References


Historical background

In 1988, the International Union of Nutritional Sciences (IUNS) Committee on Nutrition and Aging (II-8) undertook to coordinate cross-cultural studies of food habits and health in later life with the following objectives:
1) to describe health status, lifestyle and the range of food habits (present and past), amongst the aged in developed and developing countries, and
2) to determine to what extent food habits and lifestyle variables predict health status in the aged.

The principal hypothesis is that it is possible for comparable health status to be achieved by people in later life, having eaten, and continuing to eat in quite different ways from each other. We cannot, however, comment on the nature of survivorship from a nutritional point of view for those of whom die prematurely, before the age of 70, or before the upper age stratum in a community where life expectancy is relatively short. Nevertheless, our assumption is that achievement of optimal health status by nutritional means is worthy of consideration amongst the aged in its own right.

Results from 13 elderly communities, giving a total of 2013 subjects, have now been descriptively documented in book form, fulfilling the first objective of the study.

Correspondence address: Professor Mark Wahlgvist, Monash University, Dept of Medicine, 266 Clayton Road Block E, Level 5, Clayton, 3168, Victoria, Australia Tel: +61-3-9550-5525 Fax: +61-3-9550-5524
Additionally, similar studies undertaken by EURONUT-SENECA group, Horwath and colleagues in Australia and New Zealand, and the Institute of Nutrition and Food Security in Belgium, China, are also included, comprising 27 centres in all.

The value of the book is that it brought together variables from all of these centres for comparison. The variables included socio-demography, health status, food beliefs and habits, nutrition intakes, anthropometry, social network and factors, and lifestyle. The IUNS study is unique in scope and will provide researchers with data on how elderly people are eating in various components of the world and factoring affecting food intake and health. The book provides a reference point in approaches and methodology for the study of nutrition and aging in various communities.

The objective of this paper are:

1) To report methodology developed for the IUNS study of “Food habits in later life: Cross-cultural approaches” with special references to health status, food intakes, social factors, and lifestyle, and
2) To present key findings related to the general investigation of food habits and health status.

Methods

Study communities and subjects

Representative samples of 13 elderly communities, aged 70 years and over (or where this has not been the upper decile of the population, a age less than 70 years) were drawn, starting from Australia (rural Aboriginal, urban Anglo-Celtic, and urban Greek Australians), China (urban Beijing, and rural and urban Tianjin Chinese), Greece (urban Grammichele, Crete, and rural Nasso), Japanese, Philippines (urban Manila Filipinos), and Sweden (urban Gothenburg Swedes). Elderly participants were representative of the community being studied, but not of the entire country. Subjects were randomly selected from the telephone directory, register or electoral rolls. Psycho-geriatric patients in nursing homes and subjects unable to answer questions independently were excluded from the study. All study centres aimed for a participation rate of at least 60%. Anthropometric and blood pressure were recorded, and 

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Interviewed administrator questionnaire

The interviewer administered questionnaires were designed for the study on health status, food habits, social factors and lifestyle. Questions were adapted from previously trialled questionnaires used in elderly studies, such as the Multi-level Assessment Instrument which included validated health scores, the WHO Eleven Country Study in Europe, the WHO Four Country Study in the Western Pacific, and EURONUT-SENECA study in 19 European centres. Apart from the health scores, all other scores (exercise, activities of daily living, medication, well-being, memory, social activity, social networks) were developed for the study. In all cases a higher score was a better score.

The questionnaires covered the following aspects:

Health status

Health status included questions or a set of questions so that the following aspects could be assessed as an aggregate:

1. Self-rated health,
2. Self-reported health conditions,
3. Self-reported medication use,
4. Well-being, and
5. Memory.

Both individual questions and the aggregate were used to identify potential differences in health status between the study communities.

The health section of the Multi-level Assessment Instrument (MAI) was used to obtain information on self-rated health, health behaviour and health conditions. The self-rated health item consisted of four questions, describing how one would rate their overall health at present, and the aggregate gave a score of 4 to 13. The health behaviour section consisted of three questions in relation to the use of medical services (such as frequency of physician visits). The aggregate gave a health behaviour score of 3 to 9. The self-reported health conditions section consisted of a 23 item check-list of common health conditions, including diabetes, high blood pressure, eyeglass wear, and hearing, and whether or not limps were missing or handicapped. The aggregate gave a self-reported health condition score of 25 to 50. A non-index item, the descriptor of whether or not a person had a health problem, gave a score of 1 to 5. A total health score was then obtained by adding these scores together. They ranged from 33 to 74. The self-reported medication use was assessed using a 21 item check-list of the Older American Research Services (OARS) questionnaire, the aggregate gave a score of 21 to 42. Questions were also asked on vitamin and supplements and the use of various health aids, such as canes, hearing aids, and so on.

Well-being, describing feelings of worry, depression, tiredness, sleeplessness, and contentness with life, was assessed using a 7 item questionnaire of the WHO Western Pacific Study, by Andrews and colleagues. The aggregate gave a well-being score of 0 to 7. The memory of the elderly was tested with basic questions regarding their recall of their address, the date and whether they felt they were more forgetful now compared with the past. Also adopted from the WHO Western Pacific Study was a 5 item questionnaire in relation to ability to recall recent year, month and day of the week, home address and whether or not there was a feeling of improvement of people's names. The aggregate gave a memory score of 0 to 5.

Food habits

The usual food intake, distant past food intake, food and health beliefs, cooking methods, facilities, eating environment, and eating difficulties were inquired so that food habits pertaining to individual elderly could be assessed.

Anthropological methods (Rapid Assessment Procedures) were used to obtain information on food and health beliefs and to examine further other factors possibly affecting food intake. The food habits questionnaire development encouraged the expression of food culture of the study communities and, within the framework of food habits inquiries, allowed for modifications.

The food habits questionnaire (FQ) was used in study communities where seasonal intake of foods was evident (Australia, Greece, and Sweden). Questionnaire food items were modified in accordance with local food supply and cultural food preferences. A three consecutive day 24-hour recall method was used in the Chinese and Japanese study communities where the use of FQ had not been used previously and was virtually untested during the early development of this study. The FFQ methodology relies on the use of standard portion size to estimate usual intake which is possible for communities of European food culture, but not the traditional Asian food cultures where foods are in a form of the meal table, principally served to and shared amongst the extended family members.

Nutrient intake data was analysed using country specific food composition data. Micro-nutrient intakes were compared with two thirds of the US RDAs in order to

Table 1. Participating Communities: community code, location, ethnicity, and sample size (men, women and total)

<table>
<thead>
<tr>
<th>Code</th>
<th>Location</th>
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*The upper decile of the community was sampled, 50 years and over for Beijing women and Aboriginal Australians, and 55 years and over for Beijing men and Filipinos.

Table 2. Age range, by study community

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*Relative age was obtained based upon members of the community

Table 3. Information gathered, by study community

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</table>

* RAP was used to obtain demographic and community food intake information, not available to the present paper.
Additionally, similarly studies undertaken by EURONUT-SENECA group1, Horwath and colleagues in Australia and New Zealand4, and the Institute of Nutrition and Food Hygiene in Hungary, China, are also included, comprising 27 centres in all.

The value of the book is that it brought together variables from all of these centres for comparison. The variables included socio-demography, health status, food intakes, beliefs and habits, nutrient intakes, anthropometry, social network and factors, and lifestyle. The IUNS study is unique in scope and will provide researchers with data on how elderly people are eating in various community and factors affecting food intake and health. The book provides a reference point in approaches and methodology for the study of nutrition and aging in various communities.

Methods

Study communities and subjects

Representative samples of 13 elderly communities, aged 70 years and over (or where this has not been the upper decile of the population, a age less than 70 years) were studied, drawing from Australia (rural Aboriginal, urban Anglo-Celtic, and urban Greek Australian), China (urban Beijing, and rural and urban Tianjin Chinese), Greece (rural Spata Greeks), Japan (semi-urban Okazaki, urban Hiroshima, suburban Kumamoto, and urban Yokohama Japanese), Philippines (urban Manila, Filipinos), and Sweden (urban Gothenburg Swedes). Elderly participants were representative of the community being studied, but not of the entire country. Subjects were randomly selected from the telephone directory, register or electoral rolls. Psycho-geriatric patients in nursing homes and subjects unable to answer questions independently were excluded from the study. All study centres aimed for a participation rate of at least 60%.

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<table>
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</table>
assess adequacy of intake. Due to differences in country specific food composition tables, certain nutrients were not available such as zinc and magnesium for Chinese and Japanese elderly, and folacin, vitamin B6 and vitamin B12 for most study subjects. Nevertheless, a qualitative assessment of intake was made by identifying foods consumed which are good sources of these nutrients.

Food intake data derived from the FFQ or 3 day recalls were categorized into 13 major food groups and 42 food subgroups. In this report, the usual food intakes (in grams per day) are reported for selected food groups. The food intake variety was calculated based on the 43 food subgroups. Energy intake, the percentage of energy from carbohydrate and fat intakes, and the percentage below two thirds of the US RDA for retinol equivalent and thiamin intakes were reported. Social factors

Social factors, including social activity, network and support, adopted questions from the Multi-level Assessment Instrument (MAI)27. The questions were available to the Greeks (GRK-M and GRK-S), the Swedes and the Japanese (JPN-O), and modified for use in the Anglo-Celtic Australians and Chinese in Beijing and Tianjin.

Social activity, aiming to assess ways of spending time on meetings, church congregation, and personal hobbies, consisted of 22 questions. The aggregate gave a social activity score of 22 to 176. Social networks consisted of 12 questions in relation to contact with friends and relatives, and feelings of loneliness or degree of support. The aggregate gave a social network score of 12 to 46.

Lifestyle

Activities of daily living, exercise, sleep, and substance abuse were inquired and aimed to explore the cross-cultural lifestyle of the various elderly communities. Activities of daily living (ADL) questions were adopted from the WHO Eleven Country Study24. The questions consisted a 14 item check-list inquiring degrees of difficulty with basic bodily functions and performing basic tasks, such as using the toilet, eating, and walking between rooms. The aggregate gave an ADL score of 15 to 62. Questions on how often does one go out of the house or building and how many hours/minutes spent per day or week doing various activities were asked to assess exercise pattern. The aggregate gave an exercise score of 1 to 7. Questions relating to sleeping patterns, including time of waking and sleeping, number of hours sleep per night, and whether or not they nap during the day, were asked. Smoking habits and alcohol consumption were also asked.

Anthropometry

A standard protocol was developed for use in the study. Not all study centres had a complete set of anthropometric data (Table 3). Where the collection of anthropometric data was possible, the study protocol was followed. All measurements were measured twice and included:

1. Body weight: in kilograms to the nearest 0.5kg, with light clothes on;
2. Stature: in centimetres to the nearest 0.5cm, in standing position with socks and shoes removed;
3. Body mass index (BMI): calculated as weight in kilograms divided by stature in meter squared (kg/m²);
4. Waist circumference: at the level of umbilicus in centimetres to the nearest 0.5cm, with light clothes on, in standing position with abdomen relaxed, arms at the sides, feet together and weight equally divided over both legs;
5. Hip circumference: at the level of maximal gluteal protrusion in centimetres to the nearest 0.5cm, with light clothes on, in standing position with abdomen relaxed, arms at the sides, feet together and weight equally divided over both legs;
6. Waist-to-hip circumference ratio (WHR): calculated as waist circumference divided by hip circumference;
7. Mid arm circumference (MAC): in centimetres to the nearest 0.5cm, in standing position, with sleeves removed, arm relaxed, and legs apart;
8. Skinfold thickness: triceps (TSF), biceps, subscapular and suprailiac in millimetres using a Harpenden or Holtain caliper (the two agree reasonably well);
9. Mid arm muscle circumference (MAMC): calculated using the following equation:
   \[ \text{MAMC} = \text{MAC} - (3.14 \times \text{TSF}) \]
   where MAC equals mid arm circumference and TSF equals triceps skinfold thickness;
10. Mid arm muscle area (MAMA) and:
   \[ \text{MAMA} = \text{MAMC} - (3.14 \times \text{TSF}) \]
   where MAMA equals mid arm muscle circumference and TSF equals triceps skinfold thickness;
11. Fat free mass (FFM) in kilograms, total body fat (TBF) in kilograms, and percentage body fat estimated as:
   
   Body weight (in kg) x (1 - (Fat% / 100))
   
   where Fat% is the percentage of body fat loss, estimated as the ratio of body weight, stature, age, and gender; the approach makes it possible to compare body fatness amongst the study communities because more direct measures were not available from all centres; the formula as is follows:
   \[ \text{FFM} = (0.395 \times \text{WT}) + (0.282 \times \text{ST}) + (0.84 \times \text{gender} - 0.144 \times \text{age} - 23.6) \]
   where WT is body weight in kilograms, ST is stature in centimetres, gender equals 1 for men and 0 for women, and age in years.

Blood pressure

Blood pressure was measured twice from the right arm, with elderly resting in a sitting position. The Korotkoff’s phase I and V were recorded for systolic and diastolic pressure, respectively. Blood pressure data were available from most study communities, except for the Aboriginal Australians and the Japanese.

Blood tests

Fasting venous blood was sampled from the Anglo-Celtic and Greek Australians, and the Swedes. Biological markers included:

1. Haematology: full blood examination, plasma folate acid in mmol/L and plasma vitamin B12 in pmol/L;
2. Lipids: Serum total cholesterol, triglycerides, HDL cholesterol, and LDL cholesterol in mmol/L

Chinese elderly (30%). Only 10% of the Japanese elderly reported being forgetful (Figure 3).

Figure 3. Percentage reporting being forgetful, by study community, age group and gender

We graded self-reported health status into poor, fair, good and excellent. Combining good and excellent together, Greeks in Melbourne and Chinese in Tianjin, whether rural or urban, rated their health best. Those who rated least well were Filipinos in Manila and Japanese in Okazaki. Men also tended to rate their health better than the women especially in the older age group. This gender difference was particularly evident in the Greek and Swedish elderly (Figures 4 and 5).

Figure 4. Prevalence of self-reported health status, by study community, age group and gender

Several indices of mental status were assessed. One of the most illuminating indices was self-rated happiness. About 80% of the young and old elderly in all study communities reported being happy, the only exception being Greek elderly in Sparta, where 50 to 60% reported happiness. On the other hand, 20 to 30% of the elderly reported feeling sad or depressed, except Sparta and Japanese women (50%). Overall, a greater proportion of women reported feeling depressed or sad compared with men (Figure 2).

Figure 2. Percentage feeling sad or depressed, by study community, age group and gender

A greater proportion of Anglo-Celtic elderly (70%) reported being more forgetful, followed by Filipinos (60%), Greeks in Melbourne (50%), Greeks in Sparta and Rheumatism and/or arthritis, hypertension, ‘heart trouble’, diabetes and stroke were disorders most commonly reported in the elderly communities studied.
assess adequacy of intake. Due to differences in country specific food composition tables, certain nutrients were not available such as zinc and magnesium for Chinese and Japanese elderly, and folacin, vitamin B6 and vitamin B12 for most study subjects. Nevertheless, a qualitative assessment of intake was made by identifying foods consumed which are good sources of these nutrients.

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Social factors

Social factors, including social activity, network and support, adopted questions from the Multi-level Assessment Instrument (MAI)\(^1\). The questions were available to the Greeks (GKS-M and GKS-S), the Swedes and the Japanese (JPN-O), and modified for use in the Anglo-Celtic Australians and Chinese in Beijing and Tianjin.

Social activity, aiming to assess ways of spending time on meetings, church congregation, and personal hobbies, consisted of 22 questions. The aggregate gave a social activity score of 22 to 176. Social networks consisted of 12 questions in relation to contact with friends and relatives, and feelings of loneliness or degree of support. The aggregate gave a social network score of 12 to 46.

Lifestyle

Activities of daily living, exercise, sleep, and substance abuse were inquired and aimed to explore the cross-cultural circumstances of lifestyle in the various elderly communities.

Activities of daily living (ADL) questions were adopted from the WHO Eleven Country Study\(^6\). The questions consisted a 14 item check-list inquiring degrees of difficulty with basic bodily functions and performing basic tasks, such as using the toilet, eating, and walking between rooms. The aggregate gave an ADL score of 15 to 62.

Questions on how often does one go out of the house or building and how many hours/minutes spent per day or week doing various activities were asked to assess exercise pattern. The aggregate gave an exercise score of 1 to 7. Questions relating to sleep patterns, including time of waking and sleeping, number of hours sleep per night, and whether or not they nap during the day, were asked. Smoking habits and alcohol consumption were also asked.

Anthropometry

A standard protocol was developed for use in the study. Not all study centres had a complete set of anthropometric data (Table 3). Where the collection of anthropometric data was possible, the study protocol was followed. All measurements were measured twice and included:

1. Body weight: in kilograms to the nearest 0.5 kg, with light clothes on;
2. Stature: in centimetres to the nearest 0.5 cm, in standing position with shoes and socks removed;
3. Body mass index (BMI): calculated as weight in kilograms divided by stature in meter squared (kg/m\(^2\));
4. Waist circumference: at the level of umbilicus in centimetres to the nearest 0.5 cm, with light clothes on, in standing position with abdomen relaxed, arms at the sides, feet together and weight equally divided over both legs;
5. Hip circumference: at the level of maximal gluteal protrusion in centimetres to the nearest 0.5 cm, with light clothes on, in standing position with abdomen relaxed, arms at the sides, feet together and weight equally divided over both legs;
6. Waist-to-hip circumference ratio (WHHR): calculated as waist circumference divided by hip circumference.
7. Mid arm circumference (MAC): in centimetres to the nearest 0.5 cm, in standing position, with sleeves removed, arm relaxed, and legs apart;
8. Skinfold thicknesses: triceps (TSF), biceps, subscapular and suprailiac in millimetres using a Harpenden or Holtain caliper (the two agree reasonably well);
9. Mid arm muscle circumference (MAMC): calculated using the following equation:

\[
\text{MAMC} = \text{MAC} - (3.14 \times \text{TSF})
\]

where MAC equals mid arm circumference and TSF equals triceps skinfold thickness.

10. Mid arm muscle area (MAMA) and:

\[
\text{MAMA} = \text{MAMC} - (3.14 \times \text{TSF})^2
\]

where MAC equals mid arm circumference and TSF equals triceps skinfold thickness.

11. Fat free mass (FFM) in kilograms, total body fat (TFB) in kilograms, and percentage body fat (%: calculated using body weight, stature, age, and gender; the approach makes it possible to compare body fatness amongst the study communities because more direct measures were not available from all centres; the formula is as follows:

\[
\text{FFM} = 0.395 \times \text{WT} + 0.282 \times \text{ST} + 8.4 \times \text{gender} - 0.144 \times \text{age} - 23.6;
\]

where WT is body weight in kilograms, ST is stature in centimetres, gender equals 1 for men and 0 for women, and age in years.

Blood pressure

Blood pressure was measured twice from the right arm with elderly resting in a sitting position. The Korotkoff's phase I and V were recorded for systolic and diastolic pressure, respectively. Blood pressure data were available from most study communities, except for the Aboriginal Australians and the Japanese.

Blood tests

Fasting venous blood were sampled from the Anglo-Celtic and Greek Australians, and the Swedes. Biological markers included:

1. Haematology: full blood examination, plasma folic acid in mmol/l and plasma vitamin B12 in pmol/l.
2. Lipids: Serum total cholesterol, triglycerides, HDL cholesterol, and LDL cholesterol in mmol/l.
3. Plasma fasting glucose in mmol/l.
4. Iron status: plasma iron in nmol/l, plasma ferritin in µg/l, iron saturation in percentage (%), and iron binding capacity in µmol/l.
5. Immune function: white blood cell (WBC) in x10^3/l, total lymphocyte count (TLC) in x10^3/l.

Results

Health status

In a comparison of the Anglo-Celtic Australians, Greek Australians, Greeks in Spata and Swedes in Gothenburg, it was found that, in general, men had a higher weight-bearing score than women, and the young elderly (age group 70 to 79 years) had a higher score than the old elderly. Melbourne Greek and Swedish men had the highest weight-bearing score of all the communities where the score was obtained (Figure 1).

Figure 1. Mean well-being score, by study community, age group and gender.

We graded self-reported health status into poor, fair, good and excellent. Combining good and excellent together, Greeks in Melbourne and Chinese in Tianjin, whether rural or urban, rated their health best. Those who rated least well were Filipinos in Manila and Japanese in Okazaki. Men also tended to rate their health better than the women especially in the older age group. This gender difference was particularly evident in the Greek and Swedish elderly (Figures 4 and 5).

Figure 4. Prevalence of self-reported health status, by study community, age group and gender.

Several indices of mental status were assessed. One of the most illuminating indices was self-rated happiness. About 80% of the young and old elderly in all study communities reported being happy, the only exception being Greek elderly in Spata, where 50 to 60% reported happiness. On the other hand, 20 to 30% of the elderly reported feeling sad or depressed, except Spata and Japanese women (50%). Overall, a greater proportion of women reported feeling depressed or sad compared with men (Figure 2).

Figure 2. Self-rated feeling sad or depressed, by study community, age group and gender.

A greater proportion of Anglo-Celtic elderly (70%) reported being more forgetful, followed by Filipinos (60%), Greeks in Melbourne (50%), Greeks in Spata and Chinese elderly (30%). Only 10% of the Japanese elderly reported being forgetful (Figure 3).

Figure 3. Percentage reported being forgetful, by study community, age group and gender.

Rheumatism and/or arthritis, hypertension, 'heart trouble', diabetes and stroke were disorders most commonly reported in the elderly communities studied.
Rheumatism was reported by about 40 to 60% of the Anglo-Celtic, Greek and Filipino elderly, combined with only 10% of the Swedes, Chinese and Japanese elderly. Rheumatism appeared to be more frequently reported by women than by men (Figure 6).

Self-reported hypertension ranged from 30 to 55%. Japanese men reported the lowest rates of hypertension (5 to 10%). Women were more likely to report hypertension compared to men, especially Anglo-Celtic, Greeks and Filipinos (Figure 7).

Self-reported stroke ranged between 5 and 10%. Rural Chinese in Tianjin reported the highest rates (20%), followed by Japanese (15%) and Spata (20%). Anglo-Celtic men had higher reported stroke rates than their female counterparts. In contrast, Greek and Filipino women reported higher stroke rates than the men. Self-reported stroke appeared to be higher in the age group of 80 years and over, especially by men.

The self-reported prevalence of diabetes was as high as 20% amongst older Anglo-Celtic and Greek women, in each case higher than for men. Of the men, Greek Australians had the highest prevalence of diabetes (17%), followed by Japanese men aged 70 to 79 years (15%). The diabetes prevalence among the Chinese, Filipinos and Japanese was about 5 to 10%. Amongst Caucasian, Swedish elderly had the lowest prevalence of diabetes, comparable to Asians (Figure 8). Overall, the prevalence of diabetes appeared greater in women compared to men and in these aged 80 years and over.

Marked differences were observed in the types and quantities of foods consumed. Mean daily intake of cereals was highest amongst Chinese elderly (350 grams per day), followed by Greeks (250 grams per day), Sweden and Anglo-Celtics (200 grams per day).

Total vegetable intake was highest amongst Greeks in Melbourne (355 grams per day for men and 300 grams per day for women), followed by Anglo-Celtic Australians (350 grams per day for men and 300 grams per day for women) and Swedes (330 grams per day for men and 320 grams per day for women). Greeks in Greece (280 grams per day for men and 220 grams per day for women), Chinese in Beijing (292 grams per day for men and 244 grams per day for women) and Chinese in urban Tianjin (296 grams per day for men and 257 grams per day for women) had similar intakes of vegetables. Chinese in rural Tianjin had the lowest intakes of vegetables (210 grams per day for men and 190 grams per day for women).

Anglo-Celtic elderly had the highest mean fresh fruit intake (200 to 300 grams per day), followed by Greeks and Swedes (200 grams per day). Japanese and Beijing Chinese (100 grams per day) and Tianjin Chinese (less than 50 grams per day).

Caucasian elderly (especially in Australia) generally consumed almost three times as much meat (100 to 150 grams per day) as Asian elderly (30 to 40 grams per day). Anglo-Celtic elderly consumed little fish or shellfish (less than 20 grams per day) compared with Greek Australians (60 grams per day) and Sweden (90 grams per day). Japanese and Chinese elderly in Beijing also had high fish intakes (60 to 80 grams per day) compared to Tianjin elderly (less than 20 grams per day).

Mean daily intake of milk and milk products was greatest amongst the Swedes (400 grams per day), followed by Anglo-Celtics (300 grams per day), Greeks in Melbourne (200 grams per day), Greeks in Spata, Chinese in Beijing and Japanese (150 grams per day) eaten Chinese in Tianjin (less than 100 grams per day).

Mean percentage energy intake from carbohydrates was high amongst Japanese and Chinese elderly (55 to 65%) compared with Caucasian elderly (38 to 45%). Greek elderly had the lowest mean percentage from carbohydrates (38%) (Figure 12).

Mean percentage energy intake from fat was high amongst Caucasian elderly (35 to 43%) compared with Chinese and Japanese elderly (20 to 25%). Of the Caucasian elderly, Greek subjects had the highest mean percentage energy from fat (42%) and the Anglo-Celtics the lowest (33%). Of the Asian elderly, Beijing Chinese had the highest percentages of energy from fat (35%). Overall, women appeared to have a greater proportion of their energy intake from fat compared with men.
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**Figure 6. Prevalence of self-reported rheumatism, by study community, age group and gender**

Self-reported hypertension ranged from 30 to 55%. Japanese men reported the lowest rates of hypertension (5 to 10%). Women were more likely to report hypertension compared to men, especially Anglo-Celtic, Greeks, and Filipinos (Figure 7).

**Figure 7. Prevalence of self-reported hypertension, by study community, age group and gender**

Anglo-Celtic men aged 70 to 79 years had the highest self-reported rates of heart disease (60%), followed by Greek women in Melbourne aged 80 years and over (50%) and Swedish women aged 80 years and over (45%). About 20 to 30% of the remaining subjects reported having heart problems. Rural Chinese and Japanese subjects reported the lowest rates of heart problems (less than 10%) (Figure 8).

The self-reported prevalence of diabetes was as high as 20% amongst older Anglo-Celtic and Greek women, in each case higher than for men. Of the men, Greek Australians had the highest prevalence of diabetes (17%), followed by Japanese men aged 70 to 79 years (15%). The diabetes prevalence amongst the Chinese, Filipinos, and Japanese was about 5 to 10%. Amongst Caucasian, Swedish elderly had the lowest prevalence of diabetes, comparable to Asians (Figure 9). Overall, the prevalence of diabetes appeared greater in women compared to men and in these aged 80 years and over.

**Figure 8. Prevalence of self-reported heart trouble, by study community, age group and gender**

Self-reported stroke ranged between 5 and 10%. Rural Chinese in Tianjin reported the highest rates (30%), followed by Japanese women (15%) and Spata women (10%). Anglo-Celtic men had higher reported stroke rates than their female counterparts. In contrast, Greek and Filipino women reported higher stroke rates than the men. Self-reported stroke appeared to be higher in the age group of 80 years and over, especially among men. The cancer prevalence amongst the elderly Anglo-Celtic individuals was the highest amongst all communities studied (30%). This is probably attributable to the fact that skin cancer prevalence of Anglo-Celtic Australians is high by international comparisons.

**Figure 9. Prevalence of self-reported diabetes, by study community, age group and gender**

Rural Chinese and Japanese subjects reported the lowest rates of heart problems (less than 10%) (Figure 8).

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**Figure 9. Prevalence of self-reported diabetes, by study community, age group and gender**

Marked differences were observed in the types and quantities of foods consumed. Mean daily intake of cereals was highest amongst Chinese elderly (150 g per day), followed by Greeks (250 g per day), Swedes and Anglo-Celtics (200 g per day). Total vegetable intake was highest amongst Greeks in Melbourne (355 g per day for men and 300 g per day for women), followed by Anglo-Celtic Australians (350 g per day for men and 320 g per day for women) and Swedes (330 g per day for men and 320 g per day for women). Greeks in Greece (280 g per day for men and 220 g per day for women), Chinese in Beijing (292 g per day for men and 244 g per day for women) and Chinese in urban Tianjin (296 g per day for men and 257 g per day for women) had similar intakes of vegetables. Chinese in rural Tianjin had the lowest intakes of vegetables (210 g per day for men and 190 g per day for women). Anglo-Celtic elderly had the highest mean fresh fruit intake (200 to 300 g per day), followed by Greeks and Swedes (200 g per day) and Japanese and Beijing Chinese (100 g per day) and Tianjin Chinese (less than 50 g per day).

Caucasian elderly (especially in Australia) generally consumed almost three times as much meat (100 to 150 g per day) as Asian elderly (30 to 40 g per day). Anglo-Celtic elderly consumed little fish or shellfish (less than 5 g per week) compared with Greek Australians (30 g per day) and Swedes (90 g per day) and Japanese and Chinese elderly in Beijing also had low fish intakes (60 to 80 g per day) compared to Tianjin elderly (less than 20 g per day).

Mean daily intake of milk and milk products was greatest amongst the Swedes (400 g per day), followed by Anglo-Celtics (300 g per day). Greeks in Melbourne (200 g per day), Greeks in Spata, Chinese in Beijing and Japanese (150 g per day) and lastly Chinese in Tianjin (less than 100 g per day).

**Figure 10. Average daily total food intake, by major food group, study community and age group, for men**

Mean energy intake for the Caucasian men ranged between 2200 kcal per day (Greek and Anglo-Celtic) and 2700 kcal per day (Swedes). Japanese and Chinese men had energy intakes between 1700 kcal per day and 2000 kcal per day. Of the Caucasian women, Swedes had the highest energy intake (2500 kcal per day), followed by Anglo-Celtic (2100 kcal per day). Greeks in Spata and Chinese in Beijing (1700 kcal per day). The Chinese and Japanese had average energy intakes of about 1700 kcal per day (Figure 11).

**Figure 11. Mean daily energy intake, by study community, age group and gender**

Mean percentage energy intake from carbohydrates was highest amongst Japanese and Chinese elderly (55 to 65%) compared with Caucasian elderly (38 to 45%). Greek elderly had the lowest mean percentage from carbohydrates (38%) (Figure 12).

**Figure 12. Percentage energy derived from carbohydrate intakes, by study community, age group and gender**

Mean percentage energy intake from fat was highest amongst Caucasian elderly (35 to 43%) compared with Chinese and Japanese elderly (20 to 25%). Of the Caucasian elderly, Greek subjects had the highest mean percentage energy from fat (42%) and the Anglo-Celtics the lowest (35%). Of the Asian elderly, Beijing Chinese had the highest percentages of energy from fat (35%). Overall, women appeared to have a greater proportion of their energy intake from fat compared with men.
The Anglo-Celtic and Greeks in Melbourne had the highest percentage of energy from protein (28%), followed by Greeks in Spata (16%), Japanese (15%), Swedes (14%) and Chinese (12%).

Spata and Anglo-Celtic men had the highest percentage of energy intake from alcohol (5%), followed by Greek men in Melbourne (3%), Anglo-Celtic women (3%), Swedish men (2%), and Greek and Swedish women (1.5%).

Prevalence of nutrient intake inadequacy
Almost 100% of the Chinese elderly did not achieve two thirds of the US RDA for calcium, followed by Greek (20 to 50%) and Anglo-Celtic women (20%). Less than 5% of Swedish elderly did not achieve two thirds of the US RDA. Overall, a greater proportion of women appeared to have lower mean calcium intakes than men. Iron intake appeared adequate in most study communities, with less than 5% of the subjects having intakes below two thirds of the US RDA. In contrast, a greater proportion of elderly (especially women) appeared to have inadequate zinc intakes. About 20 to 30% of Anglo-Celtic men and women, Spata and Swedish women had intakes below two thirds of the US RDA. Melbourne Greek women, Greek and Swedish men had higher zinc intakes (less than 15% had intakes below two thirds of the US RDA).

About 10 to 20% of the Anglo-Celtic, Greek Australians and Swedes did not achieve two thirds of the US RDA for magnesium compared with 40 to 60% of the Spata elderly. Almost 100% of the Chinese subjects did not achieve two thirds of the US RDA for vitamin A (retinol equivalent), followed by Greeks in Spata (60%), and Greeks in Melbourne (20%). Less than 10% of Swedes and Anglo-Celtic Australians did not achieve two thirds of the US RDA (Figure 13).

Intake of thiamin was particularly high amongst Anglo-Celtics and Swedes, with less than 5% not achieving two thirds of the US RDA. Average daily thiamin intakes were similar amongst the Greeks in Melbourne, the Chinese and the Japanese, with 10 to 20% not achieving two thirds of the US RDA. The Greeks in Spata had the lowest thiamin intakes, with 30 to 50% below two thirds of the US RDA (Figure 14).

In support of the ADL score, enquiry about difficulty in walking between rooms revealed that it was unusual for more than 10% of the elderly to have difficulty. It was found that the proportion of Greek women had greater experiences of difficulty (20 to 30%).

The exercise score could only be computed for the Caucasian elderly and the Japanese. Overall, the least active appeared to be Melbourne and Spata Greeks, especially the women, with only 10% defined as very active; except 40% of Spata men were defined as very active due to their farming activities. Anglo-Celtic and Swedish elderly appeared to be the most active with 40% being defined as very active. The Japanese elderly appeared to be moderately active (Figure 15).

The highest mean intakes of vitamin C were observed in the Anglo-Celtic and Greek Australians; none of the subjects had intakes below two thirds of the US RDA. About 5 to 10% of the Swedish elderly did not achieve two thirds of the US RDA. The Spata Greeks, followed by the Chinese and Japanese elderly, had the lowest mean vitamin C intakes. The Spata elderly had lower mean intakes than their counterparts in Melbourne, with 5 to 15% not achieving two thirds of the US RDA. In China, up to 40% of the elderly did not achieve two thirds of the US RDA.

Social factors
The largest proportion of elderly reporting to have someone to confide in were the Greek subjects (90%), followed by Anglo-Celtic, Swedish and Japanese elderly (80%), and lastly Filipino elderly (30%). However, when questioned about feeling lonely, the Greek elderly in Melbourne (especially women) reported the greatest frequency of loneliness (20%) whereas Anglo-Celtic and Filipino elderly were less likely to report feeling lonely very often. Similarly, less than 10% of the Swedes, Chinese and Japanese reported feeling lonely very often.

Lifestyle
Overall, sleeping disorders were reported more often by women (20 to 30%) than by men (5 to 15%). However, the duration of sleep exceeded six hours a night for about 80% of the elderly people.

The activities of daily living (ADL) score could only be computed in the Caucasian elderly. Men generally had lower average scores above 2.5. Women tended to have lower scores, but even here, the lowest score was 49 amongst the older Greek women in Melbourne.

The Greek and Anglo-Celtic women had the highest average WHRs (about 1.1) compared with Swedish (about 0.8) and Chinese women (about 0.9) and men. The men in all study communities had average WHRs between 0.9 and 0.95 (Figure 17).

Average body fat per cent ranged from 43 to 50% in women and from 25 to 35% in men. The Greek women in Melbourne had the highest mean percentage of body fat (48%), followed by Greek women in Spata (47%) and Anglo-Celtic women (45%). The Swedish, Chinese and Filipino women had about 43% average body fat. The Caucasian men all had average body fat percentage of about 33%. The Asian men appeared to have markedly lower average percentages of body fat (23%) (Figure 18).

Blood Lipids
Blood tests were only performed on Caucasian elderly. Average fasting plasma blood glucose was greatest amongst Greeks in Melbourne (6mmol/l), followed by Greeks in Spata (5.5mmol/l) and Anglo-Celtic and Swedish elderly (5.0mmol/l). Women tended to have higher values than men and the elderly tended to have higher values than their younger counterparts.

Intake of thiamin was particularly high amongst Anglo-Celtics and Swedes, with less than 5% not achieving two thirds of the US RDA. Average daily thiamin intakes were similar amongst the Greeks in Melbourne, the Chinese and the Japanese, with 10 to 20% not achieving two thirds of the US RDA. The Greeks in Spata had the lowest thiamin intakes, with 30 to 50% below two thirds of the US RDA (Figure 14).
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Body fatness
Greek women in Melbourne had the highest mean body mass index (BMI 30), followed by Greek women in Spata (BMI 29) and Anglo-Celtic women in Melbourne (BMI 27). The remaining Caucasian elderly of both genders had average BMIs of about 25. Filipinos and Chinese elderly had average BMIs between 20 and 22, the rural Chinese had the lowest BMIs of all study communities (BMI 19). Overall, the women tended to have higher BMIs than men, and the young elderly had higher BMIs than their older counterparts (Figure 16).

The Greek and Anglo-Celtic women had the highest average WHRs (about 1.1) compared with Swedish (about 0.8) and Chinese women (about 0.9) and men. The men in all study communities had average WHRs between 0.9 and 0.95 (Figure 17).

Average body fat per cent ranged from 43 to 50% in women and from 25 to 35% in men. The Greek women in Melbourne had the highest mean percentage of body fat (48%), followed by Greek women in Spata (47%) and Anglo-Celtic women (45%). The Swedish, Chinese and Filipino women had about 43% average body fat. The Caucasian men all had average body fat percentage of about 33%. The Asian men appeared to have markedly lower average percentages of body fat (23%) (Figure 18).

Blood Lipids
Blood tests were only performed on Caucasian elderly. Average fasting plasma blood glucose was greatest amongst Greeks in Melbourne (6.6mmol/ L), followed by Greeks in Spata (5.5mmol/ L) and Anglo-Celtic and Swedish elderly (5.0mmol/ L). Women tended to have higher values than men and the elderly tended to have higher values than their younger counterparts.
《國際營養科學聯合會（IUNS）的晚年飲食習慣的跨文化研究 —— 主要發現的評論 ——》

摘要
自1986年世界衛生組織（WHO）在印度海德拉巴（Hyderabad）舉行專題討論會，人們要求了解老年人營養與健康的問題更加迫切。Gary Andrew博士代表WHO在1986年發表了一份東太平洋老年人的社會與健康狀況的研究。儘管跨文化比較困難，但在社會因素和自覺健康指標方面已有重大的差異，這些差異說明了有必要在更大的國際範圍進行進一步的跨文化研究。

IUNS委員會在「營養與壽命」這個問題上，已開始用社會——人類學的方法去研究跨文化方面的營養與健康的問題，因而產生了一個「晚年飲食習慣」的研究項目。參加這個科研项目的團體不單調生物樣本的收集，只集中研究食物文化與健康的關係，是個受害者。從1988—1992年研究了澳大利亞、中國、美國、日本、菲律賓和瑞典等國家的13個老年社會，將結果集成書，該書把老年人的跨文化研究收集在一起，同時作為IUNS研究項目，考慮食物與健康的關係。這些研究包括歐洲老年人（EC SENECA）的研究，一個由本書營養與衛生研究所進行的，包括6個老年社會的獨特食物模式的研究，一個新西蘭——澳大利亞兩個社會的研究和一個中東的澳洲。IUNS的研究本身具有生態學調查及與此有關的局限性的特徵，但將研究重點集中在人類學和人類學上體現了一種優勢，因在第一次世界上得到的結果要任何單人種的結果好得多，IUNS研究在可變因素研究的範圍內是很好的，其中一些被研究的社區將繼續追蹤並獲得利益。

Reference
The IUNS cross-cultural study of ‘Food Habits In Later Life’- an overview of key findings


The IUNS Cross-Cultural Study of “Food Habits In Later Life” — an overview of key findings


攻撃育科学連合会（IUNS）の晩年飲食習慣の跨文化研究

—— 主要発見の評論 ——

抽象

自1986年世界衛生組織（WHO）の研究報告書（Hyderabad）において、人々が飲食と栄養を健康と病気の問題にどのように関与するか、この研究は重要です。

川野元洋博士（WHO）は1986年に初めて、世界のすべての社会が健康と病気の問題をどのように認識しているかについての研究を発表しました。ただし、この研究では、食生活の多様性を認識するための新しい視角を提供することができるでしょう。

IUNS委員会が「食と健康」に関する問題、すでに使用する社会——食と健康の方法を研究する跨文化研究の形態の関係を、そして発表した『晩年飲食習慣』の研究に関する取り組み。これらの研究は世界の老人（EC SENsECA）の研究、そして北京などに展開される研究が集まり、国際的に品質を向上させることが重要です。IUNS研究は科学的な方法を用いることに、特に人間の食生活と健康の関係については、科学的な観点から研究する必要がある。