response to the short question on fruit juice and mean daily energy intake was weakly positive for women by correlation analysis (table 5.1.6). However, the pattern of mean energy intake with category of reported fruit juice intake is not uniformly increasing (table 5.1.6). The distribution of subjects within the categories is such that the two extreme categories are relatively heavily weighted for this short question in comparison to the other categories. The gradient of increase of energy intake across categories appears modest. For micronutrients, mean vitamin C increases across categories of reported fruit juice intake (table 5.1.6), a result consistent with the correlation between mean vitamin C intake and reported frequency of fruit juice intake (table 5.1.6). Mean provitamin A intake varies by category of reported fruit juice intake but this appears largely influenced by an increase in the category with the highest frequency of intake (table 5.1.5). The correlation of mean provitamin A intake with reported frequency of fruit juice consumption is weak and statistically significant for women only (table 5.1.6). Mean folate intake varies by reported frequency of fruit juice intake but again the relationship is weak by categorical and correlation analysis. The correlation of mean folate intake with reported frequency of fruit juice consumption is only statistically significant for women (table 5.1.6).

Table 5.1.1: Percentage of population groups categorised according to frequency of consumption of fruit juice by short question

Population Subgroup		Rarely or never	1/month to less than 1/week	1/week to 2/week	3/week to less than once a day	Once a day or more
All	20 to 65 years (n=792)	38.1	6.8	17.3	12.4	25.4
Gender	Males (n=368)	35.1	8.7	18.2	13.9	24.2
	Females (n=424)	40.8	5.2	16.5	11.1	26.4
Age	20-44.9 years (n=476)	36.8	6.7	17.4	12.8	26.3
	45-65 years (n=316)	40.2	7.0	17.1	11.7	24.1
Region	Hobart (n=340)	32.4	8.2	20.6	14.1	24.7
	Launceston (n=226)	42.5	4.9	15.9	8.0	28.8
	Rural (n=226)	42.5	6.6	13.7	14.2	23.0
BMI	<25 (n=343)	38.2	7.0	12.2	12.5	30.0
	25 to <30 (n=278)	37.4	6.5	22.7	10.8	22.7
	30 or more (n=143)	41.3	8.4	18.9	11.9	19.6
SEIFA category	SEIFA 1 (n=56)	60.7	5.4	7.1	8.9	17.9
	SEIFA 2 (n=613)	37.8	7.2	18.3	11.4	25.3
	SEIFA 3 (n=123)	29.3	5.7	17.1	18.7	29.3
Season	Summer (n=247)	36.4	9.3	16.6	12.1	25.5
	Autumn (n=126)	44.4	6.3	16.7	8.7	23.8
	Winter (n=217)	35.0	6.9	15.2	15.7	27.2
	Spring (n=202)	39.6	4.0	20.8	11.4	24.3

Table 5.1.2: Mean daily intake of fruit juice consumed (in grams) categorised by response to a short dietary question on fruit juice intake

Population Subgroup	Rarely or never	1/month to less than 1/week	1/week to 2/week	3/week to less than once a day	Once a day or more	p
All	18.4	24.3	54.9	81.4	156.8	<0.001
	(11.3-25.5)†	(7.7-40.9)	(36.6-73.2)	(61.9-100.9)	(136.1-177.5)	
	n=302	n=54	n=137	n=98	n=201	
	(84.4% no intake)	(77.8% no intake)	(65.0% no intake)	(41.8% no intake)	(23.4% no intake)	
Males	24.6	25.8	73.6	84.2	171.9	<0.001
	(10.9-38.3)	(5.2-46.4)	(41.3-105.9)	(57.5-110.9)	(136.0-207.8)	
	n=129	n=32	n=67	n=51	n=89	
	(81.4% no intake)	(75.0% no intake)	(59.7% no intake)	(43.1% no intake)	(23.6% no intake)	
Females	13.8	22.1	37.0	78.3	144.7	<0.001
	(6.8-20.8)	(0.0-52.0)	(19.0-55.0)	(48.9-107.7)	(120.6-168.8)	
	n=173	n=22	n=70	n=47	n=112	
	(86.7% no intake)	(81.8% no intake)	(70.0% no intake)	(40.4% no intake)	(23.2% no intake)	

† 95% confidence interval for mean

Table 5.1.3: Mean daily frequency of fruit juice consumed categorised by response to a short dietary question on fruit juice intake

Population Subgroup	Rarely or never	1/month to less than 1/week	1/week to 2/week	3/week to less than once a day	Once a day or more	p
	Daily freq. <0.03	**Daily freq. 0.03 to<0.14**	**Daily freq. 0.14 to 0.28**	**Daily freq. 0.43 to <1.0**	**Daily freq. 1.0 or more**	
All	0.07	0.10	0.24	0.40	0.75	<0.001
	(0.05-0.10)†	(0.04-0.17)	(0.17-0.31)	(0.31-0.49)	(0.66-0.84)	
Males	0.08	0.10	0.28	0.39	0.72	<0.001
	(0.05-0.13)	(0.03-0.18)	(0.17-0.39)	(0.27-0.51)	(0.58-0.87)	
Females	0.07	0.11	0.20	0.40	0.77	<0.001
	(0.04-0.09)	(0.0-0.22)	(0.11-0.28)	(0.26-0.55)	(0.66-0.89)	

† 95% confidence interval for mean

Table 5.1.4: WR-SQ† variable for fruit juice intake

		n	Mean WR-SQ	95% CI	p for difference*
All		792	- 0.12**	(-0.16 to -0.08)	
Gender	Males	368	-0.09**	(-0.14 to -0.03)	
	Females	424	-0.15**	(-0.21 to -0.08)	0.20
Age	20–44.9 yrs	476	-0.14**	(-0.20 to -0.08)	
	45–65 yrs	316	-0.10**	(-0.21 to -0.08)	0.36
Region	Hobart	340	-0.15**	(-0.22 to -0.08)	
	Launceston	226	-0.14**	(-0.22 to -0.05)	
	Other	226	-0.05	(-0.13 to 0.02)	0.17
BMI	<25	343	-0.18**	(-0.25 to -0.10)	
	25 to <30	278	-0.10**	(-0.16 to -0.04)	
	30 or more	143	0.005	(-0.07 to 0.08)	0.01
SEIFA category	SEIFA 1	56	0.03	(-0.08 to 0.14)	
	SEIFA 2	613	-0.11**	(-0.16 to -0.06)	
	SEIFA 3	123	-0.24**	(-0.36 to -0.11)	0.02
Season	Summer	247	-0.17**	(-0.26 to -0.07)	
	Autumn	126	-0.04	(-0.13 to 0.04)	
	Winter	217	-0.11**	(-0.18 to -0.04)	
	Spring	202	-0.12**	(-0.20 to -0.04)	0.31

† WR-SQ is the recorded mean daily frequency of fruit juice intake from weighed records minus the reported daily frequency of fruit juice intake from short question

* significance testing is by independent samples t-test or one-way ANOVA

** significantly different to 0.0 (p<0.05)

Table 5.1.5: Mean daily nutrient and energy intake by weighed record categorised by response to a short dietary question on fruit juice intake

Dietary factor	Rarely or never	1/month to less than 1/week	1/week to 2/week	3/week to less than once a day	Once a day or more	p
Provitamin A (mg)	2.8	3.7	2.8	2.8	3.7	<0.001
	(2.5-3.0)†	(2.9-4.4)	(2.4-3.1)	(2.3-3.3)	(3.2-4.2)	
Vitamin C (mg)	84.9	81.5	90.1	116.3	146.0	<0.001
	(78.2-91.6)	(68.0-95.0)	(79.4-100.9)	(99.3-133.3)	(133.9-158.1)	
Folate (µg)	232	250	234	231	256	0.04
	(221-243)	(226-274)	(218-251)	(215-248)	(243-269)	
Energy (kJ)	8,106	9,156	8,615	8,918	8,567	0.04
	(7,770-8,441)	(8,451-9,861)	(8,072-9,157)	(8,268-9,569)	(8,196-8,939)	

† 95% confidence interval for mean

Table 5.1.6: Correlation of response to a short dietary question on fruit juice intake with mean daily energy and nutrient intake (Spearman's correlation coefficient)

	Males	Females	Total
Provitamin A	ns	0.13	0.09
Vitamin C	0.28	0.35	0.32
Folate	ns	0.14	0.10
Energy	ns	0.16	0.08

ns – not statistically different to 0

5.2 Short question about fruit

Not counting juice, how often do you eat fruit? (Fruit includes fresh, canned, frozen, dried)

__times per day __times per week

__times per month __rarely or never

__I don't know /can't say

5.2.1 Introduction

The short question about fruit requests a frequency of fruit intake without reference to a serving size. The question states a food category to be excluded from the response to the question (juice) and includes a prompt regarding the forms of fruit to be included. The question does not include specific information on what to include as a fruit.

The food codes defined as covering the category 'fruit' in this analysis were those codes beginning with 1611 to 1691, excluding those codes beginning with 1683 (glace fruits). This included fruit in all forms (raw, stewed, canned, dried, frozen) and a limited number of dishes where fruit was the major ingredient (toffee apples, fruit crumbles, battered and crumbed fruit).

5.2.2 Results

Pattern of response

The number of distinct food codes present in the records of the sample analysed for this question was 84. The most frequently recorded code in this category was that for 'apple, not further specified, raw, unpeeled'.

The response to this question was grouped into 4 categories: rarely or never, 1/month to less than 2/ week, 2/week to less than 1/day, 1/day or more.

The percentage of subjects who reported that they consumed fruit at least once a day was 53.3%. The percentage that reported they consumed fruit rarely or never was 10.0%. The pattern of reported consumption of fruit juice varied by sex (women appeared to eat fruit more frequently), age (older people appeared to eat fruit more frequently), and SEIFA category (those in the highest SEIFA category reported eating fruit more frequently). The pattern of response to the short question on fruit did not vary substantially by rural/urban residence, body mass index or season (table 5.2.1).

Relative validity – direct

Of subjects who reported consuming fruit once a day or more frequently, 8.3% did not consume fruit during the three day dietary recording period. Conversely, 26.6% of subjects who reported consuming fruit rarely or never, consumed it on at least one occasion during the three day period. These percentages were similar for men and women (table 5.2.2).

The mean daily weight of fruit consumed increased with reported frequency of intake for both men and women (table 5.2.2). Within categories of reported frequency of intake, the mean weight consumed was generally higher for men than women.

The mean frequency of fruit consumption from the diet records also increased with reported frequency of fruit juice intake (table 5.2.3). The mean frequency of intake within categories of reported frequency of intake were similar for men and women. The Spearman correlation coefficient between response to the short question on fruit intake and the recorded frequency of intake was 0.60 for men and 0.56 for women.

Overall, in their response to a short question, the study population reported frequency of fruit intake to be about the same as that recorded during a three day measurement period (table 5.2.4). There were statistically significant differences in the performance of the short question by sex, age, region of residence and body mass index. Women were likely to over-report their fruit intake by about one occasion of eating every eight days while men had a (non-significant) tendency to under-report their frequency of fruit intake. Younger subjects over-reported their fruit intake by one occasion every nine days while older subjects on average under-reported (non-significantly) their frequency of fruit intake. Subjects living in the capital city under-reported (non-significantly) their frequency of fruit intake while subjects living outside the capital city over-reported their fruit intake. Subjects living in rural areas of Tasmania over-reported their fruit intake by about one occasion of eating every six days. Subjects in the highest category of body mass index (greater than or equal to 30 kg/m^2) over-reported their fruit intake by about one occasion of consumption every four days. Subjects in the other body mass index categories reported their frequency of fruit intake accurately overall. There was no statistically significant difference in the short question performance by SEIFA category or by season of administration (table 5.2.4). Although not significant ($p=0.07$ - perhaps due to poor distribution of subjects within the categories), the performance of the short question by SEIFA category varied from over-reporting frequency of fruit intake by one occasion every nine days in the lowest SEIFA category to over-reporting by this magnitude in the highest SEIFA category (table 5.2.4).

Relative validity – indirect

There was no significant relationship between response to the short question on fruit intake and mean daily energy intake (tables 5.2.5 and 5.2.6). There was a significant relationship between response to the short question on fruit intake and mean vitamin C intake, provitamin A intake and folate intake. By correlation analysis, the relationships were of similar strength and present in both men and women (table 5.2.6).

Table 5.2.1: Percentage of population groups categorised according to frequency of consumption of fruit by short question

Population	Subgroup	Rarely or never	1/month to less than 2/week	2/week to less than once a day	Once a day or more
All	20 to 65 years (n=793)	10.0	16.1	20.6	53.3
Gender	Males (n=368)	10.9	20.9	20.7	47.6
	Females (n=425)	9.2	12.0	20.5	58.4
Age	20-44.9 years (n=476)	10.7	18.9	21.4	48.9
	45-65 years (n=317)	8.8	12.0	19.2	59.9
Region	Hobart (n=341)	10.3	16.1	22.3	51.3
	Launceston (n=226)	10.6	15.9	19.0	54.4
	Rural (n=226)	8.8	16.4	19.5	55.3
BMI	<25 (n=345)	10.7	16.8	19.7	52.8
	25 to <30 (n=277)	9.0	14.4	22.7	53.8
	30 or more (n=143)	10.5	18.2	18.9	52.4
SEIFA category	SEIFA 1 (n=57)	19.3	26.3	17.5	36.8
	SEIFA 2 (n=613)	9.5	16.0	21.4	53.2
	SEIFA 3 (n=123)	8.1	12.2	17.9	61.8
Season	Summer (n=247)	9.3	15.4	22.3	53.0
	Autumn (n=125)	10.4	15.2	19.2	55.2
	Winter (n=219)	7.8	19.2	17.4	55.7
	Spring (n=202)	12.9	14.4	22.8	50.0

Table 5.2.2: Mean daily intake of fruit consumed (in grams) categorised by response to a short dietary question on fruit intake

Population Subgroup	Rarely or never	1/month to less than 2/week	2/week to less than	Once a day or more once a day	p
All	11.9	49.4	101.0	167.9	<0.001
	(6.1-17.7)†	(36.4-62.3)	(85.5-116.5)	(152.5-183.4)	
	n=79	n=128	n=163	n=423	
	(73.4% no intake)	(39.1% no intake)	(21.5% no intake)	(8.3% no intake)	
Males	14.4	50.0	114.5	195.4	<0.001
	(4.5-24.3)	(30.7-69.3)	(89.8-139.2)	(166.1-224.8)	
	n=40	n=77	n=76	n=175	
	(75.0% no intake)	(46.8% no intake)	(21.1% no intake)	(8.6% no intake)	
Females	9.3	48.4	89.2	148.5	<0.001
	(3.1-15.5)	(33.2-63.7)	(69.5-108.9)	(132.4-164.6)	
	n=39	n=51	n=87	n=248	
	(71.8% no intake)	(27.5% no intake)	(21.8% no intake)	(8.1% no intake)	

† 95% confidence interval for mean

Table 5.2.3: Mean daily frequency of fruit consumed categorised by response to a short dietary question on fruit intake

Population Subgroup	Rarely or never	1/month to less than 2/week	2/week to less than once a day	Once a day or more	p
	Daily freq. <0.03	**Daily freq. 0.03 to<0.28**	**Daily freq. 0.28 to <1.0**	**Daily freq. 1.0 or more**	
All	0.14	0.42	0.77	1.28	<0.001
	(0.07-0.20)†	(0.33-0.51)	(0.67-0.88)	(1.19-1.37)	
Males	0.14	0.36	0.79	1.33	<0.001
	(0.04-0.25)	(0.26-0.47)	(0.63-0.96)	(1.17-1.49)	
Females	0.14	0.51	0.76	1.25	<0.001
	(0.06-0.22)	(0.36-0.66)	(0.61-0.90)	(1.14-1.35)	

† 95% confidence interval for mean

Table 5.2.4: WR-SQ† variable for fruit intake

		n	Mean WR-SQ	95% CI	p for difference*
All		793	- 0.05	(-0.10 to 0.01)	
Gender	Males	368	0.04	(-0.04 to 0.13)	
	Females	425	-0.12**	(-0.20 to -0.04)	0.006
Age	20– 44.9 yrs	476	-0.11**	(-0.19 to -0.04)	
	45–65 yrs	317	0.06	(-0.03 to 0.15)	0.005
Region	Hobart	341	0.07	(-0.02 to 0.16)	
	Launceston	226	-0.12**	(-0.23 to -0.02)	
	Other	226	-0.15**	(-0.26 to -0.03)	0.003
BMI	<25	345	0.02	(-0.07 to 0.10)	
	25 to <30	277	0.01	(-0.08 to 0.10)	
	30 or more	143	-0.28**	(-0.44 to -0.11)	0.001
SEIFA category	SEIFA 1	57	-0.11	(-0.30 to 0.07)	
	SEIFA 2	613	-0.07**	(-0.14 to -0.004)	
	SEIFA 3	123	0.11	(-0.03 to 0.26)	0.07
Season	Summer	247	0.03	(-0.07 to 0.12)	
	Autumn	125	-0.17	(-0.37 to 0.02)	
	Winter	219	-0.03	(-0.13 to 0.08)	
	Spring	202	-0.08	(-0.18 to 0.03)	0.17

† WR-SQ is the recorded mean daily frequency of fruit intake from weighed records minus the reported daily frequency of fruit intake from short question

* significance testing is by independent samples t-test or one-way ANOVA

** significantly different to 0.0 (p<0.05)

Table 5.2.5: Mean daily nutrient and energy intake by weighed record categorised by response to a short dietary question on fruit intake

Dietary factor	Rarely or never	1/month to less than 2/week	2/week to less than once a day	Once a day or more	p
Provitamin A (mg)	2.1	2.6	3.0	3.4	<0.001
	(1.7-2.5)†	(2.1-3.0)	(2.6-3.4)	(3.1-3.7)	
Vitamin C (mg)	62.9	103.0	104.0	113.9	<0.001
	(53.3-72.4)	(87.8-118.3)	(92.0-115.9)	(106.9-120.8)	
Folate (µg)	198	236	238	249	<0.001
	(179-218)	(219-254)	(224-253)	(240-258)	
Energy (kJ)	8,240	8,987	8,714	8,286	0.07
	(7,450-9,030)	(8,488-9,485)	(8,227-9,201)	(8,020-8,551)	

† 95% confidence interval for mean

Table 5.2.6: Correlation of response to a short dietary question on fruit intake with mean daily energy and nutrient intake (Spearman's correlation coefficient)

	Males	Females	Total
Provitamin A	0.24	0.22	0.22
Vitamin C	0.26	0.29	0.25
Folate	0.28	0.22	0.18
Energy	ns	ns	ns

ns – not statistically different to 0

5.3 Summary of performance evaluation of short questions on fruit intake

When the responses to the questions were grouped, all questions provided good discrimination between groups on the basis of recorded intake of the target food categories by mean daily frequency of intake and also by mean daily weight of food consumed.

Examination of the correlation between the response to the short question and the appropriate frequency of intake from diet record showed a good correlation that was similar for both questions and similar for men and women.

The overall utility of the short questions as a measure of the mean frequency of intake of food categories for groups was satisfactory for both of the short questions, although the frequency of intake of fruit juice was over-reported to a small extent. The performance of the question on frequency of fruit juice intake varied by body mass index and by SEIFA category while the performance of the question on frequency of fruit intake varied by sex, age, region of residence, and body mass index. The direction of error in reporting was not necessarily related to the frequency of intake. For example, women were seen to over-report frequency of fruit intake compared to men and they generally report a higher frequency of intake. On the other hand, younger subjects were observed to over-report frequency of fruit intake compared to older subjects whereas older subjects generally report a higher frequency of intake.

The responses to both of the questions were not strongly related with mean daily energy intake. However the responses to both questions were related to vitamin C intake and responses to the question on fruit intake related to provitamin A intake and folate intake. The response to the question on fruit juice intake was weakly correlated with provitamin A intake and folate intake for women only.

Chapter 6: The performance of short dietary questions relating to usual frequency of food intake - meat

6.1 Short question about red meat

How often do you eat red meat? (beef, lamb, liver and kidney but not pork or ham) (In this category include all minimally processed forms of red meat such as chops, steaks, roasts, rissoles, hamburgers, mince, stir fries, and casseroles)

__times per day __times per week

__times per month __rarely or never

__I don't know /can't say

6.1.1 Introduction

The short question about red meat requests a frequency of red meat consumption without reference to serving size consumed. The question stipulates the inclusion of two animal sources of meat (cattle and sheep) and excludes pig meat. The question implies that both muscle meat and organ meat (specifically liver and kidney) is to be included. As a prompt, the question lists a number of different forms of red meat that are to be included. These are characterised by all being forms of minimally processed red meat.

The food codes defined as covering the category 'red meat' in the analysis of this question were codes beginning with 1811, 1812, 1816, 1841, 1842, 1871, 1872 to1877, 1881, 1882. This included beef, lamb, veal, liver, offal, beef and veal dishes, or meat dishes where the meat was not specified, crumbed beef or veal, and lamb dishes.

6.1.2 Results

Pattern of response

The number of distinct food codes present in the records of the sample analysed for this question was 80. The most frequently recorded code of those selected was for 'beef, steak, not specified as to cut, grilled or BBQ, lean and fat'.

The response for this question was grouped into four categories: rarely or never, 1/month to less than 2/ week, 2/week to less than 1/day, 1/day or more.

Most of the subjects (71.9%) reported eating red meat between 2/week to less than 1/day (table 6.1.1). Only a small percentage (4.4%) reported eating red meat rarely or never. The percentage reporting eating red meat once a day or more was 13.7%. The pattern of response varied by sex – men reported

eating red meat more frequently, by region – subjects living outside the capital city reported eating red meat more frequently and by SEIFA category – subjects in the highest SEIFA category reported eating red meat less frequently. There was no apparent difference in the pattern of response by age, body mass index or season of question administration (table 6.1.1).

Relative validity – direct

Of the subjects who reported eating red meat at least once a day, the percentage which did not eat red meat during a three day recording period was 13.8%. Of those subjects who reported that they rarely or never at red meat, 11.4% ate red meat on at least one occasion during the three day period (table 6.1.2).

The mean daily weight of red meat consumed increased with category of increasing frequency of reported red meat consumption (table 6.1.2). Generally, within each category of response to the short question, the mean weight of red meat consumed was greater for males than for females.

The mean daily frequency of red meat noted from the dietary records increased with category of response to the short question on red meat (table 6.1.3). The frequency of intake was generally similar for men and women within short question response category. The Spearman correlation coefficient for the relationship between the response to the short question on red meat and the frequency of red meat intake from dietary records was 0.29 for men and 0.33 for women.

Overall, in responding to a short question on frequency of red meat intake, subjects over-reported their frequency of intake by 0.06 occasions of eating per day (equivalent to about one occasion of eating every 17 days). There was no statistically significant difference in the performance of this short question by sex, age, region of residence, body mass index, SEIFA category or season (table 6.1.4).

Relative validity – indirect

Mean daily energy intake increased with category of response to a short question on frequency of red meat intake (table 6.1.5) although a significant (but weak) correlation was seen only for men (table 6.1.6). Mean total protein, total fat, saturated fat, iron and zinc increased consistently with category of short question response (table 6.1.5). For most of these nutrients there was a significant weak correlation with response to the short question for men but not for women (table 6.1.6). The exceptions were zinc intake where there was a weak correlation for both men and women, and iron intake where there was no correlation for either men or women. For nutrient density, there was no difference across short question response categories for mean iron density of the diet but a positive relationship with zinc density, fat contribution to energy intake, and saturated fat contribution to energy intake (table 6.1.5). On correlation analysis, there was no significant correlation for men or women between response to the short question and fat contribution to energy intake or saturated fat contribution to energy intake (table 6.1.6). There was a weak correlation between response to the short question and zinc density for both men and women.

Table 6.1.1: Percentage of population groups categorised according to frequency of consumption of red meat by short question

Population Subgroup		Rarely or never	1/month to less than 2/week	2/week to less than once a day	Once a day or more
All	20 to 65 years (n=794)	4.4	9.9	71.9	13.7
Gender	Males (n=368)	1.6	8.7	70.1	19.6
	Females (n=426)	6.8	11.0	73.5	8.7
Age	20-44.9 years (n=476)	5.7	9.0	72.1	13.2
	45-65 years (n=318)	2.5	11.3	71.7	14.5
Region	Hobart (n=342)	5.0	13.5	75.1	6.4
	Launceston (n=226)	5.3	8.4	67.7	18.6
	Rural (n=226)	2.7	6.2	71.2	19.9
BMI	<25 (n=345)	7.0	11.3	68.7	13.0
	25 to <30 (n=278)	1.4	10.4	73.4	14.7
	30 or more (n=143)	2.8	7.0	78.3	11.9
SEIFA category	SEIFA 1 (n=57)	0.0	10.5	78.9	10.5
	SEIFA 2 (n=613)	4.2	8.8	71.6	15.3
	SEIFA 3 (n=124)	7.3	15.3	70.2	7.3
Season	Summer (n=247)	4.5	11.3	71.3	13.0
	Autumn (n=126)	5.6	7.9	70.6	15.9
	Winter (n=219)	5.9	9.1	72.6	12.3
	Spring (n=202)	2.0	10.4	72.8	14.9

Table 6.1.2: Mean daily intake of red meat consumed (in grams) categorised by response to a short dietary question on red meat intake

Population Subgroup	Rarely or never	1/month to less than 2/week	2/week to less than once a day	Once a day or more	p
All	7.8	42.4	78.4	121.0	<0.001
	(0-16.3)†	(29.3-55.6)	(71.5-85.3)	(97.6-144.4)	
	n=35	n=79	n=571	n=109	
	(88.6% no intake)	(44.3% no intake)	(23.1% no intake)	(13.8% no intake)	
Males	0.0	46.7	97.0	143.2	<0.001
	(NA)	(22.3-71.1)	(85.5-108.5)	(110.7-175.7)	
	n=6	n=32	n=258	n=72	
	(100.0% no intake)	(43.8% no intake)	(20.5% no intake)	(12.5% no intake)	
Females	9.4 39.5	63.1	77.8	<0.001	
	(0-19.6)	(24.3-54.8)	(55.1-71.0)	(54.6-100.9)	
	n=29	n=47	n=313	n=37	
	(86.2% no intake)	(44.7% no intake)	(25.2% no intake)	(16.2% no intake)	

† 95% confidence interval for mean

Table 6.1.3: Mean daily frequency of red meat consumed categorised by response to a short dietary question on red meat intake

Population Subgroup	Rarely or never	1/month to less than 2/week	2/week to less than once a day	Once a day or more	p
	Daily freq. <0.03	**Daily freq. 0.03 to<0.28**	**Daily freq. 0.28 to <1.0**	**Daily freq. 1.0 or more**	
All	0.07	0.28	0.47	0.66	<0.001
	(0-0.14)†	(0.21-0.35)	(0.43-0.50)	(0.57-0.75)	
Males	0.0	0.27	0.52	0.72	<0.001
	(NA)	(0.16-0.38)	(0.47-0.57)	(0.60-0.83)	
Females	0.08	0.28	0.42	0.55	<0.001
	(0-0.17)	(0.19-0.37)	(0.38-0.46)	(0.43-0.67)	

† 95% confidence interval for mean

NA – not appropriate to be calculated

Table 6.1.4: WR-SQ† variable for red meat intake

		n	Mean WR-SQ	95% CI	p for difference*
All		794	- 0.06**	(-0.09 to -0.03)	
Gender	Males	368	-0.03	(-0.08 to 0.02)	
	Females	426	-0.08**	(-0.11 to -0.04)	0.18
Age	20–44.9 yrs	476	-0.07**	(-0.11 to -0.04)	
	45–65 yrs	318	-0.03**	(-0.08 to -0.02)	0.19
Region	Hobart	342	-0.03	(-0.07 to 0.02)	
	Launceston	226	-0.05**	(-0.10 to 0.0002)	
	Other	226	-0.10**	(-0.17 to -0.04)	0.11
BMI	<25	345	-0.03	(-0.08 to 0.008)	
	25 to <30	278	-0.09**	(-0.14 to -0.03)	
	30 or more	143	-0.04	(-0.11 to 0.02)	0.33
SEIFA category	SEIFA 1	57	0.02	(-0.09 to 0.13)	
	SEIFA 2	613	-0.07**	(-0.10 to -0.03)	
	SEIFA 3	124	-0.03	(-0.10 to 0.04)	0.26
Season	Summer	247	-0.03	(-0.08 to 0.02)	
	Autumn	126	-0.05	(-0.12 to 0.02)	
	Winter	219	-0.04	(-0.09 to 0.01)	
	Spring	202	-0.11**	(-0.18 to -0.04)	0.23

† WR-SQ is the recorded mean daily frequency of red meat intake from weighed records minus the reported daily frequency of red meat intake from short question

* significance testing is by independent samples t-test or one-way ANOVA

** significantly different to 0.0 ($p<0.05$)

Table 6.1.5: Mean daily nutrient and energy intake by weighed record categorised by response to a short dietary question on red meat intake

Dietary factor	Rarely or never	1/month to less than 2/week	2/week to less than once a day	Once a day or more	p
Protein (g)	64.4	75.1	84.4	100.4	<0.001
	(56.9-71.8)†	(68.4-81.8)	(82.0-86.8)	(92.0-108.7)	
Iron (mg)	10.9	12.4	12.9	14.3	0.002
	(9.3-12.4)	(11.3-13.6)	(12.5-13.3)	(13.2-15.5)	
Zinc (mg)	8.0	9.2	10.7	12.8	<0.001
	(7.0-8.9)	(8.4-10.0)	(10.4-11.1)	(11.6-14.1)	
Energy (kJ)	7,390	8,177	8,398	9,486	<0.001
	(6,423-8,357)	(7,451-8,903)	(8,176-8,620)	(8,773-10,198)	
Fat (g)	61.9	70.8	77.7	86.5	<0.001
	(51.7-72.0)	(63.8-77.8)	(75.2-80.2)	(78.2-94.9)	
Saturated fat (g)	25.4	30.5	32.5	36.2	0.002
	(20.8-30.0)	(26.7-34.3)	(31.3-33.7)	(32.5-39.8)	
Fat (% kJ)	30.6	32.0	34.1	33.4	0.002
	(27.8-33.4)	(30.5-33.5)	(33.6-34.6)	(32.0-34.9)	
Saturated fat (% kJ)	12.6	13.4	14.2	13.9	0.02
	(11.2-13.9)	(12.5-14.4)	(13.9-14.5)	(13.3-14.6)	
Iron density	1.51	1.60	1.57	1.58	0.83
(mg/1000 kJ)	(1.36-1.66)	(1.47-1.72)	(1.53-1.60)	(1.47-1.70)	
Zinc density	1.13	1.16	1.31	1.38	<0.001
(mg/1000 kJ)	(1.03-1.23)	(1.09-1.23)	(1.28-1.33)	(1.30-1.45)	

† 95% confidence interval for mean

Table 6.1.6: Correlation of response to a short dietary question on red meat intake with mean daily energy and nutrient intake (Spearman's correlation coefficient)

	Males	Females	Total
Protein	0.21	ns	0.18
Iron	ns	ns	0.09
Zinc	0.22	0.12	0.20
Energy	0.10	ns	0.10
Fat	0.11	ns	0.10
Saturated fat	0.13	ns	0.11
Fat (% kJ)	ns	ns	ns
Saturated fat (% kJ)	ns	ns	ns
Iron density	ns	ns	ns
Zinc density	0.17	0.17	0.17

ns – not statistically different to 0

6.2 Short question about processed meat

How often do you eat meat products such as sausages, frankfurters, belgium, devon, salami, meat pies, bacon or ham?

__times per day __times per week

__times per month __rarely or never

__I don't know /can't say

6.2.1 Introduction

The short question about processed meat requests a frequency of intake of processed meat without reference to a serving size. The question gives examples of food categories to include, but the list is indicated not to be exhaustive by use of the phrase 'such as'.

The food codes defined as covering the category 'processed meat' in this analysis were those codes beginning with 1814, 1815, 1851, 1852 and 1861. Those codes starting with 1861 and including chicken or turkey were excluded. This categorisation included bacon, ham, sausages, frankfurters and corned, smoked and salami type products.

6.2.2 Results

Pattern of response

The number of distinct food codes present in the records of the subjects analysed for this question was 42. The most frequently recorded code in this category was that for 'ham, not specified as to type'.

The response to this question was grouped into four categories: rarely or never, 1/month to less than 2/ week, 2/week to less than 1/day, 1/day or more.

The percentage of subjects who reported they ate processed meat 'rarely or never' was 11.2% while the percentage who reported eating processed meat at least once a day was 7.6% (table 6.2.1). Women generally reported eating processed meat less frequently than men and subjects in the highest SEIFA category reported eating processed meat less frequently than people in the lowest SEIFA category. There was no substantial difference in pattern of response by age, region of residence, body mass index or season of question administration (table 6.2.1).

Relative validity – direct

Of the subjects reporting that they rarely or never ate processed meat, 28.1% ate processed meat at least once during the three day diet recording period (table 6.2.2). Of those subjects who reported eating processed meat at least daily, 16.7% did not eat processed meat during the three day period.

The mean daily weight of processed meat consumed increased with category of response to the short question (table 6.2.2). This increase occurred for men and women but within each category the mean daily weight of processed meat was greater for men.

The mean frequency of intake of processed meat increased with category of response to the short question for both men and women (table 6.2.3). Within each category the mean frequency was somewhat higher for men than for women. The Spearman's correlation coefficient for the relationship between response to the short question and frequency of processed meat intake by dietary records was 0.28 for men and 0.27 for women.

Overall, when responding to a short question on frequency of processed meat intake, subjects underestimated their frequency of intake by 0.14 occasions of eating per day (table 6.2.4); equivalent to about 1 eating occasion every seven days. There was no statistical difference in the performance of the short question by sex, age, region of residence, body mass index, SEIFA category or season of administration (table 6.2.4). While not showing a statistically significant difference between groups, the estimate for the extent of underestimation was higher for subjects in the lowest SEIFA category (about one eating occasion in every six days) than for subjects in the highest SEIFA category (about one eating occasion in every ten days) (table 6.2.4).

Relative validity – indirect

The mean daily energy intake increased with category of response to the short question (table 6.2.5). There was also a statistically significant correlation (for both men and women) between response to the short question and their mean daily energy intake (table 6.2.6).

Mean total protein, total fat, saturated fat, and zinc increased with category of short question response (table 6.2.5). For each of these nutrients there was a significant weak correlation with response to the short question for both men and women (table 6.2.6). For mean daily iron intake, there was no significant correlation with response to the short question for either men or women (table 6.2.6) and although the mean iron intake for each category of short question response increased (table 6.2.5), it failed to reach statistical significance ($p=0.06$). For nutrient density there was no difference across short question response categories for mean zinc density of the diet but a generally positive relationship with fat contribution to energy intake and saturated fat contribution to energy intake (table 6.2.5). Mean iron density decreased across short question response categories (table 6.2.5) and this relationship was consistent with the weak negative correlation between mean iron density and response to the short question (table 6.2.6). The weak correlation between response to the short question and both fat contribution to energy intake and saturated fat contribution to energy intake was only statistically significant for women (table 6.2.6).

Table 6.2.1: Percentage of population groups categorised according to frequency of consumption of processed meat by short question

Population Subgroup		Rarely or never	1/month to less than 2/week	2/week to less than once a day	Once a day or more
All	20 to 65 years (n=794)	11.2	35.5	45.7	7.6
Gender	Males (n=368)	6.0	31.5	51.6	10.9
	Females (n=426)	15.7	39.0	40.6	4.7
Age	20-44.9 years (n=476)	10.3	32.6	49.2	8.0
	45-65 years (n=318)	12.6	39.9	40.6	6.9
Region	Hobart (n=342)	11.4	36.5	46.2	5.8
	Launceston (n=226)	12.4	31.0	46.9	9.7
	Rural (n=226)	9.7	38.5	43.8	8.0
BMI	<25 (n=345)	14.2	39.4	40.9	5.5
	25 to <30 (n=278)	6.5	32.7	51.1	9.7
	30 or more (n=143)	11.2	32.9	46.9	9.1
SEIFA category	SEIFA 1 (n=57)	7.0	26.3	56.1	10.5
	SEIFA 2 (n=613)	11.3	35.9	45.3	7.7
	SEIFA 3 (n=124)	12.9	37.9	43.5	5.6
Season	Summer (n=247)	8.9	32.0	51.4	7.7
	Autumn (n=126)	17.5	34.9	38.9	8.7
	Winter (n=219)	13.2	38.8	42.0	5.9
	Spring (n=202)	7.9	36.6	47.0	8.4

Table 6.2.2: Mean daily intake of processed meat consumed (in grams) categorised by response to a short dietary question on processed meat intake

Population Subgroup	Rarely or never	1/month to less than 2/week	2/week to less than once a day	Once a day or more	p
All	12.9	29.9	50.8	72.1	<0.001
	(6.4-19.4)†	(25.1-34.7)	(43.9-57.6)	(51.0-93.3)	
	n=89	n=282	n=363	n=60	
	(71.9% no intake)	(34.0% no intake)	(25.3% no intake)	(16.7% no intake)	
Males	24.9	35.1	64.0	81.7	<0.001
	(7.3-42.5)	(26.5-43.8)	(53.2-74.7)	(52.0-111.5)	
	n=22	n=116	n=190	n=40	
	(54.5% no intake)	(37.1% no intake)	(21.6% no intake)	(20.0% no intake)	
Females	8.9	26.3	36.3	53.0	<0.001
	(2.5-15.4)	(20.8-31.7)	(28.5-44.0)	(30.0-76.0)	
	n=67	n=166	n=173	n=20	
	(77.6% no intake)	(31.9% no intake)	(29.5% no intake)	(10.0% no intake)	

† 95% confidence interval for mean

Table 6.2.3: Mean daily frequency of processed meat consumed categorised by response to a short dietary question on processed meat intake

Population Subgroup	Rarely or never	1/month to less than 2/week	2/week to less than once a day	Once a day or more	p
	Daily freq. <0.03	**Daily freq. 0.03 to<0.28**	**Daily freq. 0.28 to <1.0**	**Daily freq. 1.0 or more**	
All	0.17	0.37	0.53	0.66	<0.001
	(0.11-0.24)†	(0.33-0.41)	(0.48-0.58)	(0.53-0.80)	
Males	0.26	0.37	0.61	0.70	<0.001
	(0.11-0.41)	(0.30-0.45)	(0.53-0.69)	(0.52-0.89)	
Females	0.14	0.37	0.43	0.58	<0.001
	(0.07-0.22)	(0.31-0.42)	(0.37-0.50)	(0.38-0.79)	

† 95% confidence interval for mean

Table 6.2.4: WR-SQ† variable for processed meat intake

		n	Mean WR-SQ	95% CI	p for difference*
All		794	0.14**	(0.11 to 0.17)	
Gender	Males	368	0.16**	(0.10 to 0.21)	
	Females	426	0.12**	(0.08 to 0.16)	0.29
Age	20-44.9 yrs	476	0.15**	(0.11 to 0.20)	
	45-65 yrs	318	0.12**	(0.07 to 0.17)	0.39
Region	Hobart	342	0.13**	(0.08 to 0.18)	
	Launceston	226	0.13**	(0.07 to 0.20)	
	Other	226	0.16**	(0.10 to 0.22)	0.65
BMI	<25	345	0.14**	(0.10 to 0.19)	
	25 to <30	278	0.12**	(0.06 to 0.18)	
	30 or more	143	0.16**	(0.08 to 0.24)	0.72
SEIFA category	SEIFA 1	57	0.18**	(0.04 to 0.31)	
	SEIFA 2	613	0.14**	(0.11 to 0.18)	
	SEIFA 3	124	0.10**	(0.03 to 0.17)	0.55
Season	Summer	247	0.17**	(0.11 to 0.22)	
	Autumn	126	0.07	(-0.01 to 0.15)	
	Winter	219	0.14**	(0.08 to 0.21)	
	Spring	202	0.15**	(0.08 to 0.21)	0.27

† WR-SQ is the recorded mean daily frequency of processed meat intake (from weighed records) minus the reported daily frequency of processed meat intake (from short question)

* significance testing is by independent samples t-test or one-way ANOVA

** significantly different to 0.0 ($p<0.05$)

Table 6.2.5: Mean daily nutrient and energy intake by weighed record categorised by response to a short dietary question on processed meat intake

Dietary factor	Rarely or never	1/month to less than 2/week	2/week to less than once a day	Once a day or more	p
Protein (g)	71.2	79.7	89.4	101.2	<0.001
	(65.5-76.9)†	(76.7-82.6)	(85.5-92.9)	(89.1-113.4)	
Iron (mg)	12.1	12.6	13.2	14.0	0.06
	(11.0-13.1)	(12.1-13.2)	(12.7-13.7)	(12.4-15.6)	
Zinc (mg)	9.3	10.0	11.3	12.9	<0.001
	(8.5-10.1)	(9.7-10.4)	(10.8-11.8)	(11.2-14.6)	
Energy (kJ)	7,126	8,094	8,871	9,939	<0.001
	(6,579-7,674)	(7,805-8,384)	(8,555-9,188)	(8,966-10,913)	
Fat (g)	61.1	74.1	82.2	89.3	<0.001
	(55.3-66.8)	(70.8-77.3)	(78.6-85.8)	(78.9-99.7)	
Saturated fat (g)	24.8	30.7	34.7	38.3	<0.001
	(22.1-27.5)	(29.2-32.3)	(33.1-36.4)	(33.6-43.0)	
Fat (% kJ)	31.4	33.7	34.3	33.3	0.004
	(29.7-33.0)	(32.9-34.4)	(33.6-34.9)	(31.3-35.4)	
Saturated fat (% kJ)	12.6	13.9	14.5	14.3	<0.001
	(11.8-13.5)	(15.5-14.3)	(14.1-14.8)	(13.4-15.3)	
Iron density	1.75	1.60	1.52	1.44	<0.001
(mg/1000 kJ)	(1.62-1.87)	(1.54-1.66)	(1.48-1.57)	(1.32-1.55)	
Zinc density	1.34	1.27	1.30	1.30	0.39
(mg/1000 kJ)	(1.26-1.43)	(1.24-1.31)	(1.26-1.33)	(1.20-1.41)	

† 95% confidence interval for mean

Table 6.2.6: Correlation of response to a short dietary question on processed meat intake with mean daily energy and nutrient intake (Spearman's correlation coefficient)

	Males	Females	Total
Protein	0.13	0.16	0.24
Iron	ns	ns	0.10
Zinc	0.12	0.11	0.20
Energy	0.12	0.15	0.23
Fat	0.12	0.17	0.22
Saturated fat	0.15	0.19	0.24
Fat (% kJ)	ns	0.12	0.08
Saturated fat (% kJ)	ns	0.17	0.12
Iron density	-0.13	-0.13	-0.13
Zinc density	ns	ns	ns

ns – not statistically different to 0

6.3 Summary of performance evaluation of short questions on meat intake

The food categories that were the subject of these two short questions covered some aspects of meat intake. Meat intake that was not addressed by these questions include intake of chicken and fish in various forms, other seafood and minimally processed pork.

When the responses to the questions were grouped, all questions provided good discrimination between groups on the basis of recorded intake of the target food categories by mean daily frequency of intake and also by mean daily weight of food consumed.

Examination of the correlation between the response to the short question and the appropriate frequency of intake from diet record showed a relatively weak correlation that was similar for both of the questions and similar for men and women.

The utility of the short questions as a measure of the mean frequency of intake of food categories for groups was satisfactory for both of the short questions and there were no substantial differences in the performance of the questions between population groups. The question on frequency of red meat intake resulted in a small over-estimate of frequency of intake while the question on frequency of processed meat intake resulted in an under-estimate of frequency of intake compared to information from weighed dietary records. This may be a reflection of the use of each food category in the Australian diet with red meat intake being more often the focus of a meal or occasion of eating.

The responses to both of the questions were positively related with mean daily energy intake. Despite this, the response to neither of the questions correlated with iron intake. In fact the response to the question about processed meat showed a negative relationship with mean iron intake. An explanation for this may be that processed meat displaces other iron rich food from the diet or that processed meat is a marker for a generally less nutrient rich diet. For men, the response to each question was positively related to protein intake, fat intake, saturated fat intake and zinc intake. For women, response to the question on red meat intake was positively related only to zinc intake (and zinc density) although the response to the processed meat question was related to each of the nutrients except iron. In all cases the correlation coefficients indicated only a weak relationship between the question responses and average nutrient intakes or nutrient density.

Chapter 7: The performance of short dietary questions relating to food intake – dairy foods

7.1 Short question about total milk intake

About how much milk (in total) do you usually have in a day? ***(please circle one)***

Less than 150mls (or 5ozs)

150 to 300ml (300ml is a small carton – 10ozs)

301 to 600ml (600ml is an old 'pint' – 20ozs)

more than 600ml

7.1.1 Introduction

The short question about total milk requests a categorical response in terms of a volumetric measurement of usual daily milk intake. The primary measurement unit is millilitres with a secondary indication of equivalent measures in the imperial system of measurement. An indication of volume is provided for two of the categories using familiar measures for milk. The question requests 'total' milk intake, implying that subjects are to include milk in all sources – as a drink, in cereal, in beverages and in cooking.

Total daily milk intake was obtained from dietary records by totalling the volume of all sources of milk (cow's milk or other types of milk). The mean daily milk intake was calculated by dividing the total milk intake for all of the days of recording by the total number of days of recording.

7.1.2 Results

Pattern of response

The largest percentage of the subject group (39.1%) selected the second category of total milk intake (150-300mls). The lowest category of intake was selected by 36.1% and the highest category of intake by 6.6% of subjects (table 7.1.1).

Pattern of response did not vary greatly by sex, age, region of residence, body mass index or season. It appeared that subjects in the lowest SEIFA category were more likely to report a lower total daily intake of milk than those in the higher SEIFA categories.

Relative validity – direct

Relatively few people did not consume any milk during the three day dietary recording period. The largest percentage (14.1%) occurs in those subjects reporting the lowest intake of milk (table 7.1.2).

The average daily volume of milk consumed increased with response category of the short question (table 7.1.2). The average total milk intake for each group was within the volume stipulated for that category except for the highest category, where the recorded mean daily milk volume was less than that stipulated for the category. In general, within question response categories, men had about the same mean daily volume of milk as women except in the highest volume category where men had a larger mean volume of intake than women.

Relative validity – indirect

Categorical response to the short question on total usual daily volume of milk was associated with increasing mean daily energy intake, protein intake and calcium intake (table 7.1.3).

Table 7.1.1: Percentage of population groups by categories of total daily milk intake by short question

Population Subgroup		Less than 150mls	150 to 300mls	301 to 600mls	More than 600mls
All	20 to 65 years (n=785)	36.1	39.1	18.2	6.6
Gender	Males (n=367)	33.8	39.8	17.7	8.7
	Females (n=418)	38.0	38.5	18.7	4.8
Age	20-44.9 years (n=471)	35.5	40.1	17.6	6.8
	45-65 years (n=314)	36.9	37.6	19.1	6.4
Region	Hobart (n=341)	33.1	38.4	20.8	7.6
	Launceston (n=220)	45.0	33.2	16.4	5.5
	Rural (n=224)	31.7	46.0	16.1	6.2
BMI	<25 (n=341)	35.2	38.4	21.1	5.3
	25 to <30 (n=277)	36.8	37.2	17.7	8.3
	30 or more (n=141)	36.2	44.0	12.8	7.1
SEIFA category	SEIFA 1 (n=57)	47.4	35.1	12.3	5.3
	SEIFA 2 (n=604)	34.8	39.6	19.0	6.6
	SEIFA 3 (n=124)	37.1	38.7	16.9	7.3
Season	Summer (n=242)	39.3	37.6	15.7	7.4
	Autumn (n=126)	36.5	34.1	21.4	7.9
	Winter (n=217)	34.1	39.2	20.7	6.0
	Spring (n=200)	34.0	44.0	16.5	5.5

Table 7.1.2: Mean daily volume of milk consumed by categorical response to a short dietary question on total milk intake

Population Subgroup	Less than 150mls	150 to 300mls	301 to 600mls	More than 600mls	p
All	115.0	200.1	292.8	419.3	<0.001
	(102.7-127.4)†	(185.8-214.3)	(261.0-324.7)	(341.6-497.0)	
	n=283	n=307	n=143	n=52	
	(14.1% no intake)	(4.9% no intake)	(2.1% no intake)	(3.8% no intake)	
Males	121.9	203.4	301.2	453.8	<0.001
	(99.9-143.9)	(181.6-225.1)	(255.7-346.6)	(346.5-561.1)	
	n=124	n=146	n=65	n=32	
	(15.3% no intake)	(3.4% no intake)	(0.0% no intake)	(3.1% no intake)	
Females	109.7	197.1	285.9	364.1	<0.001
	(95.9-123.5)	(178.1-216.0)	(240.7-331.1)	(250.2-478.0)	
	n=159	n=161	n=78	n=20	
	(13.2% no intake)	(6.2% no intake)	(3.8% no intake)	(5.0% no intake)	

† 95% confidence interval for mean

Table 7.1.3: Mean daily nutrient and energy intake by weighed record categorised by response to a short dietary question on total milk intake

Dietary factor	Less than 150mls	150 to 300mls	301 to 600mls	More than 600mls	p
Protein (g)	81.2	84.3	88.7	99.5	0.001
	(77.6-84.8)†	(81.2-87.4)	(83.0-94.4)	(84.7-114.4)	
Calcium (mg)	639.8	758.6	875.3	1132.0	<0.001
	(606.5-673.1)	(722.0-795.2)	(817.5-933.1)	(958.0-1306.0)	
Energy (kJ)	8,141	8,502	8,767	9,687	0.003
	(7,816-8,465)	(8,203-8,800)	(8,264-9,271)	(8,413-10,960)	

† 95% confidence interval for mean

7.2 Short question about cheese

How often do you eat cheese? (include all cheeses – ricotta, cottage, processed, cream, hard and soft cheeses)

__times per day __times per week

__times per month __rarely or never

__I don't know /can't say

7.2.1 Introduction

The short question about cheese requests a frequency of intake of cheese without reference to a serving size. The question focuses attention on a number of different types of cheese and states that all cheeses should be included.

The food codes defined as 'cheese' in this analysis were those with codes beginning with 1941 to those beginning with 1947. This included all cheeses, cheese spread and cheese based dips.

7.2.2 Results

Pattern of response

The number of distinct food codes present in the records of the subjects analysed for this question was 24. The most frequently recorded code of those selected was for 'cheese, cheddar (mild, tasty, vintage)'.

The response to this question was grouped into 4 categories: rarely or never, 1/month to less than 2/ week, 2/week to less than 1/day, 1/day or more.

Cheese was reported to be consumed once a day or more by 21.5% of the study population and rarely or never by 8.1% (table 7.2.1). The pattern of response did not appear to vary greatly by sex, age, region of residence, body mass index, or season of question administration. Subjects in the highest SEIFA category reported eating cheese more frequently than those in the other SEIFA categories.

Relative validity – direct

Of the subjects who reported eating cheese once a day or more, 13.5% did not eat cheese during the three day period of diet recording. Of those who reported they ate cheese 'rarely or never', 35.9% in fact did eat cheese at least once during the recording period (table 7.2.2).

The average daily weight of cheese consumed increased as the reported frequency of consumption increased (table 7.2.2). Within frequency categories, the mean intake of cheese did not differ much between men and women.

The mean daily frequency of cheese from the dietary records increased across the frequency categories reported by short question (table 7.2.3). There was no substantial difference between men and women in the frequency of cheese intake within response categories to the short question. The Spearman correlation coefficient for the frequency response to the short question and the frequency of intake from at least three days of dietary records was 0.47 for men and 0.43 for women.

On average, subjects responding to a short question on frequency of intake of cheese reported a frequency consistent with that recorded by dietary record. The performance of the short question did not vary by age, rural/urban residence, body mass index, SEIFA category or season of administration (table 7.2.4). There was a difference in the performance of the short question by sex. Women over-reported their frequency of cheese intake by the equivalent of about one occasion of eating every 17 days. Men under-reported their cheese intake by the equivalent of about one occasion of eating every month but this was not significantly different to reporting accurately (table 7.2.4).

Relative validity – indirect

Mean daily energy intake from the dietary records was not significantly related to increasing categories of reported frequency of cheese intake (table 7.2.5) although there was a significant (but weak) correlation between mean daily energy intake and reported frequency of cheese intake for women only (table 7.2.6). The finding for mean protein intake was similar: no significant variation of mean protein intake by category of reported frequency of cheese intake, but a weak correlation between mean daily protein intake and reported frequency of cheese intake for women only. Mean calcium intake was positively related to category of reported frequency of cheese intake (table 7.2.5) and weak correlations were found between mean daily calcium intake and response to the short question for both men and women (table 7.2.6).

Table 7.2.1: Percentage of population groups categorised according to frequency of consumption of cheese by short question

Population Subgroup		Rarely or never	1/month to less than 2/week	2/week to less than once a day	Once a day or more
All	20 to 65 years (n=791)	8.1	15.3	55.1	21.5
Gender	Males (n=367)	6.8	17.4	58.6	17.2
	Females (n=424)	9.2	13.4	52.1	25.2
Age	20-44.9 years (n=474)	7.6	15.2	53.8	23.4
	45-65 years (n=317)	8.8	15.5	57.1	18.6
Region	Hobart (n=341)	6.5	17.0	55.7	20.8
	Launceston (n=225)	10.2	12.4	54.2	23.1
	Rural (n=225)	8.4	15.6	55.1	20.9
BMI	<25 (n=343)	7.6	14.3	53.4	24.8
	25 to <30 (n=277)	7.9	15.9	57.8	18.4
	30 or more (n=143)	9.8	16.1	54.5	19.6
SEIFA category	SEIFA 1 (n=57)	7.0	21.1	59.6	12.3
	SEIFA 2 (n=610)	8.4	15.4	54.8	21.5
	SEIFA 3 (n=124)	7.3	12.1	54.8	25.8
Season	Summer (n=247)	10.5	13.0	55.9	20.6
	Autumn (n=126)	7.9	13.5	55.6	23.0
	Winter (n=217)	6.0	20.3	57.1	16.6
	Spring (n=201)	7.5	13.9	51.7	26.9

Table 7.2.2: Mean daily intake of cheese consumed (in grams) categorised by response to a short dietary question on cheese intake

Population Subgroup	Rarely or never	1/month to less than 2/week	2/week to less than once a day	Once a day or more	p
All	5.1	6.3	15.2	25.7	<0.001
	(2.7-7.5)†	(4.4-8.3)	(13.4-16.9)	(22.2-29.1)	
	n=64	n=121	n=436	n=170	
	(64.1% no intake)	(57.9% no intake)	(28.7% no intake)	(13.5% no intake)	
Males	7.0	7.0	18.6	28.1	<0.001
	(2.3-11.7)	(4.0-10.0)	(15.7-21.6)	(21.7-34.4)	
	n=25	n=64	n=215	n=63	
	(60.0% no intake)	(62.5% no intake)	(27.0% no intake)	(14.3% no intake)	
Females	3.9	5.6	11.8	24.2	0.001
	(1.1-6.6)	(3.2-8.0)	(10.0-13.7)	(20.1-28.4)	
	n=39	n=57	n=221	n=107	
	(66.7% no intake)	(52.6% no intake)	(30.3% no intake)	(13.1% no intake)	

† 95% confidence interval for mean

Table 7.2.3: Mean daily frequency of cheese consumed categorised by response to a short dietary question on cheese intake

Population Subgroup	Rarely or never	1/month to less than 2/week	2/week to less than once a day	Once a day or more	p
	Daily freq. <0.03	**Daily freq. 0.03 to <0.28**	**Daily freq. 0.28 to <1.0**	**Daily freq. 1.0 or more**	
All	0.18	0.21	0.47	0.77	<0.001
	(0.11-0.25)†	(0.16-0.27)	(0.43-0.51)	(0.69-0.86)	
Males	0.19	0.22	0.53	0.78	<0.001
	(0.08-0.29)	(0.14-0.30)	(0.46-0.59)	(0.62-0.93)	
Females	0.17	0.21	0.41	0.77	<0.001
	(0.08-0.27)	(0.14-0.28)	(0.36-0.46)	(0.67-0.87)	

† 95% confidence interval for mean

Table 7.2.4: WR-SQ† variable for cheese intake

		n	Mean WR-SQ	95% CI	p for difference*
All		791	-0.02	(-0.05 to 0.01)	
Gender	Males	367	0.03	(-0.02 to 0.08)	
	Females	424	-0.06**	(-0.11 to -0.02)	0.008
Age	20–44.9 yrs	474	-0.03	(-0.08 to 0.01)	
	45–65 yrs	317	-0.004	(-0.05 to 0.04)	0.41
Region	Hobart	341	0.02	(-0.03 to 0.07)	
	Launceston	225	-0.06	(-0.12 to 0.04)	
	Other	225	-0.04	(-0.10 to 0.02)	0.12
BMI	<25	343	-0.02	(-0.07 to 0.03)	
	25 to <30	277	-0.001	(-0.05 to 0.05)	
	30 or more	143	-0.03	(-0.12 to 0.06)	0.85
SEIFA category	SEIFA 1	57	-0.03	(-0.20 to 0.13)	
	SEIFA 2	610	-0.02	(-0.05 to 0.02)	
	SEIFA 3	124	-0.03	(-0.12 to 0.06)	0.95
Season	Summer	247	-0.02	(-0.08 to 0.04)	
	Autumn	126	-0.009	(-0.07 to 0.09)	
	Winter	217	-0.02	(-0.08 to 0.04)	
	Spring	201	-0.04	(-0.11 to 0.03)	0.81

† WR-SQ is the recorded mean daily frequency of cheese intake (from weighed records) minus the reported daily frequency of cheese intake (from short question)

* significance testing is by independent samples t-test or one-way ANOVA

** significantly different to 0.0 ($p<0.05$)

Table 7.2.5: Mean daily nutrient and energy intake by weighed record categorised by response to a short dietary question on cheese intake

Dietary factor	Rarely or never	1/month to less than 2/week	2/week to less than once a day	Once a day or more	p
Protein (g)	76.7	88.4	85.5	83.9	0.12
	(68.8-84.5)†	(80.7-96.2)	(82.6-88.4)	(79.6-88.2)	
Calcium (mg)	607.9	745.0	761.4	821.4	0.001
	(524.6-621.2)	(663.0-826.9)	(729.3-793.5)	(766.4-876.5)	
Energy (kJ)	7,621	8,723	8,544	8,492	0.09
	(6,922-8,320)	(8,075-9,372)	(8,271-8,817)	(8,092-8,891)	

† 95% confidence interval for mean

Table 7.2.6: Correlation of response to a short dietary question on cheese intake with mean daily energy and nutrient intake (Spearman's correlation coefficient)

	Males	Females	Total
Protein	ns	0.17	ns
Calcium	0.20	0.20	0.20
Energy	ns	0.17	0.07

ns – not statistically different to 0

7.3 Short question about yoghurt intake

How often do you eat yoghurt? (do not include dairy desserts)

__times per day __times per week

__times per month __rarely or never

__I don't know /can't say

7.3.1 Introduction

The short question about yoghurt requests a frequency of intake of yoghurt without reference to a serving size. It includes a qualifying instruction identifying a food type that should be excluded from 'yoghurt'.

The food codes defined as 'yoghurt' in this analysis were those codes beginning with the four digits from 1921 to 1926. This categorisation included ready-made and home-made yoghurts and yoghurt based dips.

7.3.2 Results

Pattern of response

The number of distinct food codes in the records of the subjects analysed for this question was nine. The most frequently recorded code of those selected was for 'yoghurt, regular fat, fruit'.

The response to this question was grouped into four categories as: rarely or never, 1/month to less than 2/week, 2/week to less than 1/day, 1/day or more.

Yoghurt was reported to be consumed once a day or more by 6.1% of the study population and rarely or never by 51.4% (table 7.3.1). Women reported eating yoghurt more frequently than men however the pattern of response did not appear to vary greatly by age, region of residence, body mass index, SEIFA category or season of question administration.

Relative validity – direct

Of the subjects who reported they ate yoghurt rarely or never, only 2.7% recorded having yoghurt at some time during the three day recording period (table 7.3.2). For the subjects who reported eating yoghurt once a day or more, 20.8% did not have yoghurt during the diet recording period.

The mean weight of yoghurt consumed increased as the reported frequency of consumption increased (table 7.3.2). Within any category of response to the short question, the mean weight of yoghurt was similar for women and men.

The mean daily frequency of yoghurt intake from the dietary records also increased across the short question frequency categories in both men and women (table 7.3.3). For any category of response to the short question, the mean daily frequency of eating yoghurt was generally higher for women than men. The Spearman correlation coefficient for response to the short question and the frequency of intake observed from at least three days of dietary records was 0.53 for men and 0.56 for women.

Overall, subjects responding to short question about frequency of yoghurt intake tended to over-report their frequency of intake by 0.05 occasions of eating a day (table 7.3.4), equivalent to one occasion of eating every 20 days. The performance of the short question did not vary by sex, age, region of residence, body mass index or season of administration (table 7.3.4). At the lowest SEIFA category, the magnitude of over-reporting by short question was estimated to be equivalent to one occasion every ten days while at the highest SEIFA category it was one occasion every thirty days. The difference was not statistically significant, but this may be partly due to the small number of subjects in the extreme SEIFA categories.

Relative validity – indirect

The mean daily energy intake from the dietary records did not vary across yoghurt frequency categories based on answers to the short question (table 7.3.5). There was a positive relationship of mean calcium intake with increasing frequency of yoghurt intake. There was no evidence for variation in mean protein intake by response category for the short question about yoghurt. Correlation analysis indicated a weak positive relationship between mean daily protein intake and response to the question on frequency of yoghurt intake for both men and women (table 3.3.6). The relationship between mean daily calcium intake and response to the question on frequency of yoghurt intake also showed a weak correlation for both men and women.

Table 7.3.1: Percentage of population groups categorised according to frequency of consumption of yoghurt by short question

Population Subgroup		Rarely or never	1/month to less than 2/week	2/week to less than once a day	Once a day or more
All	20 to 65 years (n=793)	51.4	21.8	20.8	6.1
Gender	Males (n=368)	59.5	19.0	16.6	4.9
	Females (n=425)	44.2	24.2	24.5	7.1
Age	20-44.9 years (n=475)	51.6	22.1	21.5	4.8
	45-65 years (n=318)	50.9	21.4	19.8	7.9
Region	Hobart (n=342)	44.7	24.9	24.6	5.8
	Launceston (n=225)	59.1	18.7	16.4	5.8
	Rural (n=226)	53.5	20.4	19.5	6.6
BMI	<25 (n=344)	50.6	22.1	21.2	6.1
	25 to <30 (n=278)	53.2	22.3	18.0	6.5
	30 or more (n=143)	49.0	20.3	27.3	3.5
SEIFA category	SEIFA 1 (n=57)	50.9	22.8	17.5	8.8
	SEIFA 2 (n=612)	52.8	20.6	20.8	5.9
	SEIFA 3 (n=124)	44.4	27.4	22.6	5.6
Season	Summer (n=247)	51.4	24.3	20.2	4.0
	Autumn (n=126)	47.6	22.2	22.2	7.9
	Winter (n=219)	52.1	21.0	20.1	6.8
	Spring (n=201)	52.7	19.4	21.4	6.5

Table 7.3.2: Mean daily intake of yoghurt consumed (in grams) categorised by response to a short dietary question on yoghurt intake

Population Subgroup	Rarely or never	1/month to less than 2/week	2/week to less than once a day	Once a day or more	p
All	1.8	11.1	37.5	98.1	<0.001
	(0.7-2.9)†	(5.7-16.5)	(28.2-46.9)	(69.2-127.1)	
	n=407	n=173	n=165	n=48	
	(97.3% no intake)	(83.2% no intake)	(55.2% no intake)	(20.8% no intake)	
Males	1.1	14.1	33.6	98.7	<0.001
	(0.01-2.2)	(3.0-25.3)	(14.6-52.5)	(48.6-148.7)	
	n=219	n=70	n=61	n=18	
	(98.2% no intake)	(82.9% no intake)	(63.9% no intake)	(16.7% no intake)	
Females	2.5	9.0	39.9	97.8	<0.001
	(0.5-4.6)	(3.9-14.1)	(29.8-49.9)	(60.1-135.6)	
	n=188	n=103	n=104	n=30	
	(96.3% no intake)	(83.5% no intake)	(50.0% no intake)	(23.3% no intake)	

† 95% confidence interval for mean

Table 7.3.3: Mean daily frequency of yoghurt consumed categorised by response to a short dietary question on yoghurt intake

Population Subgroup	Rarely or never	1/month to less than 2/week	2/week to less than once a day	Once a day or more	p
	Daily freq. <0.03	Daily freq. 0.03 to <0.28	Daily freq. 0.28 to <1.0	Daily freq. 1.0 or more	
All	0.01	0.08	0.24	0.68	<0.001
	(0.004-0.02)†	(0.05-0.11)	(0.19-0.29)	(0.53-0.83)	
Males	0.008	0.09	0.17	0.59	<0.001
	(0.0-0.02)	(0.03-0.15)	(0.10-0.24)	(0.38-0.80)	
Females	0.02	0.07	0.28	0.73	<0.001
	(0.004-0.03)	(0.04-0.11)	(0.22-0.35)	(0.52-0.95)	

† 95% confidence interval for mean

Table 7.3.4: WR-SQ† variable for yoghurt intake

		n	Mean WR-SQ	95% CI	p for difference*
All		793	-0.05**	(-0.07 to -0.04)	
Gender	Males	368	-0.05**	(-0.07 to -0.03)	
	Females	425	-0.05**	(-0.08 to -0.03)	0.99
Age	20–44.9 yrs	475	-0.05**	(-0.08 to -0.03)	
	45–65 yrs	318	-0.05**	(-0.07 to -0.02)	0.74
Region	Hobart	342	-0.04**	(-0.06 to -0.02)	
	Launceston	225	-0.07**	(-0.10 to -0.04)	
	Other	226	-0.05**	(-0.08 to -0.02)	0.39
BMI	<25	344	-0.04**	(-0.07 to -0.02)	
	25 to <30	278	-0.06**	(-0.09 to -0.03)	
	30 or more	143	-0.06**	(-0.10 to -0.02)	0.58
SEIFA category	SEIFA 1	57	-0.10**	(-0.17 to -0.03)	
	SEIFA 2	612	-0.05**	(-0.07 to -0.03)	
	SEIFA 3	124	-0.03	(-0.07 to 0.02)	0.14
Season	Summer	247	-0.05**	(-0.08 to -0.03)	
	Autumn	126	-0.06**	(-0.11 to -0.003)	
	Winter	219	-0.06**	(-0.09 to -0.03)	
	Spring	201	-0.04**	(-0.07 to -0.01)	0.89

† WR-SQ is the recorded mean daily frequency of yoghurt intake (from weighed records) minus the reported daily frequency of yoghurt intake (from short question)

* significance testing is by independent samples t-test or one-way ANOVA

** significantly different to 0.0 ($p<0.05$)

Table 7.3.5: Mean daily nutrient and energy intake by weighed record categorised by response to a short dietary question on yoghurt intake

Dietary factor	Rarely or never	1/month to less than 2/week	2/week to less than once a day	Once a day or more	p
Protein (g)	83.8	85.0	85.3	90.4	0.60
	(80.7-86.8)†	(79.5-90.5)	(80.7-89.9)	(79.9-100.9)	
Calcium (mg)	704.7	803.8	803.2	910.8	<0.001
	(673.1-736.4)	(740.1-867.4)	(745.6-860.9)	(798.3-1023.3)	
Energy (kJ)	8,479	8,480	8,452	8,622	0.99
	(8,197-8,761)	(8,001-8,959)	(8,044-8,860)	(7,571-9,674)	

† 95% confidence interval for mean

Table 7.3.6: Correlation of response to a short dietary question on yoghurt intake with mean daily energy and nutrient intake (Spearman's correlation coefficient)

	Males	Females	Total
Protein	0.10	0.16	ns
Calcium	0.26	0.18	0.16
Energy	ns	0.10	ns

ns – not statistically different to 0

7.4 Summary of performance evaluation of short questions on dairy food intake

Examination of the short question on total usual daily milk intake suggests that subjects are able to categorise their usual milk intake consistently to their usual intake. It appears that subjects who classified themselves into the highest category of intake over-estimated their usual intake however the mean intake of this group was still substantially higher than the next lower category. Selection of categories by subjects defined groups that differed in their mean daily total milk intake and also their mean daily energy, protein and calcium intake.

When the responses to the frequency questions were grouped, all questions provided good discrimination between groups on the basis of recorded intake of the target food categories by mean daily frequency of intake and also by mean daily weight of food consumed.

Examination of the correlation between the response to the short question and the appropriate frequency of intake from diet record showed a fair to good correlation that was similar for both questions, and similar for men and women.

The overall utility of the short frequency questions as a measure of the mean frequency of intake of food categories for groups was satisfactory for both of the short questions with the frequency of intake of yoghurt being over-reported to a small extent. The performance of the question on frequency of yoghurt intake did not vary by any of the factors examined while the performance of the question on frequency of cheese intake varied only by sex.

The responses to both of the questions were not strongly related with mean daily energy or mean daily protein intake. However the responses to both questions were related to mean daily calcium intake although the correlation coefficients were weak.

Chapter 8: The performance of other short dietary questions

8.1 Short question about frequency of breakfast

How many days per week do you usually have something to <u>eat</u> for breakfast?

__times per week __I don't know /can't say

8.1.1 Introduction

The short question about breakfast replicates a question included in the 1995 National Nutrition Survey and examined in the document 'Evaluation of short dietary questions from the 1995 National Nutrition Survey' (Rutishauser et al 2001). For the purposes of examining this question, breakfast was defined as any food intake between 3:00am and 10:00am. Beverage intake only was not counted as breakfast.

8.1.2 Results

Pattern of response

The response for this question was grouped into three categories: rarely or never, 1 to 4 days a week and 5 or more days a week.

A higher percentage of subjects in the lowest social class reported rarely or never having breakfast than in the other social classes (table 8.1.1). Differences in pattern of response were small for other population sub-groupings. Younger subjects appeared somewhat more likely to report having breakfast rarely or never than older subjects. The pattern of response observed in this survey was similar to that observed in the 1995 National Nutrition Survey (ABS 1997).

Relative validity – direct

The mean frequency of breakfast intake measured in the three-day dietary records increased by category of response to the short dietary question for both women and men (table 8.1.2). The frequency of intake recorded was substantially higher than implied by the response to the short question in the lower two categories of response to the short question. Of the subjects who stated they never or rarely ate breakfast, almost four fifths recorded having food intake prior to 10am on at least one day of their dietary recording period.

Overall, subjects under-reported the frequency they had breakfast by about one occasion every 11 days (table 8.1.3). There was a significant difference in performance of the question by SEIFA category where people in the lowest SEIFA category under-reported frequency of having breakfast by one occasion in every five days. The degree of under-reporting in the group overall is not as large as might be expected by the substantial under-reporting in the lower two categories of response but most subjects were in the highest category of response where it appears there was little under-reporting.

Relative validity – indirect

Intake of fibre, iron, calcium and folate were higher in the highest category of response compared to the two lower categories (table 8.1.4). The ratio of energy intake to basal metabolic rate was also larger in the highest category of intake compared to the two lower categories. One possible explanation for this is that subjects reporting lower frequency of intake of breakfast may also be under-reporting their dietary intake by weighed dietary record. The intake of fruit was higher for those who reported a higher frequency of having breakfast, but the mean intake of milk was not significantly higher.

Table 8.1.1: Percentage of population groups categorised according to reported frequency of consumption of breakfast by short question

Population Subgroup		Rarely or never	1 to 4 days a week	5or more days a week
All	20 to 65 years (n=793)	11.2	14.4	74.4
Gender	Males (n=368)	10.6	16.8	72.6
	Females (n=425)	11.8	12.2	76.0
Age	20-44.9 years (n=475)	13.7	18.9	67.4
	45-65 years (n=318)	7.5	7.5	84.9
Region	Hobart (n=342)	12.6	14.9	72.5
	Launceston (n=225)	12.4	11.1	76.4
	Rural (n=226)	8.0	16.8	75.2
BMI	<25 (n=345)	10.4	15.1	74.5
	25 to <30 (n=278)	11.2	13.3	75.5
	30 or more (n=143)	12.6	17.5	69.9
SEIFA category	SEIFA 1 (n=56)	23.2	12.5	64.3
	SEIFA 2 (n=613)	10.9	14.4	74.7
	SEIFA 3 (n=124)	7.3	15.3	77.3
Season	Summer (n=247)	13.4	13.4	73.3
	Autumn (n=126)	7.9	10.3	81.7
	Winter (n=218)	9.2	18.3	72.5
	Spring (n=202)	12.9	13.9	73.3

Table 8.1.2: Mean frequency of breakfast per day categorised by response to a short dietary question on breakfast frequency

Population Subgroup	Rarely or never	1 to 4 days a week	5 or more days a week	p
	Daily Freq. <0.14	Daily freq. 0.14 to 0.57	Daily freq. >0.71	
All	0.58	0.74	0.95	<0.001
	(0.50-0.66)†	(0.67-0.80)	(0.93-0.96)	
	n=89	n=114	n=590	
	(20.2% did not have breakfast)	(10.5% did not have breakfast)	(0.2% did not have breakfast)	
Males	0.62	0.74	0.94	<0.001
	(0.49-0.74)	(0.66-0.83)	(0.92-0.96)	
	n=39	n=62	n=267	
	(17.9% did not have breakfast)	(9.7% did not have breakfast)	(0.0% did not have breakfast)	
Females	0.55	0.73	0.95	<0.001
	(0.44-0.66)	(0.63-0.83)	(0.94.-0.97)	
	n=50	n=52	n=323	
	(22.0% did not have breakfast)	(11.5% did not have breakfast)	(0.3% did not have breakfast)	

† 95% confidence interval for mean

Table 8.1.3: WR-SQ† variable for frequency of breakfast

		n	Mean WR-SQ	95% CI	p for difference*
All		793	0.09**	(0.07 to 0.11)	
Gender	Males	368	0.09**	(0.06 to 0.13)	
	Females	425	0.09**	(0.06 to 0.12)	0.87
Age	20-44.9 yrs	475	0.10**	(0.07 to 0.13)	
	45-65 yrs	318	0.07**	(0.04 to 0.10)	0.19
Region	Hobart	342	0.11**	(0.07 to 0.14)	
	Launceston	225	0.07**	(0.03 to 0.12)	
	Other	226	0.08**	(0.04 to 0.12)	0.42
BMI	<25	345	0.08**	(0.05 to 0.11)	
	25 to <30	278	0.10**	(0.06 to 0.14)	
	30 or more	143	0.08**	(0.03 to 0.14)	0.67
SEIFA category	SEIFA 1	56	0.20**	(0.09 to 0.32)	
	SEIFA 2	613	0.08**	(0.05 to 0.10)	
	SEIFA 3	124	0.08**	(0.03 to 0.14)	0.02
Season	Summer	247	0.08**	(0.04 to 0.12)	
	Autumn	126	0.04	(-0.01 to 0.10)	
	Winter	218	0.09**	(0.05 to 0.13)	
	Spring	202	0.12**	(0.08 to 0.16)	0.22

† WR-SQ is the recorded mean daily frequency of having breakfast from weighed records minus the reported daily frequency of having breakfast from short question

* significance testing is by independent samples t-test or one-way ANOVA

** significantly different to 0.0 ($p<0.05$)

Table 8.1.4: Mean daily food, nutrient and energy intake by weighed record categorised by response to a short dietary question on frequency of breakfast

Parameters	Rarely or never	1 to 4 days a week	5 days or more per week	p
Foods				
Fruit (g/day)	64.0	60.5	139.4	<0.001
	(42.8-85.1)†	(46.3-74.7)	(127.1-151.6)	
Milk (g/day)	186.0	170.1	206.5	0.09
	(135.2-236.8)	(138.0-202.3)	(193.7-219.3)	
Energy Intake				
Energy (kJ)	7,908	8,321	8,605	0.09
	(7,094-8,722)	(7,776-8,865)	(8,379-8,830)	
Energy Intake/Basal	1.16	1.19	1.28	0.003
Metabolic Rate	(1.06-1.27)	(1.12-1.26)	(1.25-1.31)	
Nutrient density				
Fibre (g/MJ)	2.17	2.11	2.77	<0.001
	(1.77-2.57)	(1.98-2.24)	(2.69-2.86)	
Iron (mg/MJ)	1.30	1.34	1.65	<0.001
	(1.20-1.39)	(1.28-1.40)	(1.61-1.69)	
Calcium (mg/MJ)	89.1	84.6	92.8	0.05
	(79.5-98.7)	(78.8-90.5)	(90.2-95.4)	
Folate (µg/MJ)	27.9	25.9	30.2	0.001
	(23.3-32.6)	(24.6-27.3)	(29.4-30.9)	

† 95% confidence interval for mean

8.2 Short question about food security

In the last 12 months were there any times that you ran out of food and you couldn't afford to buy more?

Yes No

8.2.1 Introduction

The short question about food security replicates a question included in the 1995 National Nutrition Survey and examined in the document 'Evaluation of short dietary questions from the 1995 National Nutrition Survey' (Rutishauser et al 2001).

8.2.2 Results

Pattern of response

The response to this question was grouped into those answering 'yes' and those answering 'no'. The broad pattern of response was very similar to that found in the National Nutrition Survey. The percentage of people answering 'yes' was low, slightly higher in women than men, higher in the lower age group and among those in the lower SEIFA categories (table 8.2.1).

Relative validity – direct

The number of subjects who answered yes to this question was 41 representing 5.2% of the sample. It is difficult to identify the appropriate comparison data to use to evaluate the direct validity of response to the question, but we are able to examine response in relation to SEIFA category (table 8.2.1). The percentage of subjects responding 'yes' to this question was 7.0% in the lowest social class category, 5.2% in the middle social class category and 4.0% in the highest social class category. This is consistent to the finding in the 1995 National Nutrition Survey.

Relative validity – indirect

There were no significant differences between subjects who responded 'yes' to the food security question compared to those who responded 'no' by any of the selected indirect dietary factors (table 8.2.2). These included fruit intake, milk intake, energy intake, ratio of energy intake to basal metabolic rate, and nutrient density of vitamin C, iron, calcium and folate. The lack of statistical significance is probably largely due to the small number of subjects who reported they had run out of food in the last 12 months but there may also have been some confounding by age. A larger percentage of subjects reported running out of food in the younger age group than in the older age group and in general younger people will also have a greater food intake than older people.

Table 8.2.1: Percentage of population groups categorised according to their answer to the food security question

Population Subgroup		% responding 'Yes'
All	20 to 65 years (n=793)	5.2
Gender	Males (n=368)	4.1
	Females (n=425)	6.1
Age	20-44.9 years (n=476)	7.8
	45-65 years (n=317)	1.3
Region	Hobart (n=342)	5.6
	Launceston (n=225)	4.4
	Rural (n=226)	5.3
BMI	<25 (n=345)	4.9
	25 to <30 (n=278)	5.4
	30 or more (n=142)	5.6
SEIFA category	SEIFA 1 (n=57)	7.0
	SEIFA 2 (n=612)	5.2
	SEIFA 3 (n=124)	4.0
Season	Summer (n=247)	5.3
	Autumn (n=125)	6.4
	Winter (n=219)	6.4
	Spring (n=202)	3.0

Table 8.2.2: Mean daily nutrient and energy intake by weighed record categorised by response to a short question on food security

Parameters	Ran out of food in the last 12 months	Did not run out of food in the last 12 months	p
Foods			
Fruit (g/day)	90.0	121.2	0.17
	(38.5-141.6)†	(111.2-131.3)	
Milk (g/day)	222.4	198.0	0.37
	(165.6-179.2)	(185.8-210.3)	
Energy intake			
Energy (kJ)	8,284	8,498	0.65
	(7,293-9,275)	(8,287-8,709)	
EI/BMR	1.22	1.26	0.56
	(1.09-1.35)	(1.23-1.28)	
Nutrient density			
Vitamin C density	15.7	12.9	0.22
	(11.2-20.2)	(12.2-13.5)	
Iron density	1.45	1.57	0.12
	(1.33-1.57)	(1.54-1.61)	
Calcium density	92.4	91.2	0.83
	(80.4-104.4)	(88.8-93.6)	
Folate density	26.6	29.5	0.12
	(23.5-29.8)	(28.6-30.3)	

† 95% confidence interval for mean

8.2.3 Follow-up question

The 41 subjects who reported that they 'ran out of food and couldn't afford to buy more' were asked to respond to a further question as follows:

Q. Did this occur because you were accidentally caught short of money or because of longer term problems?

Accidentally short of money Longer term problems Don't know/can't say

The number of respondents who reported 'accidentally short of money' was 26 (63.4%). Fourteen subjects (34.1%) reported 'longer term problems' and 1 subject responded 'don't know/can't say'.

8.3 Summary of evaluation of other short questions

The pattern of response for the questions considered in this chapter was similar in the Tasmanian survey and in the National Nutrition Survey.

Most of the subjects (70.2%) responded ‘every day’ to the question on frequency of having breakfast. For subjects who reported having breakfast less frequently, this evaluation indicates substantial under-reporting. For example, those who reported having breakfast less than once a day were estimated by dietary record to have breakfast once every 1.7 days. It is likely that the definition of a breakfast used in this analysis covered other food intake that subjects did not consider to be a breakfast. Nevertheless, the results observed here for the short question are similar to the results observed in an analysis of the same question when used in the National Nutrition Survey (Rutishauser et al 2001). In that analysis, the subjects themselves allocated the name of the meal when providing data for the dietary comparison method.

There was a suggestion in this survey that the subjects who reported a lower frequency of intake of breakfast (and who appeared to under-report their usual intake) were more likely to have under-reported their dietary intake by weighed dietary record.

The analysis of the food security question in relation to food and nutrient intake in this study was largely inconclusive because of the small proportion of the study sample that responded ‘yes’ to the question. Response to the follow-up question suggests that most of the people who respond ‘yes’ are people who have experienced a short-term food access problem primarily due to an ‘accident’. It is not clear whether the intent of this question is to include such people in the category of ‘food insecure’. It appears to identify at least two groups of subjects: those with long-term problems and those with short term problems. The specific meaning of the alternative phrases is not clear. The distinction between them might be based on how often the respondents run out of food.

Chapter 9: Conclusions and recommendations

9.1 Introduction

The individual performance of sixteen short dietary questions was assessed after face-to-face administration to an adult Tasmanian population as part of a 67-item questionnaire. The questions were understood with less than 2% of subjects being unwilling or unable to provide an answer to any of the questions.

Thirteen of the short questions related to usual frequency of intake of foods or food categories. One question related to usual daily amount of a food consumed (volume of milk consumed), one question related to usual frequency of eating at a particular mealtime (breakfast), and one question related to running out of food.

Where possible, this evaluation compared the variable that the short question was directly measuring with the same variable estimated from dietary records. To contribute further information on the utility of the question, other variables of interest were compared to the response to the short questions. These included mean weight of intake of food categories and mean nutrient intake.

In addition to assessing the overall performance of each short question in the study population, the performance was examined for difference by sex, age, region of residence, body mass index, relative social disadvantage and season of administration.

This report describes the performance of the short questions according to their ability to describe usual dietary intake of individuals over a particular time. The data available cannot be used to examine the utility of short questions to measure dietary change in individuals over time.

Strengths of this evaluation

This evaluation utilises data from a study that was designed for the purpose of evaluating short dietary questions in an Australian adult population. The study population was chosen because of its relatively easy accessibility, the likelihood of a satisfactory response rate and because of its ethnic homogeneity.

This study collected dietary intake information using two methods from a large number of subjects. This is the largest study using weighed dietary records conducted in Australia. The response rate for the study was satisfactory (chapter 2) and there is only relatively minor variation in the response rate by category of relative social disadvantage.

Weighed dietary records have a high subject burden but the data are collected at approximately the same time as dietary intake and are very detailed. For validation studies it is advantageous to use a comparison method that is distinctly different in nature to the test method – weighed dietary records meet that criterion in this study.

Limitations of this evaluation

The data for this evaluation were obtained from a large sample of Tasmanian adults. The cultural homogeneity of the population is an advantage in generating statistical power for Anglo-Celtic

Australians but does not allow generalisation to Australian populations with other ethnic backgrounds. It is not known whether the particular questions evaluated would perform in the same way for different populations. It is reasonable to generalise the results to other Australian adults of Anglo-Celtic background. Some aspects of dietary behaviour vary by region in Australia but the magnitude of the differences between regions is very much smaller than the differences within populations. During the development of the dietary questionnaire, attention was given to ensuring that the wording of questions would be applicable to Australian adults from all regions and not influenced by local food terms and dietary behaviour.

The period of dietary measurement using weighed dietary records was three days. This is not long enough to accurately measure 'usual dietary intake' for an individual but is a compromise in order to maximise the response rate and the care with which subjects kept their dietary records. The mean intake for the group over the recording period should provide an unbiased estimate of the true usual intake. If short-term dietary intake is correctly recorded and not influenced by the measurement methodology, it will have the same chance of being higher or lower than the true usual intake. These data are therefore designed to measure the usual dietary intake for groups of people.

Within a population, there is seasonal variation in dietary intake and variation by day of the week. Three days of weighed dietary record will not capture this variation for an individual however in this study care was taken to allocate starting days for the dietary record at random and to conduct the data collection uniformly throughout an entire year.

Weighed dietary records have been observed to influence food intake and dietary intake from weighed dietary records is usually noted to be under-reported. Comparison of the ratio of energy intake to estimated basal metabolic rate (EI/BMR) from the Tasmanian weighed records with the one-day recall data for adults aged 19 years and over from the 1995 National Nutrition Survey suggests a greater extent of under-reporting in the weighed records. The extent of under-reporting probably varies by food category and across different population sub-groups and is difficult to quantify. However the advantages of using the weighed dietary record method were considered to be more compelling than its disadvantages.

The evaluation outlined in this report compares information on the same food or food category measured by two methods. Clearly the definition used to categorise data from the weighed dietary records by food category could greatly influence the comparison. All definitions of food categories were formulated before close examination of either the data from the short questions or the data from the weighed records. It is possible that alternative food category definitions would provide a closer match between sets of data, thus providing additional insight as to how the subjects were interpreting and responding to the short questions. This level of insight might be more clearly generated by focus group discussion.

The response rate for this survey compared favourably to dietary surveys in general and surveys that apply weighed dietary intake methodology. Nevertheless, the non-response was high enough to have the potential to influence the interpretation of population data if the performance of short dietary questions in non-responders is very different to that in responders to this survey. This possibility is thought to be unlikely since the main reason for non-response was probably unwillingness to comply with the demanding study requirements rather than a difference in ability to answer or interpret the short questions.

9.2 Questions on usual frequency of intake

The questions considered under this category ranged from questions about foods that were frequently eaten by most subjects in the study population (eg bread) to foods that were relatively infrequently eaten by most subjects but frequently eaten by some (eg yoghurt). All of the questions used an identical response structure that allowed the respondent to describe the frequency of intake for the timeframe that most suited them. The interviewers noted respondent difficulty for only one question – the question on usual frequency of eating salad – for which many respondents initially said that their intake depended on season. When the interviewers pointed out the question applied to the previous three months, less than 0.5% were unable to answer the question.

9.2.1 Grouped responses to short questions

When the responses to the short questions were grouped into categories, the categories differed significantly both in terms of mean frequency and the mean weight of food consumed. This was generally true for the subjects overall and for males and females separately.

9.2.2 Correlation between response to the short question and frequency estimated from weighed records

When the correlation between frequency of intake by short question and frequency of intake by weighed record was examined, all were significantly correlated. The magnitude of the correlation coefficient varied considerably between questions (table 9.2.1) but tended to be of similar magnitude for males and females. The strongest correlation coefficient was found for the question on frequency of breakfast cereal intake while the weakest correlation was for frequency of cooked vegetable intake. Correlation coefficients are strongly influenced by the distribution of the variables (and the proportion of 'tied scores'). It should be pointed out that even for the cooked vegetable intake question, the categories of response discriminated between mean frequency of vegetable intake and between mean total weight of intake in the appropriate and expected pattern.

Table 9.2.1: Spearman's correlation coefficient for relationship between frequency of intake by short questions and frequency of intake by three days of weighed dietary records

	Men	Women
Q14. Breakfast cereal	0.80	0.81
Q20. Fruit	0.60	0.56
Q19. Fruit juice	0.51	0.58
Q28. Yoghurt	0.53	0.56
Q12. Bread	0.53	0.45
Q17. Salad	0.49	0.48
Q26. Cheese	0.47	0.43
Q16. Other potato	0.36	0.46
Q13. Cooked cereal	0.39	0.33
Q15. Fried potato	0.29	0.34
Q30. Red meat	0.29	0.33
Q31. Processed meat	0.28	0.27
Q18. Cooked vegetables	0.19	0.24

Questions are listed in descending order of mean coefficient for men and women

9.2.3 Subjects who responded 'rarely or never' or 'once a day or more'

Examination of the lowest and highest frequency response categories to the short questions was enlightening. Many subjects who reported that they 'never or rarely' (<1 per month) ate a particular food, in fact recorded eating that food during the three-day dietary recording period (table 9.2.2). Cheese, processed meat and fruit, were eaten by more than 25% of these subjects at least once during the three day reporting period when less than 5% would have been expected to have done so during a three day period. This suggests that some sources or forms of these foods, included in estimating the frequency of intake from the weighed records, were not included by subjects when answering a short question on frequency of intake. There was considerable variation between questions in the percentage of subjects who reported that they ate foods 'once a day or more often', who actually ate the food during the dietary recording period (table 9.2.2). The lowest percentages occurred for fried potato and cooked cereals for which less than 75% of subjects who said that they usually ate it once a day or more often actually ate the food during the recording period.

Recorded mean frequency of intake for subjects reporting frequency of food consumption by short question in the highest and lowest categories was also examined (table 9.2.3). For those who reported consuming a food 'rarely or never', the mean frequency of intake would be expected to be less than once a month, or a mean daily frequency of less than 0.03. The mean frequency of intake within this category was close to the expected value (<0.1) for seven questions. The mean frequency of intake from the weighed record was five times higher than from the short question for cheese intake and processed meat intake and more than four times greater for the question on fruit intake. For these foods subjects who reported the lowest frequency of intake of a food thus tended to under-report their intake. For subjects who reported consuming a food once a day or more, the mean daily frequency of intake would be expected to be at least 1.0. For this group the mean daily frequency of intake from the weighed record was greater than one only for fruit intake while for fried potato and cooked cereal the mean daily frequency of intake was less than half that expected (0.5).

Table 9.2.2: Percentage of subjects within extreme categories by short question who consumed the target food category within the dietary recording period

	SQ category 'Rarely or Never (Expected <5%)'	SQ category 'Once a day or more' (Expected 100% or more)
Q26. Cheese	35.9%	86.5%
Q31. Processed meat	28.1%	83.3%
Q20. Fruit	26.6%	91.7%
Q13. Cooked cereal	22.7%	71.4%
Q17. Salad	20.7%	83.5%
Q15. Fried potato	19.8%	62.5%
Q19. Fruit juice	15.6%	76.6%
Q30. Red meat	11.4%	86.2%
Q14. Breakfast cereal	10.9%	96.0%
Q28. Yoghurt	2.7%	79.2%
Q12. Bread	NC	99.0%
Q18. Cooked vegetables	NC	89.6%
Q16. Other potato	NC	88.2%

Questions are ranked by percentage who ate the target food despite reporting their consumption was 'rarely or never'

NC – not calculated – the number of subjects in this category was very small

Table 9.2.3: Mean daily frequency of intake of target foods by weighed record within extreme categories by short question

	SQ category 'Rarely or Never' [Expected < 0.033]	SQ category 'Once a day or more' [Expected 1 or more]
Q28. Yoghurt	0.01	0.68
Q14. Breakfast cereal	0.04	0.88
Q30. Red meat	0.07	0.66
Q19. Fruit juice	0.07	0.75
Q15. Fried potato	0.08	0.41
Q17. Salad	0.09	0.64
Q13. Cooked cereal	0.09	0.46
Q20. Fruit	0.14	1.28
Q31. Processed meat	0.17	0.66
Q26. Cheese	0.18	0.77
Q16. Other potato	NC	0.62
Q18. Cooked vegetables	NC	0.63
Q12. Bread	NC	NC

Questions are listed in order of the frequency of intake for the 'rarely or never' group

NC – this category not used for analysis of this question

9.2.4 Overall performance of the short questions

The performance of the short questions is listed from positive to negative according to the magnitude of the mean value of the WR-SQ variable in table 9.2.4. This variable is the best index of overall accuracy of reporting frequency by short question compared to measuring frequency by weighed dietary record. The overall magnitude of the WR-SQ variable ranged from –0.16 for the question on other potato to 0.14 for the question on processed meat. The extreme values represent reporting that differs from recorded intake by approximately one occasion of eating every week. For most public health applications, this level of under- or over-reporting would not invalidate the use of short questions to estimate the average population frequency of intake. In large studies differences of this magnitude are, however, likely to be detected as statistically significant.

For five of the 13 short frequency questions, the WR-SQ variable was not significantly different from zero. The two questions that showed the most over-reporting relative to the weighed record were those concerning 'other potato' intake and 'cooked vegetable' intake.

9.2.5 Difference in performance between population sub-groups

The results for differences in the WR-SQ variable between population sub-groups are shown in table 9.2.5. The performance of four out of the 13 questions was significantly different between men and women. In general, women over-reported the frequency of intake by short question in comparison to men except for fried potato intake where men over-reported in comparison to women. The performance of only two short questions varied by season of administration (cooked cereals and breakfast cereal intake) while the performance of foods that are expected to show seasonal variation in intake (salad, fruit) did not vary. The short question on the frequency of fruit intake performance varied by sex, age, region and body mass index.

The performance of nine out of 13 questions differed between population sub-groups for one factor or less. The performance of most of the questions was therefore very consistent in relation to categorisation by the factors examined.

Table 9.2.4: Overall performance of short dietary questions

	Mean WR-SQ Variable	95% confidence interval
Q16. Other potato	-0.16	-0.18 to -0.13
Q18. Cooked vegetables	-0.14	-0.18 to -0.11
Q19. Fruit juice	-0.12	-0.16 to -0.08
Q12. Bread	-0.09	-0.14 to -0.04
Q30. Red meat	-0.06	-0.09 to -0.03
Q28. Yoghurt	-0.05	-0.07 to -0.04
Q20. Fruit	-0.05 (ns)	-0.10 to 0.01
Q14. Breakfast cereal	-0.04 (ns)	-0.07 to 0.01
Q17. Salad	-0.03	-0.06 to -0.001
Q26. Cheese	-0.02 (ns)	-0.05 to 0.01
Q13. Cooked cereal	-0.02 (ns)	-0.04 to 0.01
Q15. Fried potato	0.012 (ns)	-0.006 to 0.04
Q31. Processed meat	0.14	0.11 to 0.17

Questions are listed in order of the mean WR-SQ variable. A negative value represents average over-reporting

ns – not statistically different from zero

Table 9.2.5: Factors for which statistically significant differences in performance of short questions were observed between sub-groups

	Sex	Age	Region	Body Mass Index	Relative social disadvantage	Season
Q3. Breakfast					X	
Q12. Bread						
Q13. Cooked cereal						X
Q14. Breakfast cereal						X
Q15. Fried potato	X			X		
Q16. Other potato			X			
Q17. Salad	X					
Q18. Cooked vegetables		X	X			
Q19. Fruit juice				X	X	
Q20. Fruit	X	X	X	X		
Q26. Cheese	X					
Q28. Yoghurt						
Q30. Red meat						
Q31. Processed meat						

9.2.6 Use of short questions to indicate usual nutrient intake in populations

An association between the frequency of intake of a given food and intake of a specific nutrient may arise because the food itself is a major source of that nutrient, or because the intake of this food reflects intake of another food or foods that make a major contribution to the intake of the nutrient.

In this study the correlations observed between nutrient intake and the response to short questions about foods were generally weak. However, differences in nutrient means between categories were apparent for the questions shown in table 9.2.6. It is likely that findings such as these vary with population dietary habits but the sensitivity of these relationships to change in population dietary habits is not known.

In view of the weak correlation between nutrients and responses to questions about individual foods, it is tempting to try to achieve a better correlation by combining responses from several questions. It was not feasible to evaluate this possibility in the present report because of the way in which the frequency of intake of foods was determined from the weighed records (see 1.4.3). One approach to this would be simply to add together, for each individual, the frequency responses to every food on the questionnaire that varies in the same direction with the nutrient under consideration. The combination of responses from modules of short dietary questions on frequency of intake require further consideration before they can be shown to improve estimates of nutrient intake for a population.

Table 9.2.6: Nutrients for which statistically significant mean differences were found by categories of short question responses

	Nutrients
Q12. Bread	Energy, Thiamin
Q13. Cooked cereal	Fibre
Q14. Breakfast cereal	Fibre, Thiamin, Carbohydrate
Q15. Fried potato	Energy, Fat, Saturated fat, Provitamin A (negative)
Q16. Other potato	Provitamin A
Q17. Salad	-
Q18. Cooked vegetables	Provitamin A
Q19. Fruit juice	Provitamin A, Vitamin C
Q20. Fruit	Provitamin A, Vitamin C, Folate
Q26. Cheese	Calcium
Q28. Yoghurt	Calcium
Q30. Red meat	Energy, Protein, Fat, Saturated fat, Zinc
Q31. Processed meat	Energy, Protein, Fat, Saturated fat, Iron (negative)

9.3 Question on volume of milk intake

Although more people had difficulty in answering this question, than the frequency questions, 98.9% of subjects were able to answer the question.

For this question subjects had to choose one of five options for the usual amount consumed. The subject responses were distributed across each of the different options although only 6.6% selected the highest category.

The mean intake of milk, calculated from the food records, increased significantly with increasing volume categories for the question for both men and women. This suggests that the question can discriminate between groups of subjects based on their total milk intake.

It is not known whether this question would have worked as well or better if an open-ended response or different values had been used for the response options. It is thought that the options selected were appropriate both because of the distribution of responses and because three of the categories represented commonly available volumes of milk. It is likely that subjects faced with an open-ended question would have used similar benchmarks.

9.4 Questions from the 1995 National Nutrition Survey

9.4.1 Question on frequency of breakfast

This question was answered by 99.9% of subjects and the pattern of response was similar to that found in the 1995 NNS (Rutishauser et al 2001). Approximately 75% of subjects stated that they ate breakfast five times or more a week. Younger people were more likely to eat breakfast infrequently than older people, and people from the group with the greatest relative social disadvantage were more likely to eat breakfast infrequently than people from the group with the least relative social disadvantage. The pattern with relative social disadvantage appeared stronger in the Tasmanian data but this was probably due to a different classification of relative social disadvantage.

Comparison of the frequency of having breakfast by short question with the weighed record frequency of having something to eat before 10am indicated that people who report a low usual frequency of having breakfast by short question appear to under-estimate how often they have something to eat before 10am. An explanation for this is that the definition of ‘breakfast’ from the weighed dietary record for the purpose of this analysis was broader than the definition people apply when responding to a short dietary question about breakfast. However, the result is similar to that found in an analysis of the question as applied in the 1995 National Nutrition Survey where the definition of ‘breakfast’ in the comparison method was based on what the subjects themselves had called breakfast or brunch (Rutishauser et al 2001).

The performance of the short question did not vary significantly with any of the population sub-group characteristics evaluated except for relative social disadvantage. The degree of under-reporting in the group with the greatest relative social disadvantage was greater and probably resulted from the relatively large proportion of this population sub-group that reported rarely or never eating breakfast.

The findings regarding the variation of mean food intake, mean energy intake and mean nutrient density with category of response to the short question were similar to the findings of the analysis of the same question in the 1995 National Nutrition Survey. Mean food intake (fruit intake and milk intake) and nutrient density was greater in the subjects reporting the highest frequency of having breakfast than in subjects reporting lower frequencies. In the Tasmanian data, however, the mean EI/BMR (energy intake divided by basal metabolic rate) increased as frequency of having breakfast increased raising the possibility that people who report rarely or never eating breakfast (and who appear to under-report the frequency of having something to eat before 10am) are also more likely to under-report their total dietary intake by weighed dietary record.

9.4.2 Question on food security

The question relating to food security was answered by 99.9% of subjects. The pattern of response for the question on food security was similar to that observed in the 1995 National Nutrition Survey (Rutishauser et al 2001).

There was no statistically significant difference between the two response categories for mean food intake (fruit or milk), energy intake, energy intake divided by basal metabolic rate or nutrient density for any of the nutrients examined. This is in contrast to the findings of the evaluation of the same question in the 1995 National Nutrition Survey where significant differences were found between groups for the density of some nutrients but not for energy intake or energy intake divided by basal metabolic rate. Examination of the differences in the means for nutrient densities for both data sets suggests that one reason for failing to find a statistically significant difference in the Tasmanian data was because of the much smaller sample size. The direction of the differences in means for nutrient density was the same between data sets for calcium, iron, and folate, but not for vitamin C. Similarly, the direction of the differences in means for fruit intake and milk intake in the Tasmanian data set was consistent with that for milk products and dishes and fruit products and dishes in the National Nutrition Survey data.

9.5 Recommendations

9.5.1 General recommendations

1. If the questions evaluated here are used in other surveys, the exact wording of the question and the response categories should be retained unless there is a well-justified reason not to do so. In the event that wording is altered, the reasons for the change should be documented for the information of other users.

2. If the short questions evaluated in this report are used for other Australian population sub-groups (eg ethnic groups not of Anglo-Celtic origin, children or adolescents) it is desirable that a more detailed method of dietary assessment is also included since the results may not be interpretable in the same way as the questions in this report.

3. Similar short questions about foods which have not been evaluated, should if possible be evaluated before use. If it is not practical to evaluate 'new' questions, the structure of the questions should be consistent, as far as possible, with that for the questions outlined here.

4. New questions require cognitive testing with subjects from the target population regarding how questions are interpreted. This relatively simple step may reveal differences in interpretation between subject and investigator that might easily be resolved by minor wording changes.

5. The evaluation described here does not address the ability of the short questions to measure either intentional or unintentional dietary change. This is precisely the purpose for which many users wish to use short questions – the ability of short questions to detect selected changes in diet should be addressed as a priority.

6. Within a questionnaire questions are preferably grouped according to style and structure. This will facilitate the training of subjects as to the response expected, and focus attention on the type of information required.

7. The use of multiple questions (and the combination of the results from them) to achieve a defined purpose should be given further consideration, although the performance of combinations of questions was not evaluated here.

9.5.2 Recommendations regarding questions on frequency of food intake

1. The frequency questions evaluated here were well-understood by the adult subjects in this study population and the responses were clearly related to mean frequency of use of the target food category and mean intake of the target food category. The specific questions evaluated in this report should be considered for use in other surveys of Anglo-Celtic adults.

2. When target foods for new frequency questions are determined, attention should be directed towards how easy it is for subjects to identify the consumption of the particular target food. For example, it is probably useful to ask about cooked potato separately from other cooked vegetables and separately from fried potato if these foods are conceptualised differently by the subjects. This may apply to other cooked vegetables.

3. When formulating new frequency questions, specific attention should be directed to providing a clear definition of foods to be included and excluded in the category.

9.5.3 Recommendations regarding the question on frequency of eating breakfast

1. The frequency responses to the breakfast question did not relate closely to the frequency of breakfast (defined as any food before 10am in the morning) recorded in the weighed records. The question may discriminate better if the wording included a definition of what is meant by 'breakfast'.

2. The performance of this question is expected to be as good or better than similar short questions regarding other meals because 'breakfast' is a relatively easily identified meal. Therefore, if other questions are developed to determine the frequency of specific meals, a suitable operational definition of the meal should be included in the question.

3. Any new questions on frequency of meal intake should be fully evaluated before use.

9.5.4 Recommendations regarding the question related to food security

1. Although the current question about running out of food provides only limited information and has the potential to be interpreted differently by different population sub-groups a positive response was associated with greater socio-economic disadvantage in both the Tasmanian and the 1995 National Nutrition Survey data.

2. The concept of food security is unlikely to be assessed effectively with a single question and additional questions suitable for use in Australia need to be developed and evaluated.

3. Until suitable additional questions have been developed and tested for assessing food security, the current question should be retained to allow comparisons to be made over time.

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