

COUNTRY OF ORIGIN PREDICTS NUTRITION RISK AMONG COMMUNITY LIVING OLDER PEOPLE

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Abstract: *Objectives:* To assess the nutrition risk status of community living older people and to identify associated risk factors. *Design:* A cross-sectional study using convenience sampling. *Setting:* North Shore City, Auckland, New Zealand. Data collection was carried out by a research nutritionist using computer assisted personal interviewing in the participant's own home. *Participants:* Fifty-one independently living people aged between 80 and 85 years. *Measurement:* A survey using three validated questionnaires: Practitioner Assessment of Network Type (PANT) to evaluate social networks; Elderly Assessment System (EASY-Care) to evaluate physical and mental wellbeing and Seniors in the Community: Risk Evaluation for Eating and Nutrition Version II (SCREEN II) to assess nutrition risk. *Results:* A third of the participants (31%) were at high risk of malnutrition (SCREEN II score <50; range 29-58 out of maximum score of 64). The majority of participants (82%) lived alone and nearly half (47%) had supportive social networks including close relationships with local family, friends and neighbours. Low self-rated health, disability and social factors (being born outside of New Zealand, losing a spouse and loneliness) were key underlying factors associated with being at nutrition risk. *Conclusion:* Nutrition risk is common among aged individuals living in the community. Health and social factors that shape eating behaviours place older people at increased nutrition risk. Strategies are needed for the early identification of risk factors to prevent nutrition problems. Engaging older people at risk to share meal preparation and dining experiences may foster better outcomes.

Key words: Older people, nutrition risk, SCREENII, New Zealand.

Background & significance

People over age 85 years are the fastest growing population group in New Zealand and have the highest expenditure on personal health and disability support (1). Increases in life expectancy put health and wellbeing of older people at the fore in government, health funding and planning and health care delivery. The majority of older people in New Zealand live independently in the community (2). The growth in numbers of older people along with the government 'ageing in place' policy (3) highlights the need to understand the factors and characteristics related to nutrition risk status among people who live at home.

Nutrition is a key determinant of successful ageing; food is not only critical to physiological well being but also contributes to social, cultural and psychological quality of life (4). There is a risk that those who live alone consume an inadequate amount of food through forgetting to eat proper meals, decreased motivation to prepare meals, not wanting to eat a meal once it has been prepared, or wanting to eat with others rather than by oneself (5). A decline in food intake may compromise dietary variety which is positively associated with nutritional quality and positive health outcomes (6).

Nutrition risk screening is a process to identify factors or characteristics related to nutrition status that could lead to malnutrition. Its purpose is to identify individuals who are malnourished or at risk of becoming malnourished (7). Nutrition screening tools provide a simple and rapid method to

identify those at the risk. For a tool to be relevant, it must be based on information known or believed to be associated with malnutrition. However pathways to nutrition health in older people are complex and multifactorial and no one screening tool can be used as a gold standard for identifying malnutrition (8). The 'Seniors in the Community: Risk Evaluation for Eating and Nutrition (SCREENII)' index determines nutrition risk using four key factors: food intake, physiological, adaptive and functional (9). Determination of nutrition problems amongst these factors provides an opportunity to identify appropriate and actionable areas of change in the dietary lifestyle. SCREENII has been validated and has good inter-rater and test-retest reliability as well as excellent sensitivity and specificity (10).

Eating is a social activity and food consumption generally increases in a social setting. Social connectedness contributes to the wellbeing of older people (11) and sharing mealtimes can increase food intake (12). Meals eaten in groups tend to be larger by up to 44 % compared to meals eaten alone (13). Social isolation can cause a lack of interest in food and eating and is a warning sign for malnutrition in older people (14-16). Social isolation is associated with weight loss (16) and poorer health outcomes (12). Factors such as lack of transport contribute to social isolation and increased nutrition risk (12, 17). Among New Zealanders aged over 75 years who no longer had access to a private car, over half experienced difficulty in meeting transport needs for food shopping and 38% were dependent on assistance from others (18). The type of social

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networks an older person belongs to can be used as a measure of social participation and informal support available (19). Loss of social networks may compromise food and nutrient intake (6). The type of social networks of older people can be assessed using the Practitioner Assessment of Network Type (PANT) (20). This is a validated tool shown to relate to many areas of behaviour and may help identify network types which increase nutrition risk.

Physical health may also impact on an older person's ability to procure, prepare and eat meals. For example, declining physical strength may lead to shopping difficulties in older women (21). Physical limitations in meal preparation and consumption can lead to inadequate nutrient intake (22) and disability is a key cause of weight loss (6). Self rated health has been shown to predict a decline in functional ability (23) whereas higher self rated health is associated with consumption of a healthier diet (23-25).

Factors related to nutritional risk in community living older people in New Zealand have not been established. Identification of social and health related factors which affect the risk of malnutrition may help to avoid nutrition problems among people living in the community. The aim of the current study was to describe the nutrition risk status in this sample of community living older people and to identify key health and social factors that place them at increased nutrition risk.

Methods and materials

Sampling

A convenience sample of independent older people living in the community was recruited to participate in the study over a three month period. Participants lived in North shore City, Auckland in New Zealand. Eligibility criteria for inclusion in the study were age between 80 to 85 years and living independently at home either alone or with a spouse or partner. Participants living in a retirement village or with family members or others who could be described as carers were excluded. Recruitment was undertaken with the assistance of Age Concern North Shore, a non-profit organisation that serves the needs of older people. Methods of recruitment included newsletter and local newspaper advertising and the use of information flyers distributed to other community groups. Older people who were interested in the research contacted the researcher by telephone and were screened for eligibility. Two people were not eligible to participate because of their age. Participants were fully informed of the requirements of the research and were sent an information sheet. Prior to the interview the researcher checked the understanding of the information sheet and participants signed a consent form. Computer assisted personal interviewing (CAPI) was used to capture data from an interviewer administered survey conducted in the participant's home. Surveys were undertaken by a research nutritionist between April and July, 2006 and took 20 to 50 minutes to administer. The study was approved by the Massey University Human Ethics Committee, Albany,

Auckland, New Zealand.

Measures

The questionnaire used in this study included

Socio-demographic characteristics: Age, gender, ethnicity, change in living situation (during the past five years), access to a private car and whether a holder of a community services card (as a proxy to low income level). The NZDep2006 index of socioeconomic deprivation (26) was used to provide a score (one to 10) for the residential address of each participant (one indicates the least and 10 indicates the most deprived 10 percent of areas throughout New Zealand).

Seniors in the Community: Risk Evaluation for Eating and Nutrition Version II (SCREEN II): to assess nutritional risk. This provides information on weight change, food intake and risk factors for food intake (meal frequency, diet restriction, appetite, chewing and swallowing difficulties, meal replacement, eating alone, meal preparation and shopping difficulties). Items are scored and range from 0 to 64. A cut off of less than 50 is considered at significant nutrition risk. Individual item scores range from 0 to 4; lower scores indicate an increased likelihood of behaviours or problems that influence nutritional risk (27).

Practitioner Assessment of Network Type (PANT): to assess the strength of the social and support networks of older people (20). On the basis of eight precoded questions PANT classifies the social network types into five different categories. The most robust network type is the Locally integrated support network for those in close relationships with local family, friends and neighbours. The Local family dependent support network is where family networks support the most highly dependent people. The Wider community focused support network provides active relationships with distant relatives, usually children, and a high prominence of friends and community involvement. The Local self-contained support network is typified by arms-length relationships or infrequent contact with at least one relative and is more likely than other network types to have problems related to poor health. The Private restricted support network is house-hold focused with an absence of local family, few nearby friends and limited community involvement.

Elderly Assessment System (EASY-Care): to assess physical and mental wellbeing. This is a validated questionnaire designed to gather information that affects an older person's ability to maintain independence and provides a summary score for disability, cognition and depression (28). The questionnaire comprises four parts. Part one establishes basic functional ability and self-ratings on health, loneliness and accommodation (7 items). Part two investigates a person's ability to carry out activities of daily living (17 items). The sub-questions of EASY-Care are scored according to the need for assistance and responses are summed to provide a disability score out of 100. Part three is used to identify the possibility of depression (4 items). Scores ranged from 0- 4 where 0 is

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indicative of no evidence of depression. Part four assesses the possibility of cognitive impairment (6 items). From a maximum score of 28, cognitive impairment is considered normal to mild for scores 0-10 or moderate to severe for scores 11-28.

Statistical analysis

Statistical analyses were conducted using SPSS Version 14.0 and the software package R, version 2.7.0 (R Development Core Team (2008). Binary variables were tested for differences in nutrition risk score by means of two-sample t-tests.

To determine associations with nutrition risk categorical variables were investigated by ANOVA and covariates by linear regression analysis. A multiple linear regression model was built in three steps. The first step of the model consisted of a backwards elimination of all variables. A forward selection of all possible interactions was then applied followed by a further backwards elimination to reduce the model components to significance. Statistical significance was set for p-value less than 0.05.

Results

Participants

The mean age of the sample was 82.4 ± 1.7 years. Thirty six participants were female and 42 lived alone in their own homes. Three quarters of the participants (39) were New Zealand European and a quarter (12) was born outside of New Zealand (England (9), Scotland (1) and Ireland (1) and Canada (1). The mean NZDep2006 index score was 4.4 ± 2.5 and ranged from deciles one to nine. More than half of the participants (n=29) held a current drivers licence and owned a private car (Table 1).

Table 1
Demographic characteristics of the participants

Characteristics	Mean ± SD	% (n)
Age (80-85) years	82.4 ± 1.7	
Socioeconomic deprivation NZDep2006 index (Range 1-9, out of maximum 10)	4.4 ± 2.5	
	Mean ± SD	
Gender		
Female		71 (36)
Male		29 (15)
Country of origin		
New Zealand European		76 (39)
British/Canadian		24(12)
Living situation		
Living Alone		82(42)
Lives with Spouse		18 (9)
Change in living situation in the past five years		
No change (either still alone or still with spouse)		84(43)
Lost spouse in the past five years		16(8)
Private transport		
Car		57 (29)
No car		43 (22)

Nutrition risk

A third (31%) of the participants was at nutrition risk (SCREEN II score < 50, range 38 to 61, maximum 64). The mean SCREENII score was 52.2 ± 6.7. The key factors contributing to nutrition risk are shown in Table 2.

Social networks, physical and mental wellbeing

Nearly half (47%) of the participants had supportive social networks including close relationships with local family, friends and neighbours. These participants belonged to the 'Locally integrated support network' (Table 3).

Table 2
SCREEN II item scores that indicate nutrition risk

SCREEN II Item ^a		% (n) Participants with Scores ≤2 ^b
Eating alone	Eats one or more meals/day with someone sometimes/ never	67 (34)
Milk Product Intake	Drinks milk or eats milk products <1-2/day	49 (25)
Meal Preparation	Chore sometimes/always or not satisfied with food prepared by others	33 (17)
Meat & Alternatives Intake	Eats meat or alternatives <1/day	33 (17)
Weight Change	Weight perceived to be more/less than it should be	24 (12)
Frequency of Eating	Skips meals sometimes/often/almost every day	16 (8)

a. SCREEN II items are the questions from SCREEN II; b. SCREEN II items with scores less than or equal to two, out of a maximum score of four, potentially lead to 'nutrition risk' (29)

Table 3
Social network typology (PANT)

Social Network type	% (n)
Locally Integrated	47 (24)
Wider Community Focused	19 (10)
Local Family Dependent	14 (7)
Local Self contained	12 (6)
Private Restricted	6 (3)
Inconclusive	2 (1)

More than half of the participants (51%) rated their health as excellent. Eighty six percent regarded themselves as never or sometimes lonely. The majority (84%) of participants had no evidence of depression. The mean disability score was 4.9 (± 7) and ranged from zero to 28 out of a maximum of 100. The mean cognitive impairment score was 6.5 (± 4.7) and ranged from zero to 18 out of a maximum of 28. Eighty percent of the participants showed normal to mild cognitive impairment (scores from zero to 10) and 20% of participants showed moderate to severe cognitive impairment (scores 11 to 28) (Table 4).

Social and wellbeing factors independently related to nutrition risk

Participants born in New Zealand tended to be at lower nutrition risk (higher SCREEN II scores) than participants born

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overseas in Britain or Canada (53.62±6.22 versus 47.75±6.42, p=0.01). Nutrition risk was significantly lower among participants who never or sometimes felt lonely compared to those who often felt lonely (53.25±6.46 versus 45.86±4.4, p=0.003). All participants who described themselves as often feeling lonely lived alone. There was a high correlation (phi coefficient) between loneliness and ethnicity (r=0.45) where 42% of British or Canadian versus 5% of New Zealand participants reported often feeling lonely.

Self rated health and scores for disability predicted nutrition risk. There was a significant difference in SCREENII scores with self-rated health (Adjusted R²=0.09, p=0.04). As participants lowered their self-rated health from excellent to poor the scores for SCREENII decreased. There was a linear relationship between the SCREENII score and the score for disability (Adjusted R²=0.08, p=0.02). The higher the score for disability (indicated by the need for assistance with housework, meal preparation, shopping, paying the bills and help with dressing and feeding) the lower the SCREENII score.

Table 4

Personal assessments for health and wellbeing (EASY-Care)

	Mean ± SD	% (n)
Self Rated Health		
Excellent		51 (26)
Good		27 (14)
Fair		22 (11)
Loneliness		
Never or sometimes		86 (44)
Often		14 (7)
Depression		
No evidence of depression		84 (43)
Some evidence of depression		16(8)
Disability Score	4.9 (± 7)	
No disability		33(17)
Some disability		67(34)
Cognitive Impairment Score	6.5 (± 4.7)	
Normal-mild		80(41)
Moderate-severe		20(10)

Predictors of nutrition risk using a multiple regression model

The multiple regression model found that binary factors of country of origin (born in New Zealand or Britain/Canada) and change in living situation (lost spouse or no change during the past five years), as well as the interaction between self-rated health (excellent, good, poor) and depression (none or some evidence of depression) explained 40.35% of the variation in the SCREENII score (Table 5). The baselines for each of the variables used in the model were: self-rated health ‘excellent’, no evidence of depression, being born in New Zealand and no change in living situation. The regression table shows the effects relative to these baselines.

The model determined that higher nutritional risk was positively correlated with being born in Britain or Canada versus New Zealand (p = 0.013) and losing a spouse in the last

five years compared with no change in living situation (either still alone or with spouse) (p = 0.02).

Among participants with no evidence of depression lower self health ratings were associated with greater nutritional risk (self-rated health as good: p = 0.035, self-rated health as poor: p < 0.001). Excellent self-rated health was unaffected by the presence or absence of depression (p = 0.173). With some evidence of depression, good (p = 0.023) and poor self-rated health (p = 0.014) were associated with significantly lower nutritional risk than in the absence of depression.

To determine the effects of self-rated health in participants with some evidence of depression the baseline was reversed with the reference set to ‘some evidence of depression’. The reversed model displayed no relationship between self-rated health and nutritional risk in the presence of some evidence of depression (good self-rated health: p = 0.101, poor self-rated health: p = 0.373). Results are not shown.

Table 5

Multiple Regression Model showing factors associated with nutrition risk

	Coefficient	Std. Error	p-value
Intercept	56.819	1.184	< 0.01
<i>Main Effects</i>			
Self-Rated Health			
Good	- 4.305	1.975	0.035
Poor	- 10.233	2.308	< 0.001
Depression			
Some Evidence of Depression	- 6.112	4.406	0.173
Country of Origin			
British/Canadian	- 5.551	2.142	0.013
Change in Living Situation			
Previously with Spouse	- 5.312	2.2	0.02
<i>Interactions</i>			
Self-Rated Health : Depression			
Good : Some Evidence of Depression	12.403	5.235	0.023
Poor : Some Evidence of Depression	14.963	5.844	0.014
Adjusted R ² = 0.4035		Regression p-value: < 0.001	

Discussion

A third of the older people in this study were at risk of malnutrition as determined by SCREENII. Although the prevalence of risk was lower compared to community living older people in Canada (30), our findings support that nutrition risk is a common phenomenon among this group of aged individuals. In this study we identified participant’s health and wellbeing and social factors that are independently associated with nutrition risk.

Most of our participants belonged to supportive social networks suggesting they had supportive family, friends or neighbours (19). However the majority (82%) lived alone. The key nutrition risk behaviour identified by SCREENII was eating alone. Two thirds of the participants ate one or more meals a day with someone sometimes or never. Living alone is

associated with increased nutrition risk (31) which may adversely affect health. Reduced opportunities for social facilitation of intake among older people who live alone may lead to a reduction in food intake (32). Eating is facilitated when an older person eats in the presence of another person (33). Providing an increased food intake will lead to an increase in dietary variety (34, 35) which is positively correlated with nutritional quality as well as health outcomes (36). Thus, assisting to arrange for older people to have an eating companion at mealtimes may help to promote an improved food intake.

Two thirds of our participants (67%) showed some evidence of disability as assessed by EASY-Care. Those with higher scores which indicate a need for assistance with activities of daily living were at greater nutrition risk. Many older people with disabilities have trouble getting to shops, doing their grocery shopping, and preparing food. The difficulties encountered when shopping for food can include bending to reach items, reaching items high on shelves, pushing trolleys and carrying shopping (5). Without support, the food choice of older people can be restricted and this may lead to food inadequacy (21). Older people who require assistance for shopping are usually dependent on the goodwill of family, or possibly friends. Sidenvall (21) showed older people preferred close relatives to assist with shopping as they were more able to know and understand how food was used and prepared in the household. Older New Zealanders who lose access to a private car through failing a medical test at age 75 or a practical driving test at age 80 do not always feel they are given enough time to make their choices when taken food shopping by relatives or carers (18). They are also not able to take advantage of sales or seasonal fruit and vegetables in the same way as they may have in the past. Activities that involve mobility, like shopping, are strongly associated with self-rated health (37). In the present study we found that as participants lowered their self rated health from excellent to poor their risk of malnutrition increased. This linear relationship is consistent with other studies. Burge and Gazibarich (38) found a significant positive relationship between perceived health status of elders and nutrition risk using the Australian Nutrition Screening Initiative checklist. Among Canadian elders Keller et al (39) found those who perceived their health to be excellent had significantly higher SCREEN II scores than those rating their health as poor. Similarly amongst older people in rural New Zealand those with greater feelings of control over their future health had better nutrition practices and were willing to make dietary changes to improve their future health (40). Healthier diets are associated with higher ratings of self-rated health (23-25, 41). Self-rated health may predict morbidity, mortality and declines in functional ability (23, 42). Its relationship with nutrition risk highlights that relatively simple interventions around improving nutrition may be able to break this cycle.

In the present study we found that nutrition risk was significantly lower among the participants who never or

sometimes felt lonely compared to those who often felt lonely. All of the participants, who reported feeling lonely often, lived alone. Loneliness was correlated to being British or Canadian born ($r=0.45$). Participants born in New Zealand were at significantly lower risk of malnutrition than those born in Britain or Canada. A possible explanation is that older migrants may be more socially isolated. New Zealand has had a long history of immigration. Over 350,000 people arrived from Great Britain under the assisted immigration scheme between 1947 and 1975 (43). New Settlers' Associations began to be established in 1948 to promote social contacts and closer ties of friendship between new arrivals and New Zealanders. Many immigrants appreciated the lifeline the Association offered when the shock of living in New Zealand was difficult to cope with. As one correspondent wrote in 1949, "I tried to keep an open mind, but it was all rather strange, so different from anything I had experienced. I was born and bred in the centre of London, I felt lost here-so few people, such small houses, so many wide open spaces, so little organized entertainment" (43). In later years these older migrants may have experienced the loss of a partner or close friends. Without the support of family they may be more likely to have weaker social networks and access to care. A study of frail older people in residential care in New Zealand found that those born in Britain had a six times greater risk of fall-related injury compared with those born in New Zealand, controlling for other health and socio-demographic factors (44). Differences in dietary factors and exposure to sunlight (vitamin D) may be one explanation for the higher rate of falls. On the other hand the British born residents may not have had the same level of social support. The multiple regression model of the present study showed the main effects on nutrition risk were being born overseas and losing a spouse in the last five years. Country of birth has not previously been identified as a risk factor for malnutrition. This finding requires replication and further research. The nutritional vulnerability among older migrants may be alleviated by simple preventative measures.

This study was limited by a small sample size and the results should be interpreted cautiously. The cross sectional design does not allow us to comment on causality in factors related to nutrition risk. The sample had a self-selection bias and is not representative of the population. Only 29% of the study participants were men. This compares with 41% of men in the general population of the 80 to 84 year age group (45). As older men have poorer dietary behaviours and dietary quality compared to older women (46) future studies may warrant oversampling men to investigate gender comparisons. Furthermore 76% of our sample was New Zealand European compared to 91% of the general population aged 80 to 84 years (45). Whilst a quarter of both our sample and the general population aged 80 to 84 years were born overseas (45) Maori, Pacific and Asian people in our study sample were not represented. Although we are not able to demonstrate cause and affect relationships we have found SCREENII to be a useful tool to identify nutrition risk factors. Our findings contribute to

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the body of evidence of indicators that can increase the risk of malnutrition in later life. We found a high prevalence of nutrition risk in this sample of older people who live at home. Low self rated health, disability and social factors (being born outside of New Zealand, losing a spouse in the last five years and loneliness) were factors associated with the risk of malnutrition. Early identification of risk factors may help to prevent nutritional problems in older people with failing health. Strategies which encourage older people at risk to engage in meal preparation and sharing may help to improve nutritional status.

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