

WHAT IS THE NUTRITIONAL STATUS OF OLDER AUSTRALIANS?

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Summary

No matter which way you look at it, Australia's population is aging. Many health problems of the older person can be linked in some way to nutrition, so it is important to appropriately assess the elderly population to identify those at risk of nutritional deficiency or excess. The Australian Nutrition Screening Initiative Working Party was set up to evaluate a screening tool (checklist) developed specifically for the elderly in the United States but adapted for Australia. The checklist, which consisted of 12 simple questions directed at well-recognised risk factors, was evaluated in over 1000 free-living subjects (70 years and over) who were already enrolled in the Australian Longitudinal Study of Ageing. The most frequently occurring risk factors were: three or more prescription or non-prescription drugs, eating alone, having an illness that changed the kind or amount of food consumed, and an involuntary weight change. The least frequent were having insufficient money, eating insufficient fruits and vegetables, and having less than three meals a day. The total score from all 12 questions classified 30% of the population as being at high, 20.6% moderate and 49.5% at low risk of developing health or nutritional problems. Nutrient intakes of a sub-group of over 300 were analysed by food frequency and the mean nutrient intakes for this population were above the recommended intakes for many of the nutrients. The checklist was a significant predictor of how participants perceived their health and of whether or not a nutritionally adequate selection of foods were chosen. Thus, the checklist as it is currently designed is a useful tool to identify individuals in the community who may be at high risk of having a compromised health and nutrition status and who may need further follow-up by health professionals.

I. INTRODUCTION

Australia's elderly population (60 years or more) is increasing in numbers with an increased life expectancy (Australian Bureau of Statistics 1993). Problems with health tend to increase with age and the elderly have become the heaviest users of the health care system and social support systems (Australian Institute of Health and Welfare 1994). Many of the health problems of the elderly are closely linked with nutrition which has been implicated in the etiology as well as management of some chronic diseases (such as cardiovascular disease and cancer), cognitive and physical performance, and overall sense of physical and mental well being (Lester 1994).

It is important to recognise that the elderly as a group are not homogeneous and there are some sub-populations such as the frail elderly who are at greater risk of undernutrition rather than the overnutrition associated with the so-called affluent diet. The average elderly person living independently in the community is likely to be healthier, fitter and in better nutritional status than the more frail, more dependent, institutionalised elderly person (Woodhouse et al. 1988; Davis et al. 1985).

As part of a study to examine the nutritional status of the elderly in Australia a nutrition checklist that had been used in the United States (US) as a screening tool (White et al. 1992) was trialled in over 1000 participants of the Australian Longitudinal Study of Ageing. This was used to examine the prevalence of known risk factors, the percentage of the population deemed to be at

risk of a compromised nutritional intake and the capacity of the checklist to predict food intake and health status.

II. METHODS

The Australian Nutrition Screening Initiative (ANSI) is a cooperative project with the Royal Australian College of General Practitioners, the Council on the Ageing, the Dietetics Association of Australia and the Pharmaceutical Society of Australia. The major aim of ANSI is a multidisciplinary approach to introduce a self-administered risk-appraisal questionnaire/nutrition screening checklist for use with the elderly. The checklist is comprised of 12 questions based on identified nutritional risk factors, namely the presence or absence of disease, eating poorly, inadequate intakes of fruits, vegetables, dairy products and fluids, excess alcohol intake, oral problems that interfere with eating, inadequate income to buy food, social isolation, polypharmacy, involuntary weight change and loss of independence in relation to shopping, cooking and feeding. Each of the checklist items would normally be assigned a score according to the presence or absence of the item. The value of each item's score was based on original US scores (Posner et al. 1993) but with modifications determined by the ANSI Advisory Board. A total score from all 12 questions enabled an individual to classify their nutritional risk as either high, moderate or low. This study, however, was designed to trial the checklist in Australia, so participants were asked to answer only 'yes' or 'no' to each of the items on the checklist with no score attached. A total score for risk was calculated for data analyses only.

The general aim of the ongoing Australian Longitudinal Study of Ageing is to gain an increased understanding of how social, biomedical, behavioural, economic, and environmental factors are associated with age-related changes in the health and well-being of older persons. The target population was residents of Adelaide aged 70 years and over. The original specified sample was a large random selection from the State Electoral Roll and was stratified by age and gender. All potential participants were approached initially via a letter of invitation to join the study. Apart from the fact that all invited initial participants needed to be 70 years or older, there were no exclusion criteria. Spouses aged at least 60 years and other household members aged 70 years and over were included in the final sample (representing 4.4% of the elderly population in Adelaide). The study protocol was accepted by the Flinders Medical Centre Clinical Investigation Ethics Committee. The participants were followed up biennially and the data discussed in this paper are from the second year of the study.

The ANSI checklist, nutritional intake, and information related to food choice were collected by a self-complete questionnaire and a food frequency questionnaire both of which were explained to the study participants by staff of the Centre for Ageing. These questionnaires were then left with the subjects to complete at their leisure during the subsequent one to two weeks. The completed questionnaires were collected or returned via mail to the Centre for Ageing. Five hundred participating subjects were asked to complete the CSIRO semi-quantified food frequency questionnaire (Baghurst and Record 1984) based on the British (Paul and Southgate 1978) and Australian Food Tables (Department of Community Services and Health 1992). Intake was analysed from the diet alone; the estimations of intakes do not include nutrients from supplements. Information on perceived health and sociodemographic details were collected in an interview setting (computer assisted) in the participant's usual place of living.

(a) Minimum Food Choice Score (MFCS)

Selection of food was assessed in relation to the 12345+ Guide to Healthy Eating which was established as an educational dietary assessment tool at CSIRO (Baghurst et al. 1992). The minimum base diet to supply adequate dietary intakes of most nutrients requires that at least five servings of breads and cereals, four servings of a variety of vegetables (at least one starchy, one green-leafy, one yellow-orange), three servings of fruit, two of dairy products and one of meat or meat alternatives be eaten daily. The original eating plan was devised to include an additional two

serves or 1200 kJ from so-called indulgence foods (such as alcoholic beverages, soft drinks, pastries and pies, confectionery, sugar, nuts, sweet biscuits and cakes, ice cream, cooking or salad oils). A composite score (maximum of 10) of the total number of serves of each of the food groups, reflecting variation with energy intake, was determined for each person. Additional single points were given for the following if: no more than the maximum number of recommended serves of indulgences were consumed; wholemeal/brown/rye bread was chosen instead of white; non-saturated fat was used as a spread or in cooking; no salt was added at the table; and if fat was trimmed from the meat. An additional three points were allocated if there was at least one serve per day of starchy, green leafy or yellow/red vegetables (one point for each) consumed as recommended in the 12345+ plan and an extra 0.5 point added if reduced fat milk was used. Thus the maximum score allocated to each of the major food groups was 11 for cereal; 13 for vegetables; 12 for fruit; 10.5 for dairy/alternatives; 11 for meat/alternatives which, with additional bonus scores for no added salt, choice of fat type and number of indulgences, reached a maximum of 60.5 points. The composite score, called the Minimum Food Choice Score (MFCS) thus placed major emphasis on the minimum intake of different foods needed to provide a healthy intake with minor emphasis on over-consumption. The MFCS has been shown to have significant correlations with kilojoule, total fat, carbohydrate and sugar, alcohol, fibre, sodium, potassium, calcium, iron, zinc, carotene, vitamin C, vitamin E, vitamin B6, total folic acid and cholesterol intakes (Cobiac and Syrette 1995).

(b) Analyses

Only data from participants who were over 70 years of age and who lived independently in the community and not in retirement villages, hostels or nursing homes were analysed. Those who lived in retirement homes were not included because at the time of writing this paper there was no information available on their degree of independent living. To determine gender and age group differences in the MFCS perceived health status one-way ANOVA tests (with Scheffe tests of contrast) were performed. The percentage of the total population who answered that they had a particular risk factor was used as an estimate of the prevalence of nutritional risk factors and the percentages of the population who were at low, moderate or high nutritional risk were estimated after summing the scores usually assigned to each of the 12 risk factors. Chi-square tests were conducted to determine if there were any differences with age (categorised into 5-year age bands) and between the genders for responses to each of the checklist items. Since the total ANSI score were not normally distributed, a Kruskal-Wallis one-way ANOVA test was performed to determine if there were significant differences in the total score between genders and age-groups. To determine whether the checklist was a significant predictor of nutritional adequacy, and health status, multiple regressions (after adjusting for age and gender) were conducted. Adjustments were made since gender and age did affect some of the ANSI risk factors. Additional adjustments for hospitalisation (number of hospital days over the last year) and whether or not the participant was a smoker were carried out for the analysis with health status. Effects were deemed as being significant if there was a $P < 0.05$. The data were not weighted since the participants included in this study were not necessarily representative of the overall elderly Australian population. All results are expressed as mean \pm standard error of the mean (SEM).

III. RESULTS

A total of 1098 ANSI forms and 383 Food Frequency Questionnaires (FFQ) were received which represented a 73% and 77% response rate respectively for the ANSI and FFQ forms. Of these, 940 (479 men and 461 women) were aged 70 years or over and lived independently in the community, representing 86% of the completed ANSI checklists. Three hundred and thirty eight FFQs were received from the specified community sample. The mean age was 78.6 ± 0.2 years; 33% were aged 80 years and over. Of the community sample 64% were either married or lived in a de facto relationship whilst 32% were widowed; 74% lived in a house, and 25% in an

independent home unit or flat; and 63% had incomes of less than \$15,000 with 38% having less than \$12,000. The majority (74%) of this population had not been in hospital at all over the last year and the mean for the whole population (including those with zero days) was 3.3 ± 0.3 days over the last year. Most (94%) were non-smokers. Of the total population who rated their health, 5% rated it as poor, 24% as fair, 33% felt their health was good, 30% as very good and 8% felt their health was excellent. There was no difference between men and women in the way they rated their health. Perceived health was rated more poorly in the older age groups although the magnitude of association was not large ($r=0.12$; $P=0.0003$).

The mean nutrient intakes for those who completed a food frequency are shown in Table 1. The distributions of age, gender, income, perceived health status and income were similar to those in the total population. MFCS was 45.9 ± 0.4 ($n=338$). Women had a slightly higher MFCS (46.9 ± 0.6) than men (44.9 ± 0.5); $P<0.008$. The MFCS did not change significantly with age.

Table 1. Mean daily nutrient intake data from all those 70 years of age and over who lived in the community and who filled in food frequency questionnaires

	Men					Women				
	Total	Age (years)				Total	Age (years)			
		70-74	75-79	80-84	>85		70-74	75-79	80-84	>85
Number participants	172	41	56	48	27	166	66	46	31	23
Kilojoules	9383	9054	8985	10119	9397	8686	7862	9148	9650	8827
%energy from protein	16.6	16.3	17.2	16.4	15.8	17.3	17.6	17.1	16.8	17.3
% energy from fat	32.8	32.1	32.7	32.8	34.0	32.3	31.9	31.7	33.8	32.6
% energy from CHO	46.2	46.8	45.7	45.9	47.1	47.1	46.9	47.8	46.8	46.8
%energy from alcohol	2.9	3.1	2.9	3.5	1.6	1.6	1.9	1.6	1.1	1.7
Fibre (g)	29.0	28.6	29.4	29.4	28.1	30.2	27.1	34.2	30.5	30.8
Zinc (mg)	12.1	11.3	12.3	12.6	23.0	11.7	10.5	12.6	12.2	12.5
Iron (mg)	14.8	14.4	14.8	15.1	14.9	14.7	13.2	15.7	15.8	15.2
Calcium (mg)	1129	1038	1145	1193	1122	1139	1055	1223	1130	1227
Vitamin B ₆ (mg)	1.89	1.83	1.95	1.90	1.84	2.09	1.89	2.31	2.23	2.09
Folate (mg)	280	273	284	289	268	291	268	318	285	311
Thiamin (mg)	1.50	1.42	1.52	1.57	1.46	1.50	1.35	1.65	1.51	1.58
Vitamin C (mg)	153	142	148	160	172	171	167	196	182	189
Vitamin B ₁₂ (mg)	5.2	5.6	4.7	5.4	5.3	5.1	4.0	5.6	6.0	5.6

The percentages of the population who stated that they had any of the risk factors identified on the checklist are shown in Figure 1. The most frequently occurring risk factors were as follows: the taking of three or more prescription or non-prescription drugs, eating alone most of time, having an illness that changed the kind or amount of food that was consumed, and an involuntary weight change. The least frequent were having insufficient money to buy food, eating insufficient fruits and vegetables, and having less than three meals a day. A greater percentage of men than women stated that they did not eat sufficient fruits and vegetables ($P=0.003$) and drank more than three glasses of alcohol ($P<0.00001$) whereas a greater percentage of women than men stated that they ate alone ($P=0.001$), and had experienced an unintentional weight change ($P=0.005$). There was a decrease with age in the percentage of the population who stated that they drank 6-8 cups of fluid per day ($P=0.021$) and were able to always shop/cook/feed themselves ($P<0.00001$). On the other hand, there was an increase with age in the percentage who stated that they ate alone ($P<0.00001$), those who had problems with their mouth or swallowing ($P=0.010$) and who took more than three medications daily ($P<0.0001$).

The percentage of the total population who fell into the low (score of 0-3), moderate (score of 4-5) and high (score of 6 or more) nutritional risk categories after totaling their scores were as

follows; 49.5% low risk, 20.6% moderate risk and 30% at high risk of a compromised nutritional and health status. The mean score overall was 4.1 ± 0.1 (n=853) with a range of 0-19, median of 4.0 and mode of 0 (20.3% of the whole population had a score of zero). There was no significant difference in the total ANSI score between men and women but there was an increase with age: increasing from 3.6 ± 0.2 in those 70 to 74 years of age up to 5.3 ± 0.3 in those older than 85 years ($P < 0.0001$). The total ANSI score was a significant predictor of a lower or less nutritionally adequate food choice score (n=308, $P = 0.0001$) and of a poorer perceived health status (n=853, $P < 0.0001$) after adjusting for age and gender. The association with health status was not significantly altered after an additional adjustment for the number of hospital days and whether or not the participant was a smoker.

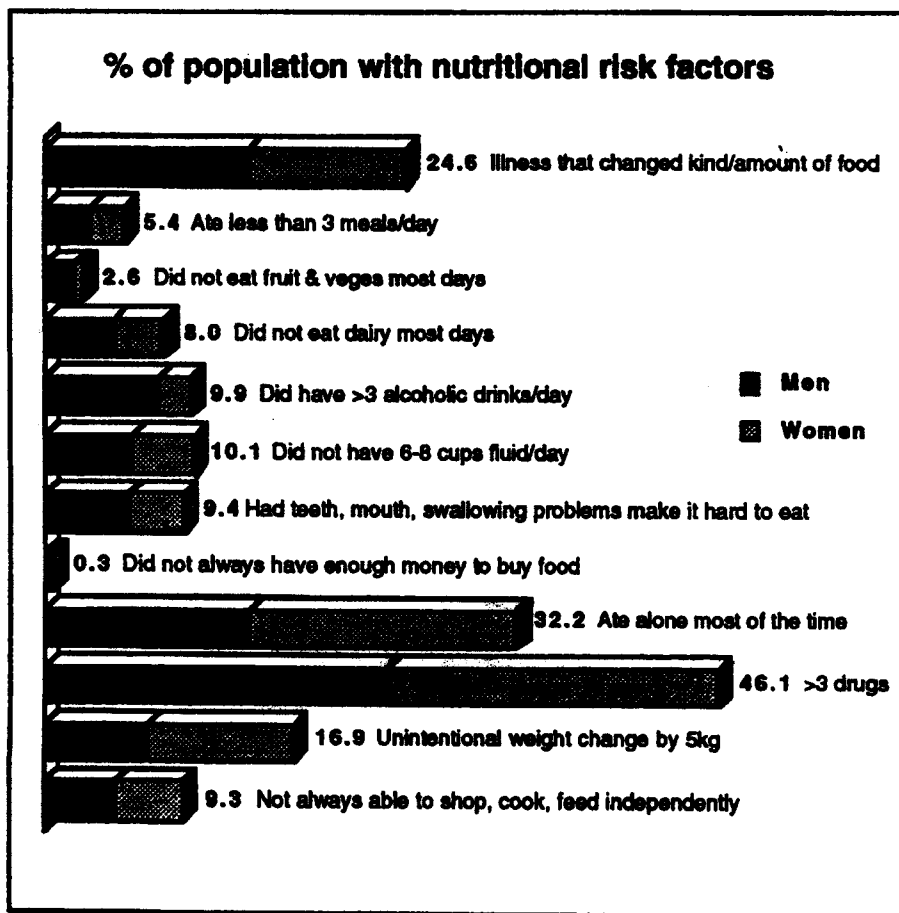


Figure 1. Percentage of males and females who stated that they had any of the 12 risk factors identified on the ANSI checklist.

IV. DISCUSSION

The ANSI checklist identified approximately 30% of this Australian population to be at high, and 20% being at moderate nutritional risk. Whilst the majority perceived their health to be good or better, nearly 30% felt that their health was poor or only fair. Although the ANSI checklist was not designed to be a clinical diagnostic or complete nutritional assessment tool this indicates a disturbingly high percentage of community-living elderly who may be at increased risk of poor nutritional status and who may need further follow-up by health professionals. On the other hand, there were 20% of the population who scored a perfect score of zero. This may be viewed as a positive sign of the good health of a large proportion of this population and is mirrored by the

findings on perceived health status.

The Nutrition Screening Initiative checklist was originally designed as a public awareness tool in the US to identify individuals in the community who may be at high risk of having a compromised health and nutrition status (White et al. 1992). It was designed to be completed by the older person themselves or the care-giver. The Australian version, having been based on this origin, has the same applicability. The ANSI Advisory Board has changed the wording of some of the questions, added an extra question about fluids, and changed the weighting/score for some of the risk factors after a pilot study in a small group of elderly in the Newcastle region (D. Roberts, personal communication). Direct comparisons between the United States and Australian data thus may not be possible for all risk factors or for the percentage of the population appearing to be at risk. Nevertheless, some comparisons are possible. Similar estimates (24-46%) of US elderly were identified as being at high nutritional risk (Posner et al. 1993). This US study found similar prevalences to the current Australian study for illness or medical condition affecting food intake and consumption of more than three alcoholic drinks a day but a lower percentage of the US population reported taking three or more medications. The most dramatic differences between this and the US study were seen in the number of meals eaten (US saw twice the prevalence), and serves of fruits, vegetables and dairy products (US saw three to 10 times greater prevalence). It is unclear as to why there is such a dramatic difference between the two populations. One explanation could be the greater incidence of poverty; the US study reported an incidence of insufficient funds at 25 times greater frequency than the current study population for whom poverty did not, on average, appear to be an issue. There would be, of course, some sub-groups within the Australian population for whom insufficient money to buy food would be an important determinant for food and hence nutrient intake.

In the current study, there was no difference between men and women in overall nutritional risk but there were gender differences in some of the individual checklist items. A greater percentage of women than men reported that they ate alone which is likely to be a reflection of the longer life-expectancy of women compared to men. Eating alone has been considered to be a general risk factor for poor nutrition and health in the elderly (Dwyer 1991; White et al. 1991) but in fact this may be more applicable to men (Horwath 1987) and less so to women (Cobiac and Syrette 1995). There were more men than women who did not consume fruits and vegetables on a daily basis which is reflected in the MFCS. The prevalence of consumption of alcohol in excess of three alcoholic drinks a day was higher in men compared to women and this is in agreement with alcohol contributing to a greater percentage of total daily energy intake of the men. Proportionally, more women than men reported an unintentional weight change but the reasons for this are unclear since the weight change includes both weight gain and loss.

The prevalence of those at higher nutritional risk increased with age and this result is similar to other studies which have shown that age itself could be considered a risk factor for poor nutritional intake (White et al. 1991). More specifically, five of the individual risk factors were associated with an increase in age; oral problems, polypharmacy, drinking insufficient fluid, eating alone and loss of independence to shop, cook or feed themselves. Health status was also perceived to be poorer by the older age groups which is likely to be related to the increased health problems that are frequently observed with advanced age.

The nutrient intake data from the food frequencies suggests that in general, the average diet of the 300 or so elderly who completed the food frequency was not deficient in any of the key nutrients that have often been identified as being 'at-risk' in the elderly (Horwath 1989). Since food-frequencies collect information on long-term intakes thus relying on individuals' long-term memory, it has been suggested that they may not be the preferred dietary assessment tool to use in the elderly. However, given the study design, and the fact that they have been used successfully with the elderly in the past (Horwath 1994; Baghurst 1991), the food frequency questionnaire was the most feasible tool to use. At first glance it would seem contradictory that 50% of the population should be at some nutritional risk whilst the average daily nutrient intake data was more than adequate. One explanation is that only younger, healthier people completed the FFQ but this was not the case since the demographics of this sub-population were similar to the total population. The mean nutrient intakes do not however, reflect the proportion of the population (or their profile) who are consuming less than the recommended amounts. Furthermore, the ANSI

checklist aims to identify those who with a compromised health status as well as nutritional risk and for this purpose, contains items (such as polypharmacy) that affect health (or reflect poor health) and nutritional status but are, in themselves, independent of nutritional intake .

The current ANSI score was a significant predictor of perceived health status and food choice suitable to provide a nutritionally adequate diet with minimal dietary excesses and as such can be considered to be a useful screening tool that can be used to identify those at some nutritional risk. The original tool was designed for community dwelling elderly and as such the prevalences of risk factors are likely to be lower in this population compared to other sicker or more frail populations. The checklist is currently being trialled by other researchers in the frail elderly. Further analysis is to be carried out to examine the current scores of each item on the checklist.

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