



**FOOD SAFETY
AUTHORITY**
OF IRELAND



Recommendations for a national food and nutrition policy for older people



Nutrition



Recommendations for a
national food and nutrition
policy for older people



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FOREWORD

The nutritional needs of individuals change with lifestyle and over time. As children reach maturity and adulthood they no longer require nutrition for growth. Instead food and nutrition is needed to replace expended energy and to provide sufficient protein, fat, carbohydrate, vitamins and minerals as well as other essential components to meet the body's needs. With advancing age the ability to store nutrients declines, as do regulatory and recovery abilities. However, the nutritional requirements of the population aged over 65 years are diverse and are influenced by health, physiological function and susceptibility to disease.

Inappropriate food intake, chronic disease and functional impairment place a substantial number of older Irish people at high risk of malnutrition. Unrecognised or untreated malnutrition, including both over- and under-nutrition, can lead to disability, reduce the quality of life, increase morbidity and the need for health care and social services, and can contribute towards premature institutionalisation and early mortality.

This report on "Recommendations for a national food and nutrition policy for older people" provides information on the status of nutrition in our older population and on the common risk factors affecting this status. It relates nutrition to diseases and conditions experienced in the older population and outlines the benefits of adequate diet.

In order to be of practical use to health professionals and those caring for older people, the report sets out nutritional requirements and dietary guidelines as well as highlighting barriers that impede proper eating patterns.

A number of recommendations aimed at improving the nutritional status of our older population are made. Amongst these is a recommendation for the implementation of "Adding Years to Life and Life to Years: A Health Promotion Strategy for Older People" published in 1998 by the National Council on Ageing and Older People and the Department of Health and Children.

The interaction of adequate diet and healthy lifestyle has a strong influence on the wellbeing of this sector of society. Older people constitute a significant and growing proportion of the Irish population. In 1996, 413,882 people (11.4%) were over the age of 65. By 2011 the percentage is expected to increase to 14%. Consequently, the growth in the older population, particularly in the group 85 years and over, has far-reaching implications for nutritional policy.

Implementation of this policy can enable better health and will demonstrate that society values its older members.

*Ms Sheena Rafferty
Chairperson*

Food and Nutrition Policy for Older People Working Group

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EXECUTIVE SUMMARY

Background

The Irish population is ageing. In 1996, 11.4% of the population was over 65 years and this figure is expected to rise to 14.1% by 2011. There is an important relationship between nutritional status, diet and health status of the population. A need for optimum nutrition in this ever increasing population was identified. A Working Group was established by the Nutrition Sub-committee of the Food Safety Authority of Ireland to address the issue of nutrition and older people in Ireland.

For older people as for the general population, the maintenance of good health depends on safe, affordable and appropriate foods. Eating a balanced diet high in fresh fruit and vegetables and low in fat gives some protection against heart disease, stroke, some cancers, obesity and arthritis. In the developed countries most nutritional problems are related to eating too much but among older people, under-nutrition may also be a problem. Diet may be insufficient to provide adequate nutrition in certain circumstances (8).

Among the most common chronic diseases (including cardiovascular and cerebrovascular diseases, cancer, diabetes, osteoporosis and constipation) suffered by older people are those which are directly linked to a combination of inappropriate diet and unhealthy lifestyles. Inadequate intake of some vitamins and minerals are also particularly liable to occur among older people as they adopt more limited diets. This reduced vitamin and mineral intake can cause specific nutritional diseases or disorders (15) and early detection of poor nutritional status can assist in the treatment and/or prevention of many conditions.

Chronic geriatric diseases, physical and psychological disabilities and poverty are among the risk factors for older people developing malnutrition. Preventing this condition in at-risk groups can depend on providing home-delivered meals and assisting with food shopping and cooking, particularly for those who are confined to their own homes within the community. It is also important that vigilance is maintained with regard to feeding practices in nursing homes. Older people and their carers need to be aware of the risks of adverse effects of therapeutic drugs and alcohol on nutrition and professional advice should be sought as far as possible on optimal medication regimens.

As the size of the older population grows there is also an increase in the need for improved social structures, e.g. easy access to public transport, a health/medical system to assist those with ailing health and the necessary advice and ability to obtain a satisfactory nutritional status.

Early nutritional intervention can reduce the length of hospital stay for these older people following illness and in general can improve their overall health and well-being (98). Nutrition intervention has also been shown to be cost effective for the health care providers (99, 100).

The implementation of these recommendations requires commitment from several government departments and agencies. It is our hope that these recommendations on policy will provide the basis for the improvement of the nutritional status of older people in Ireland.

The Working Group on a Food and Nutrition Policy for Older People set out to:

- Examine the rationale for a food and nutrition policy for older people
- Develop food and nutrition guidelines for key people involved in the care of older people
- Consider the current provision of service for older people
- Make recommendations for the future development and implementation of a Food and Nutrition Policy for Older People.

Issues addressed

- Risk factors associated with the development of poor nutritional status and methods of nutritional assessment.
- Classification and consequences of poor

nutritional status.

- Nutritional requirements of the healthy older population including dietary guidelines.
- Supportive environments necessary to provide access to healthy food choices and thus promote a healthy nutritional status.
- Recommendations for the implementation of the policy.

Recommendations

Government action

Given the evidence to support the role of nutrition in promoting health and social gain for older people, the Department of Health and Children should take the lead role in co-ordinating action to improve the nutritional status of the older population. Communication between Government departments is required on matters relevant to food and nutrition for older people.

Structures exist and should be utilised to facilitate implementation of the recommendations in this document.

Specific resources should be allocated for the implementation of the recommendations in this document.

Implementation of policy

The Department of Health and Children should oversee the implementation of policy at national level. At local level, a co-ordinated

multi-agency approach should be taken and the policy should be implemented through the coordinators of services for older people in the health boards.

An evaluation strategy should be put in place by each responsible agency to assess whether the implementation of the policy is effective and appropriate.

Research

A national food and nutrition consumption survey specifically targeting the older population should be carried out. Ideally, this should become an integral part of on-going national nutrition surveys.

Research should be carried out to establish the prevalence of poor nutritional status in older people in Ireland and to identify those groups with specific nutritional deficiencies.

A validated nutritional assessment tool needs to be developed to facilitate the practical assessment of the nutritional status of older people.

The development of reference data for anthropometry and biochemistry for older people is urgently needed.

Recommended dietary allowances specifically for older people need to be researched and developed.

Research is required to investigate barriers that affect access to healthy food choices for older people.

The requirements of older people with specific poor nutritional status, e.g. dementia, should be investigated so that specific recommendations can be developed for these groups and their carers.

Dietary guidelines

The dietary guidelines outlined in this policy should be made available to older people so that they can be used as the basis for making healthy food choices. These guidelines will need to be reviewed on a regular basis taking into account the findings of scientific research.

Supportive environments

The recommendations outlined in the document *"Adding Years to Life and Life to Years: A Health Promotion Strategy for Older People"* (8) should be implemented. Recommendations include those for transport, income and housing, all of which affect access to healthy food choices by older people.

The retail sector should be encouraged to initiate and extend facilities provided for the older consumer particularly in grocer shops and supermarkets. Such facilities could include the wider availability of delivery services.

Caterers should be familiar with healthy eating guidelines. Catering training should include nutrition information relating to the specific needs of older people.

Community action

A nutrition health promotion programme for the specific needs of the older person should be developed and implemented at both national and local level. Community nutritionists/dieticians can facilitate this process in each health board in association with other service providers such as public health nurses and co-ordinators for services for older people.

Those providing community meals, e.g. day care centre workers and those preparing meals-on-wheels should be aware of the specific needs and preferences of the older person. Regular monitoring of the content of community meals should be undertaken in each health board area.

Practical easy-to follow food based dietary guidelines should be developed and made available to those caring and providing meals for older people. Family carers and those providing the Home Help service for older people should be encouraged to become familiar with the dietary guidelines for older people that are contained in this policy document.

In order to implement this policy it is essential that health professionals are educated in the principles of nutrition for older people. This will require an increased emphasis on nutrition education and recognition of the importance of nutrition as a scientific discipline in public health and medicine. In-service training should be provided on a continuous basis in association with services for older people in each health board and care facility.

Health services

A co-ordinated nutrition service for older people should be developed as a matter of urgency. It is recommended that all health boards should establish a dedicated Nutrition and Dietetic Advisory Service for older people. The Eastern Health Board provides a model of good practice in this area.

Acute hospital setting

Hospitals that specialise in age-related health care require a dedicated nutrition and dietetic service.

All acute hospitals should have formal access to nutrition and dietetic services for age-related health care for a specified amount of time.

Day hospitals for older people should have formal access to a specialist in nutrition and dietetics.

Long-term care

Formal access to nutrition and dietetic services should be provided for community hospitals and welfare homes to assist in the provision of therapeutic diets and nutritional support. This would facilitate the monitoring of menus regularly for nutritional adequacy and suitability to the individual needs of the older person.

Nutritional standards should be added by statute to the standards set in the Nursing Homes (Care and Welfare) Regulations, 1993 (S.I. No. 226 of 1993).

Primary health care professionals should have formal access to nutrition and dietetic services to assist them in supporting the acutely and/or chronically ill older people in the community.

Caterers in acute hospitals and long-term care facilities should become familiar with the specific nutritional needs of older people.

Developing personal skills

The implementation of this policy should include the development of groups and resources at local level that include older people themselves.

Dietary guidelines

The principle dietary guidelines for healthy older people are:

- A wide variety of foods, including those with high nutrient density should be eaten regularly.
- Energy intake should be balanced with physical activity.
- Starchy foods should be eaten throughout the day. For people with an acute and/or chronic illness with a limited appetite, intake of starchy foods should be modified to suit their individual needs. Excessive consumption of sugar dense foods should be avoided.
- For those who are healthy, four or more portions of fruit and vegetables should be eaten daily. People with an acute and/or chronic illness should modify their fruit and vegetable intake to suit their individual needs.
- An adequate intake of high fibre foods and fluids should be maintained.
- Meat, poultry and fish should be eaten regularly. Dairy foods such as milk, yoghurt and cheese should be eaten daily. For those with an acute and/or chronic illness, an increased intake of dairy foods may be recommended. Fortified milk should be consumed by all older people unless otherwise recommended.
- For those who are healthy, a moderate fat intake, with a mixture of fats should be included in the diet. For those who have an acute and/or chronic illness, fat intake should be modified to suit their individual needs.
- At least eight cups/glasses of fluids should be drunk each day.
- Enriched foods, fortified foods and dietary supplements should be used where specifically indicated for an individual but a nutritional assessment is required prior to such food modification. The use of dietary supplements should be reviewed regularly.
- Alcohol should be consumed in moderation.

CHAPTER 1 : INTRODUCTION

1.1 Background

The older population is growing worldwide in both developed and developing countries. In 1990, 13.7% of Europe's population was over 65 years and it is projected that by 2025, this proportion will have increased to 22.4% (1). In 1996, 11.4% of the Irish population was over 65 years of age and this percentage is expected to increase to 14.1% in 2011 (2). In Ireland in 1960, the life expectancy at birth was 68 years for males and 71 years for females whereas in 1995 life expectancy was 74 and 79 years respectively.

In Ireland the high birth rate in the 1970's (3) together with the increase in life expectancy indicates that the number of people aged over 65 is likely to increase from 393,000 in 1988 to 688,000 in 2025 (4). Also, due to the subsequent low birth rates from the early 1980's to date (5), the number of older people as a percentage of the total population is predicted to increase.

Social, economic, physiological and psychological factors and adverse health conditions may influence eating habits. Poor dietary intake and subsequent poor nutritional status can result in or exacerbate many conditions of ill health such as cancer, cardiovascular disease, diabetes, etc. As the population gets older, the prevalence of these diseases is also increasing.

1.2 Terms of reference and aims of the report

The Working Group on a Food and Nutrition Policy for Older People was established with the following terms of reference:

- To produce recommendations for a food and nutrition policy for older people in Ireland.
- To produce a policy document for the Nutrition Sub-committee of the Food Safety Authority of Ireland.

This report sets out to facilitate the development and maintenance of good health for older people through appropriate food consumption. The objectives are to:

- Attempt to ensure adequate food and nutrient intake
- Prevent poor nutritional status
- Avoid excessive food and nutrient intake which may predispose to several chronic diseases

To this end the Working Group set out to:

- Examine the rationale for a food and nutrition policy for older people
- Develop food and nutrition guidelines for key people involved in the care of older people
- Consider the current service provision for older people
- Make recommendations for the future development and implementation of a Food and Nutrition Policy for Older People.

CHAPTER 2 : RATIONALE FOR A FOOD AND NUTRITION POLICY FOR OLDER PEOPLE

2.1 Characteristics of the older population

With advancing age, reserve and storage capacities decline, as do regulatory and recovery abilities. While these characteristics are associated with all ageing people, these physiological changes depend substantially on individual conditions and environments. As with the total population, older people are a heterogeneous population with varying needs. Prior to reviewing the nutritional status and requirements of this sector of the population it is important to decide on what is meant by the term “older” and the relationship between age and nutritional status.

2.1.1 Age and demographic trends

The most commonly used definition of old age is based upon chronological age usually taking 65 years and over as a broad indicator, with pre-retirement age usually 55 - 64 years (6). Throughout this document the term that will be used for the population aged 65 years and over is “older people” with sub-categories as follows:

- ‘Young old’ who are aged between 65 and 74 years
- ‘Older old’ who are aged 75 years and over (7, 8).

An expansion in the older population is evident in Ireland with this section of the population increasing from 10.9% in 1986 to 11.4% in 1996 (9, 2). It is projected that this growth will continue in the period 1996-2011 when the proportion of the Irish population over 65 years is anticipated to reach 14.1% (10). While this expansion is expected throughout the older population, the largest increase is expected in the oldest age sub-group, i.e. those aged 80 years and over. The number of people in that age group is expected to increase from 79,000 in 1991 (2.2% of the total population) to 130,000 in 2011 (3.5% of the total population) which is an increase of almost two-thirds (10).

Approximately 91% of the population aged 65 and over in Ireland live in the community in private households (11). Of these free-living individuals, 26% live alone, of which 20% are male and 31% female.

As this older population increases, there is also an increase in the need for improved social structures, e.g. easy access to public transport, a health/medical system to assist those with ailing health and the necessary advice and ability to obtain a satisfactory nutritional status.

2.1.2 Nutritional needs of the older population

Older people represent a very heterogeneous population in terms of health, physiological function and susceptibility to disease. For any given physiological function, the distribution and heterogeneity of that function becomes more diverse as the population ages. Digestion, for example may decline at a slow rate in one older person but at a faster rate in another person of the same age. The age at which disability and increased susceptibility to infection occurs will be dependent upon the rate of decline of various physiological functions (12).

The nutritional needs of this group therefore, are varied and wide-ranging (13) and could be summarised as follows:

- Healthy older people - Those for whom the nutritional requirements are similar to younger adults with the exception of a number of specific vitamins and minerals.
- Acutely ill older people - Those for whom nutritional requirements have changed in response to the stress of an acute illness.
- Chronically ill older people - Those for whom dietary intakes may be inadequate and there is an increased need for specific nutrients.

Nutritional requirements of any one individual depend on a variety of factors. However, the health status of these individuals at any one

time will have a crucial effect on their nutritional requirements.

2.2 Health status

The health status of an individual depends on a variety of factors, e.g. level of physical activity, mental health, agility, etc. The health status of a given population is measured primarily using indices such as life expectancy, mortality and morbidity rates. Nutritional status of a given population is also an indicator of health status, although for older people nutritional status is not always easy to measure.

2.2.1 Life expectancy

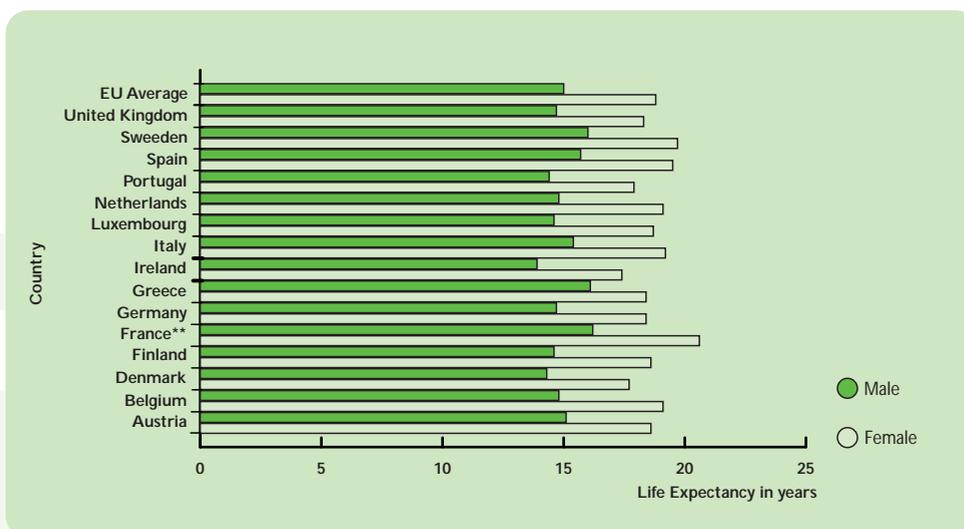
Over the last 4 decades life expectancy has steadily increased for both sexes aged over 60 years (Figure 2.1.). From 1950 to 1994 the life expectancy of women aged 65 increased by 4.1 years and the increase in life expectancy for men in the same age group was 1.8 years (14).

Figure 2.1. Life expectancy in Ireland for people aged 65 (1950 to 1994)

| | 1950-1952 | 1970-1972 | 1990-1992 | 1994 |
|--|--------------|--------------|--------------|--------------|
|  65 years | + 12.1 years | + 12.4 years | + 13.4 years | + 13.9 years |
|  65 years | + 13.3 years | + 15 years | + 17.1 years | + 17.4 years |

In 1994, life expectancy for both sexes aged 65 in Ireland was the lowest compared with all other countries in the European Union (Figure 2.2.) (8).

Figure 2.2. Life expectancy at 65 years for people in select EU countries, 1994



* all data for 1994 except Italy 1992, Spain 1993, EU Average 1992

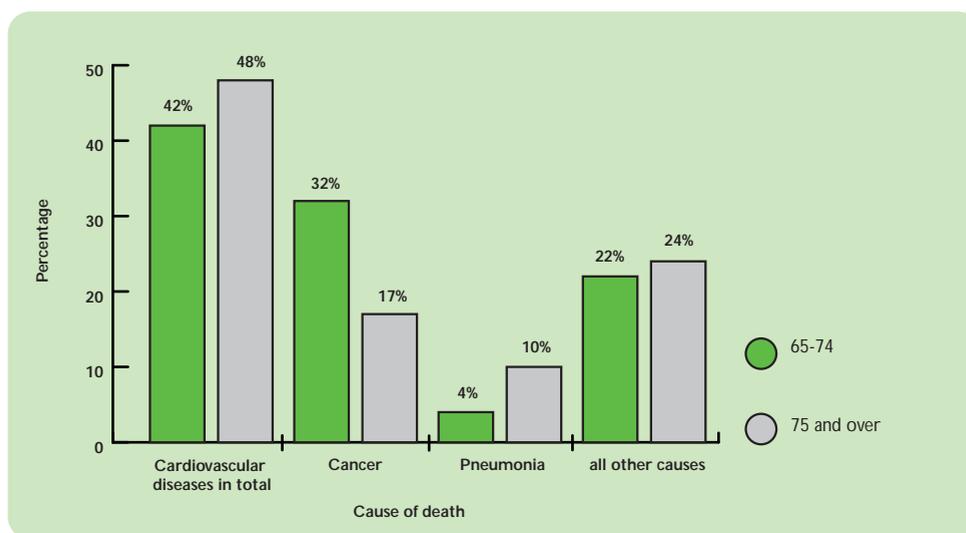
** Provisional data

Source: Demographic Statistics, Eurostat 1996. Adapted from National Council on Ageing and Older People, 1998 (8)

2.2.2 Mortality rates for older people in Ireland

The principle causes of death (Figure 2.3.) in people aged 65 and over in Ireland in 1997 were diseases of the circulatory system (including coronary heart disease, stroke and other cardiovascular diseases), cancer and pneumonia. Mortality resulting from these diseases accounts for 75% of all deaths in both the young old and the older old.

Figure 2.3. Death by principle cause in people aged 65-74 and 75+ in Ireland, 1997



* total figure including coronary heart disease, stroke and all other circulatory diseases

Source: Central Statistics Office, Ireland 1997 (2)

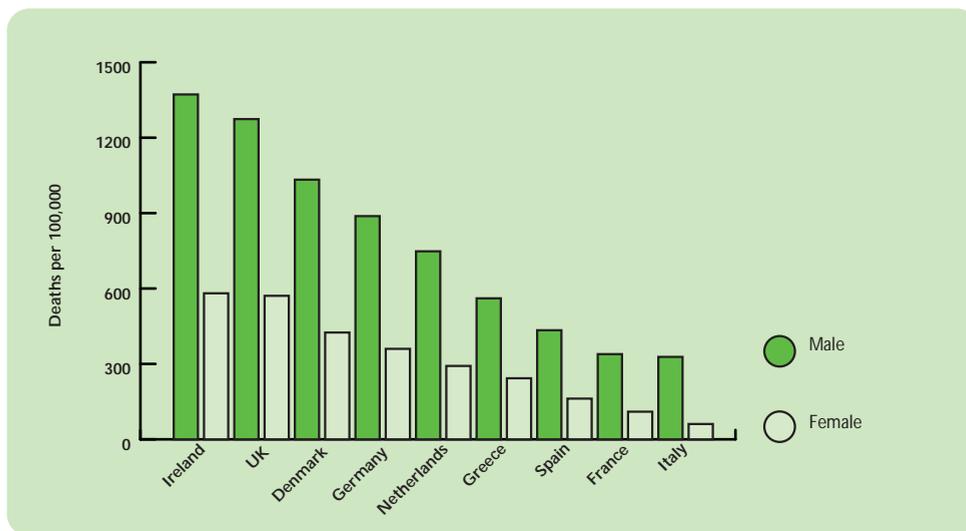
These figures follow the pattern of previous years, with (a) cardiovascular disease representing the most common cause of death in those aged 65 and over and (b) cancer representing the second most common cause of death in the same age group.

(a) Cardiovascular disease

The two principle cardiovascular diseases (CVD) in Ireland are coronary heart disease (CHD) and stroke. CHD is the major cause of death in both the young old and the older old age groups (26% and 24% respectively), and stroke is the cause of 7% of deaths in the young old and 11% in the older old.

Although the trend in CHD and stroke mortality has fallen (19% and 33% respectively measured from the early 1980s), death due to cardiovascular disease in this age group remains higher in Ireland than in other EU countries (Figure 2.4.) (8).

Figure 2.4. Deaths due to heat disease in people aged 65-74 in select EU countries



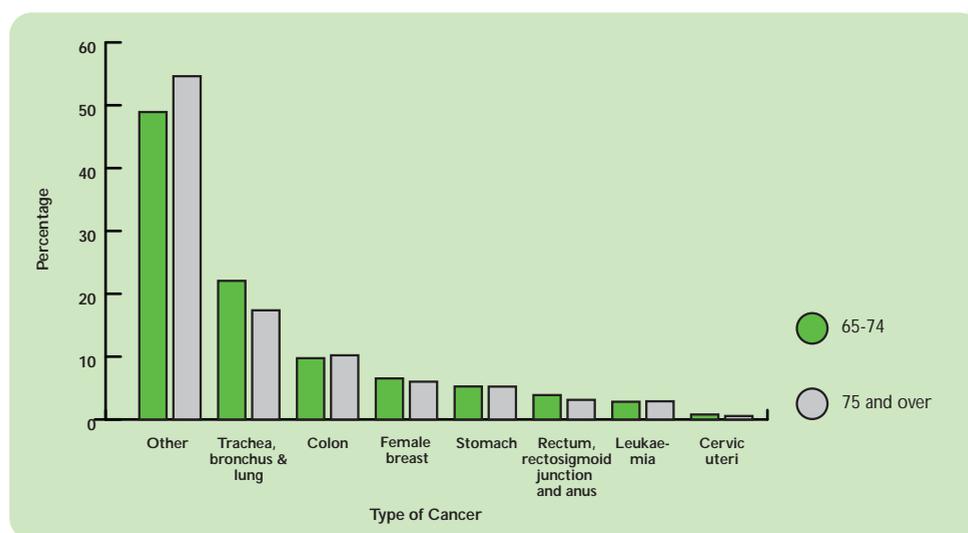
Source: World Health Statistics Annual, 1993 and 1994. Adapted from National Council on Ageing and Older People, 1998 (8)

(b) Cancer

The overall death rate from cancer in Ireland is increasing and is also above the EU average (8). This increase in mortality is principally in older people (71% of all cancer deaths in 1997 occurred in those over 65 years (2)), with trachea, bronchus and lung cancer presenting the main causes of cancer deaths (Figure 2.5).

Cancer is a multi-stage process with many inextricably linked causal factors such as lifestyle, genetic make-up, diet, environment etc. Evidence of contributory factors for the emergence of each stage of carcinogenesis is regularly emerging and a wide variety of dietary factors may influence each stage of the process.

Figure 2.5. Proportion of deaths due to various types of cancer, Ireland 1997



Source: Central Statistics Office, Ireland 1997 (2)

Among the most common chronic diseases (including cardiovascular and cerebrovascular diseases, cancer, diabetes, osteoporosis, constipation) older people suffer from are those which are directly linked to a combination of inappropriate diet and unhealthy lifestyles. Inadequate intake of some vitamins and minerals are also particularly liable to occur among older people as they adopt more limited diets. This reduced vitamin and mineral intake can cause specific nutritional diseases or disorders among older people (15) and early detection of poor nutritional status can assist in the treatment and/or prevention of many conditions.

2.3 Nutritional status

Nutritional well-being is influenced by the nutrient content of foods consumed relative to requirements that are determined by age, sex, level of physical activity and health status, as well as the efficiency of nutrient utilisation by the body. Factors such as mental activity, social interactions and socioeconomic conditions also influence nutritional status. Across the population spectrum, ensuring an optimum nutritional status by meeting nutritional needs is essential for healthy ageing (16).

A diet is adequate when it provides sufficient energy, protein, fat, carbohydrate, micronutrients (vitamins and minerals) and other essential components, including dietary fibre to meet the body's

needs in a balanced and diversified manner. If intakes are too low, nutritional deficiencies may occur, e.g. anaemic and non-anaemic iron deficiency and osteomalacia due to Vitamin D deficiency. On the other hand, if intakes are excessive, other nutrition-related problems may arise, e.g. the development of overweight/obesity if more energy is eaten in the diet than is used for growth and activity. Adequate nutrient intakes are needed to meet energy expenditures of metabolism, physical and mental activity and also in response to disease and growth (17).

A number of risk factors (see 2.3.2) have been highlighted among the older population which potentially compromise their nutritional status (18) and may play a role in the development of debilitating diseases. By identifying such risk factors it should be possible to target individuals or groups who may be susceptible (19), with a view to preventing and treating poor nutritional status.

2.3.1 Nutritional assessment

Nutritional assessment can identify both those with a poor nutritional status and also those who are at risk of developing a poor nutritional status. Several methods of assessment are available to measure a patient's nutritional status including anthropometric and biochemical measurements and evaluation of dietary intake.

- Anthropometric measurements consist of body weight, height and skinfold thickness. As ageing affects body shape, size and composition, obtaining skeletal size from height alone is unsatisfactory and similarly skinfold thickness measurements only offer a rough guide to body fatness (16). Body mass index (BMI) is a ratio of weight (in kilograms) over height (in metres squared) and can be used as a simple indicator of overweight or underweight (20).

The following classification system for BMI is very widely used:

| BMI (kg/m²) | Class |
|-------------------------------|--------------|
| <20 | Underweight |
| 20-25 | Ideal range |
| 25-30 | Overweight |
| >30 | Obese |

Source: Webb and Copeman, 1996 (16)

The underlying assumption when using BMI to indicate body fatness is that differences in weight for any given height are largely due to differences in body fat content. Loss of height with age and an increase in the fat to lean ratio in older people may make the use of the standard classification system for BMI less reliable (16). The most appropriate measurement of height for this age group is that of the demispans (distance from the web of the fingers to the sternal notch when the subject's arm is held horizontally to the side), armspan or knee height (7, 21).

As a single parameter BMI cannot be diagnostic of malnutrition, but it is a useful adjunct to other anthropometric and biochemical measurements in nutritional assessment and may be used in screening programs for undernutrition in older people (21).

- Biochemical measurements - Many assays, e.g. serum albumin, transferrin and micronutrients, are used for the measurement of tissue, serum and plasma proteins, vitamins and minerals. They are generally sensitive indicators of nutritional status. These measurements however, may be influenced by factors other than nutritional status such as medical condition and age (22) and they are also quite labour intensive and expensive.
- Dietary intake - A range of methods is

available for the evaluation of dietary intake. Past intake may be assessed by interview or questionnaire and present intake by records at the time of eating. Either approach may be qualitative or quantitative (23), however all the methods of dietary intake measurement are subject to error and uncertainties (16).

Simple assessment tools have recently been developed to assist in the detection of poor nutritional status in the older person (24, 25, 26, 27), e.g. the Mini Nutritional Assessment. This was developed by Guigoz *et al.* (28) and consists of 18 simple and rapid-to-measure items. It involves anthropometric assessment, general assessment, dietary assessment and subjective assessment. The results categorise older patients as: (i) well nourished; (ii) at risk for malnutrition; or (iii) malnourished. Simple tools such as these can facilitate the design of appropriate and relevant nutrition interventions to improve the nutritional status of older people.

In the older person however, assessment is fraught with difficulty (29). Currently no gold standard exists which is practical, efficient, valid and reliable enough to warrant routine use in the Irish clinical or community geriatric assessment setting. Careful interpretation of information gained from any assessment is of paramount importance to the usefulness of results (30).

2.3.2 Classifications of poor nutritional status

Poor nutritional status may be observed in the presence or absence of disease states. Lack of interest in food, reduced taste acuity, poor food choice and psychiatric morbidity all contribute to this condition (31) (see 2.3.3). Davis (32) suggested four main classifications of poor nutritional status which generally affect the older person. They are distinct, yet are often interrelated and comprise long-standing, recurrent, sudden and specific:

Long standing - Some people exhibit long latent periods between the onset of nutritional deficiency and its clinical appearance. This is generally due to a combination of circumstances, e.g. social isolation, depression, undiagnosed disease or limited income reducing nutrient intake (33). Over a prolonged period of time body nutrient stores become depleted, placing the individual at risk of developing poor nutritional status (34).

Recurrent - In some cases there is a repeated return to a poor nutritional status which is accompanied by a reduced resistance to disease. This recurrent class of poor nutritional status is often associated with co-existing medical disorders (19) and repeated hospital admissions (35).

Sudden - Sudden occurrence of poor nutritional status is usually related to acute medical or social stress. Research has shown that bereavement may contribute to a poorer quality diet and reduced energy intake (36). Hip fracture may result in sudden reduced nutrient intake and weight loss (37).

Specific - This includes the occurrence of deficiency diseases and nutrition related conditions, e.g. arthritis, cognitive impairment, constipation, diabetes, dysphagia, macular degeneration/cataract, osteoporosis, cardiovascular diseases, obesity or underweight and wound healing. These are considered in more detail in section 2.4.

2.3.3 Identifying risk factors associated with poor nutritional status

Many studies have been performed on the nutrition of older people in order to distinguish relevant risk factors (19, 13) (Table 2.1).

These factors are often interrelated and are rarely seen in isolation.

Table 2.2. Summary of common risk factors affecting nutritional status

| | |
|------------------------------------|--|
| Being housebound/institutionalised | Chronic ill health |
| Socio-economic status | Polypharmacy |
| Social isolation & loneliness | Physiological ageing |
| Psychiatric morbidity | Cognitive impairment/deterioration |
| Poor dentition | Service provision factors (see Table 2.3.) |

Source: Lipschitz, 1991 (19), Web and Copeman, 1996 (16)

Homebound or long term care residents - Nutritional deficiencies have been observed more frequently in long term care residents than in an independent population (34, 18, 13, 38).

Socio-economic status - Lack of education, income and adequate facilities to prepare food have been identified by a number of researchers as predisposing the older independent person to decreased nutrient intake (39).

Social isolation and loneliness have both been shown to predispose to poor quality diets and low energy intake (40, 36, 39).

Psychiatric morbidity - In patients with depression or dementia, apathy, general unhappiness, low morale, forgetfulness, inability to prepare food, low energy levels and loss of appetite may all directly affect nutritional status (41).

Poor dentition may reduce the intake of foods which could lead to an inadequate intake of fibre and protein (42).

Chronic ill health and multiple diseases can contribute to under-nourishment. This contribution could be due to increased requirements or interference with uptake and/or utilisation of nutrients, which may be secondary to disease processes or medication (34, 38).

Polypharmacy (the use of several prescribed and/or non-prescribed drugs at the same time) may interfere with the absorption and metabolism of essential nutrients among older individuals (42) placing them at risk of developing a poor nutritional status (43).

Physiological ageing and age per se, result in the gradual loss of efficiency of many body systems, (decreased taste acuity, gut motility etc.) which can directly affect food intake, absorption and utilisation (42, 31).

Cognitive impairment/deterioration can be contributed to or be exacerbated by nutritional deficiencies (44).

Table 2.3. Service provision factors affecting nutritional status in older hospital patients (or clients in residential and nursing homes)

| |
|--|
| • In many hospitals, the serving of meals is not timed appropriately, leading to long enforced fasts throughout the day. |
| • Prolonged holding of food prior to serving leads to deterioration of both nutritional quality and palatability. |
| • Inherently unappetising food and limited choice. |
| • Providing patients with portions of food that are insufficient for their needs due to staff underestimation. |
| • Food wastage not monitored or recorded by staff and so very low intakes are not recognised early. |
| • Inadequate amount of time allowed for slow eaters to finish their meals. |
| • Lack of staff help and/or feeding aids for those who need help with eating. |

Source: adapted from Webb and Copeman, 1996 (16)

The early identification and treatment of poor nutritional status could reduce the risk of disease complications and reduce the length of hospital stay (27).

2.3.4 Incidence of poor nutritional status

In Ireland, there is a paucity of data available. The 1990 Irish National Nutrition Survey (INNS) revealed that for all nutrients except vitamin D and folate, the diet of the total healthy Irish population was nutritionally adequate (45). However, there is little data available on dietary intake that is specific to the older population. A number of studies have been carried out in other countries, indicating the nutritional status of older people and Tables 2.4. to 2.7. outline the findings of these studies.

For ease of comparison, the studies have been divided into those carried out on:

- Institutionalised older people in nursing homes and long term care settings (Table 2.4.)
- Older people in the acute hospital setting (those recently admitted to acute hospital setting where the duration of stay does not exceed 150 days) (Table 2.5.)
- Homebound older people (Table 2.6.)
- Free-living older people (Table 2.7.)

Table 2.4. International studies indicating poor nutritional status in institutionalised older people

| Country of research | Paper title and reference | Key results |
|---------------------|--|---|
| USA | Factors associated with low body mass index and weight loss in nursing home residents (46). | Poor oral intake, eating dependency, decubiti and chewing problems increase the likelihood of both low BMI and weight loss. Undernutrition in nursing home residents is a multifactorial syndrome. |
| USA | Malnutrition in the institutionalised older adult (47). | Ten to 85% of older adults residing in long-term care settings are malnourished. |
| UK | A study of nutritional deficits of long-stay geriatric patients (48). | All of the elderly long-stay hospital patients consumed < 2/3 RDA for vitamins D, E, B ₆ and folic acid, while most were also consuming < 2/3 RDA for magnesium, dietary fibre, retinol, iron and pantothenic acid. Over half of these subjects had a diet deficient in energy when levels of physical activity were taken into account. |
| France | Antioxidant vitamins in hospitalised elderly patients: analysed dietary intakes and biochemical status (49). | The study highlights low antioxidant vitamin intakes, particularly vitamins E and C and an important proportion of low blood vitamin C and beta-carotene concentrations in hospitalised elderly women. |

Table 2.5. International studies indicating poor nutritional status in older people in the acute hospital setting

| Country of research | Paper title and reference | Key results |
|---------------------|---|---|
| Ireland | Personal communication (50). | From 218 acute hospital patients surveyed, 16% had a BMI below 20 and 10% were malnourished. |
| Ireland | The identification and assessment of under nutrition in patients admitted to the age related health care unit of an acute Dublin general hospital (26). | Mean BMI below 19.2, albumin below 34g/l and underweight was observed in half of the patients in an acute hospital setting. |
| Norway | Reduced nutritional status in an elderly population (>70 years) is probable before disease and possibly contributes to the development of disease (51). | Intake of vitamins and trace elements < 2/3 of the US RDAs was more common in the hospital group (recently hospitalised) when compared with the home living group. |
| Sweden | Nutritional status in recently hospitalised and free-living elderly subjects (52). | Low nutritional indices are a common occurrence in elderly subjects recently admitted to hospital and undernutrition is related to the nature of the disease rather than age. |

Table 2.6. International studies indicating poor nutritional status in homebound older people

| Country of research | Paper title and reference | Key results |
|---------------------|--|---|
| USA | Dietary characteristics and nutrient intake in an urban homebound population (53). | Mean intake of energy, folic acid and calcium was below the RDAs for both men and women, and intake of thiamin was below the RDA for men. Nutrient intake failed to meet the RDAs for nine leader nutrients in 40-80% of the sample population. |
| USA | Nutritional status of urban homebound older adults (38). | This study found a high prevalence of undernutrition in urban homebound older adults. 54% consumed < 75% of their energy needs, 38% consumed < 75% of their protein needs, 29% of the women and 63% of the men had BMI below 24, indicating that these subjects were underweight. |
| USA | Vitamin D deficiency in homebound elderly persons (54). | Despite a relatively high degree of vitamin supplementation in the USA, homebound elderly persons are likely to suffer from vitamin D deficiency. |

Table.2.7. International studies indicating poor nutritional status in free living older people

| Country of research | Paper title and reference | Key results |
|---------------------|--|--|
| Ireland | Assessment of the nutritional status of rural and urban elderly people living at home (55). | Nutritional inadequacy exists in both rural and urban subjects studied. Dietary intake of both subject groups is inadequate when compared to 80% of RDA for elderly Irish subjects. |
| Ireland | Personal communication (50). | In this study 47 patients aged 65 and over, attending three general practitioners were nutritionally assessed. Within this group, 15% were classified as underweight (BMI<20) and 18% were classified as obese (BMI>30). |
| USA | What is the nutritional status of the elderly (56)? | The percentage of people with vitamin and mineral intakes below 2/3 of the RDA was common. Low nutrient intakes included those of vitamins A, D, thiamin, riboflavin, folic acid, calcium and zinc. |
| USA | Nutritional risk in New England elders (57). | 41.5 % of subjects were overweight and mean dietary lipid intakes were considerably above recommended levels. 16% were underweight; mean dietary calcium levels were low and about 28% of older individuals failed to consume adequate levels for three or more key nutrients. |
| Italy | Nutritional intake, socio-economic conditions, and health status in a large elderly population (58). | 90% of older people examined showed inadequate intake of thiamin and vitamin B ₆ , 30-40% demonstrated deficiencies of vitamin A, vitamin C, niacin, vitamin B ₁₂ , calcium and iron, while only 10% had inadequate intake of protein. |
| Finland | The nutritional status of Finnish home-living elderly people and the relationship between energy intake and chronic diseases (59). | Energy intake in women was low compared with the Nordic Nutrient Recommendation. The intakes of vitamins and minerals met the recommendations, except for those of folic acid and zinc. |
| Canada | Folate and vitamin B ₁₂ status of the elderly (60). | Probability analysis of dietary intake revealed an appreciable number of subjects at risk of deficiency of vitamin B ₁₂ and also of folate deficiency. |

2.4 Nutrition related diseases and conditions

2.4.1 Relationship between diet and chronic non-infectious diseases

Diet alone does not cause diseases such as cardiovascular disease, cancer, diabetes mellitus, etc. but it is a contributory factor in conjunction with environmental and genetic influences (61).

Among the most common chronic diseases older people suffer from are those which are directly linked to a combination of inappropriate diet and unhealthy lifestyles. These chronic diseases include cardiovascular and cerebrovascular diseases, cancer, diabetes and osteoporosis. Inadequate intake of some vitamins and minerals are also particularly liable to occur among older people as they adopt more limited diets and these inadequate intakes potentially cause specific nutritional diseases or disorders among older people (17).

The following section outlines the relationship between a variety of diseases and nutrition.

(a) Cardiovascular diseases (including CHD and stroke)

A variety of risk factors are known to contribute to the development of cardiovascular disease. Increasing age, smoking, physical inactivity and other factors

(see below) are known to play a role and many of these are interrelated. In addition many have been identified as nutrition related.

Risk factors contributing to the development of CVD:

- **Plasma total cholesterol, triglyceride levels and fat intake** - Numerous epidemiological and clinical studies have demonstrated a strong, continuous and positive relationship between plasma total cholesterol and risk of CHD. Cholesterol is transported around the body primarily by lipoproteins, of which high density lipoprotein (HDL) and low density lipoprotein (LDL) are the two principle forms. The relationship between plasma total cholesterol and risk of coronary heart disease resides mainly in the LDL fraction. Several large prospective studies and intervention trials have indicated that high LDL concentration and/or low HDL concentration represent an independent risk for CHD. Extensive evidence has also shown that replacement of saturated fatty acids in the diet by polyunsaturated fatty acids is associated with reduced coronary risk (62).
- **High blood pressure** - Epidemiological studies have consistently identified an important and independent link between

high blood pressure (hypertension) and various disorders, especially CHD, stroke, congestive heart failure and impaired renal function. Hypertension is more common in people aged 65 years or more. In absolute terms, hypertension is a much greater risk factor for cardiovascular events in older people than it is in young people (63).

High blood pressure increases the heart's workload causing it to enlarge and weaken over time (64). High blood pressure is the main risk factor for stroke, with obesity, alcohol intake and excess salt intake playing major contributory roles (65, 16). In 1988 the Intersalt Study (66) (an interpopulation study involving 10,079 men and women in 52 centres from 32 countries) assessed the role of obesity, alcohol and mineral intake in determining the progressive rise in blood pressure seen with age in most countries. A high BMI and high alcohol intake had strong, independent effects on blood pressure:

- *Obesity and overweight*

Excess body weight increases the workload of the heart and is directly linked with CHD because it influences blood pressure, blood cholesterol and triglyceride levels and increases the likelihood of developing diabetes (64). Non-insulin-dependent diabetes mellitus is two to three times as frequent in hypertensive

populations than it is in non-hypertensive populations (63). Excess fatness in adults causes metabolic changes which increase the risk of cardiovascular and other diseases (67).

- *Excessive alcohol intake*

Excessive alcohol intake can raise blood pressure, and contribute to obesity, raised triglyceride levels, cancer and other diseases. It can contribute to the development of heart failure and stroke (64).

- *Minerals*

There is evidence that dietary sodium intake, principally from common table salt, is important in determining levels of blood pressure and in particular the rise in blood pressure with age (67). Other minerals measured e.g., potassium and magnesium, seemed to play a beneficial role in limiting the rise of blood pressure and are readily found in diets rich in complex carbohydrates, which also contain a variety of other minerals that were not studied (65).

- **Diabetes mellitus** – This condition is the failure to maintain the concentration of blood glucose within the normal range. In an adult population uncontrolled diabetes mellitus is associated with a large excess risk of CVD (67). There is a very strong correlation between obesity and developing diabetes and the risk of

developing this condition in adults with BMI over 30 is five times greater than that of adults with BMI less than 25 (23). Even when glucose levels are under control, diabetes seriously increases the risk of heart disease and stroke (64).

- **Homocysteine** - Levels of the amino acid homocysteine increase with age (68) and current research has identified the importance of the relationship between homocysteine and CVD (68, 62). There is a growing recognition that high levels of homocysteine are associated with an increased risk of heart disease. Blood homocysteine levels are inversely related to intake and blood concentration of folate, vitamin B₁₂ and vitamin B₆ (69, 62).
- **Haematological balance** - This is the balance between the forces that cause blood to solidify or to remain fluid (70). Prospective epidemiological studies have established an association between disturbances of the haemostatic balance and the occurrence of coronary events. The dynamic response of the haemostatic system to physical exercise, dietary fatty acids and other environmental factors remain to be further investigated (62).
- **Antioxidant nutrients** - Epidemiological studies have found that low plasma levels

of vitamins C and E, and diets low in fruit and vegetables, are associated with a higher risk of CHD (67). The possible protective effect of antioxidant vitamins towards CHD is subject to ongoing research.

(b) Cancer

There is a large body of evidence pertaining to the relationships between diet and human cancer. However, partly because of the poor quality of many studies and partly because of a lack of data on mechanisms postulated to act in humans, the value of the data is limited (71).

Fat, fibre and the anti-oxidant vitamins are the nutrients most frequently studied with respect to their relationship to cancer development. Several prospective studies have however failed to show an association between dietary fat and breast cancer, while some evidence suggests that diets low in fibre but rich in saturated fats may contribute to the risk of colon cancers. Current evidence would strongly suggest that an increased intake of antioxidant vitamins through foods, as opposed to supplements, would considerably help to reduce the incidence of certain cancers in Ireland. At present the intake of fruit and vegetables in Ireland is half that of the Mediterranean countries (72), where there is a very high known intake of fruit and vegetables rich in antioxidants, and a much lower incidence of cancer.

(c) Diabetes

Type I (insulin dependent) diabetes mellitus usually develops in childhood. It is caused by autoimmune damage resulting in an inability of the body to produce enough insulin. This results in raised blood glucose levels and those affected by Type I diabetes require insulin replacement therapy for life. Type II non-insulin dependent diabetes mellitus (NIDDM) is prevalent in older people and those affected by this condition demonstrate a progressively inadequate insulin production or an inability to adequately use the insulin that is produced (73). Treatment typically includes diet control, exercise, home blood glucose testing and in some cases, when these measures are not enough to bring blood sugar down near the normal range, oral medication (pills) and/or insulin shots are required (73). Obesity has long been accepted as a major precipitating factor in the development of Type II diabetes where the risk is related to both the duration and the degree of obesity (74).

(d) Constipation

Constipation is defined as the passage of hard stools less frequently than normal for a particular individual (16). It is the most common disorder of the gastrointestinal tract in older people (75). A common cause of constipation is a diet low in fibre which can be found in vegetables, fruits and whole grains and a diet high in fats found in cheese, eggs and

meats. People who eat plenty of high-fibre foods are less likely to become constipated. Liquids like water and juice add fluid to the colon and bulk to stools, making bowel movements softer and easier to pass. People who have problems with constipation should drink enough non-alcoholic fluids every day (76).

(e) Dysphagia

The term dysphagia means difficulty with the swallowing process. The incidence and severity of swallowing problems increase with age and older people with dysphagia are at a high risk of developing poor nutritional status. Traditionally, individuals with dysphagia are placed on modified textured diets. In most cases, from this time onward, total food intake decreases (77).

(f) Cognitive impairment/Dementia

Loss of cognitive function is a feature of the ageing process. It has been shown that mild or sub-clinical vitamin deficiencies play a role in the pathogenesis of declining cognitive function in ageing (78). Research by several authors has highlighted low levels of folate, vitamin B₁₂ and B₆ as significant in relation to impaired cognitive function (79, 88, 78, 44).

(g) Osteoporosis

Osteoporosis is characterised by low bone density and destruction of bone architecture, leading to increased bone fragility and increased risk of fracture (81). Bone loss in osteoporosis accounts for the high incidence of fractures of waist, hip and spine (82) in older people. Factors identified in the development of osteoporosis include insufficiency of calcium, vitamin D and lack of exercise resulting in bone resorption (83).

(h) Arthritis

Arthritis is a chronic inflammatory disease process that affects the joints. In arthritis sufferers the associated reduced mobility in addition to certain specific medication requirements can interfere with nutritional intake (84).

(i) Gallstones

Gallstones or biliary calculi are by far the most common biliary disease and the only one in which there is evidence for a role of the diet. In developed countries most gallstones (> 70%) are rich in cholesterol and most of them also contain calcium salts, chiefly carbonate, phosphate, palmitate or bilirubinate. About one third of gallstones are composed mostly of such salts and the proportion of these calcium rich stones increases with age (23).

The strong links between obesity and gallstones encourage the belief that overeating is a key

factor in their development. Evidence for specific eating habits or dietary components causing gallstones is inconclusive (23).

(j) Wound healing and immune function

One of the most common problems encountered by older patients is a delay in the efficiency of wound healing (85). Sub-optimal stores of protein, zinc, vitamin A and vitamin C have been associated with poor wound healing. Increased susceptibility to infection and certain cancers (86) in old age may be related to declining immune function and adequate protein and micronutrient intakes are essential to maintaining immune function.

(k) Macular degeneration and cataracts

Age-related macular degeneration (AMD) and cataracts are the leading cause of irreversible blindness among people aged over 65 years (87, 88). Nutrition and lifestyle factors are emerging as two components which may prevent or reduce the likelihood of the onset of these diseases (89). Research indicates that those with low dietary intakes of vitamin C have an increased risk of developing cataracts relative to those with a high intake (88). Research by Seddon *et al*, (1989) (88) also suggests that an increase in vitamin C intake may reduce the risk of developing AMD.

(l) Obesity

A BMI of more than 30 indicates obesity (see section 2.3.3) and maintaining a healthy weight is important irrespective of age (90). Being overweight is generally associated with the 'young old' population (91), and combined levels of overweight and obesity are also high among this age group (16). Appendix I shows centiles for ideal body weight for older people.

(m) Underweight

With advancing age (75 years and over) the prevalence of underweight is higher than the prevalence of obesity, with a significant minority of this group being underweight (16). Being underweight in this particular age group is associated with nutrient deficiency, increased risk of hip fracture, infection and mortality (92).

2.4.2 Incidence of nutrition related diseases and conditions in Ireland

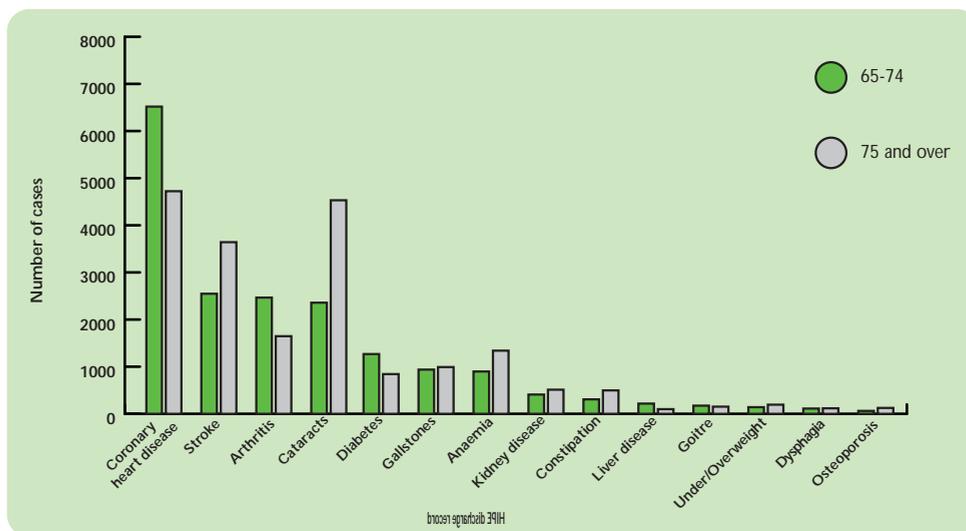
It is difficult to draw any firm conclusions to the question of trend in morbidity among older people in Ireland as suitable data is not available. Bearing this lack of data in mind, that collected by the Hospital In-Patient Enquiry Scheme (HIPE) and the National Cancer Registry combined give an indication of the prevalence of some conditions in older people.

a) Hospital In-Patient Enquiry Scheme

In Ireland, the HIPE Scheme is a computer based health information system designed to collect medical and administrative data, i.e. discharges and deaths from acute hospitals (short stays in acute hospitals). Each HIPE discharge record represents one episode of care. The records therefore facilitate analyses of hospital activity rather than incidence of disease, but in doing this they provide an indication of the prevalence of a particular disease within specified criteria.

Figure 2.6. shows HIPE cases recorded in 1997 (93) for patients in age groups 65-74 years and 75 years and over, indicating diseases of the circulatory system, dysphagia, cataracts, diseases of the bones and joints and diabetes as the most recorded cases. It should be noted that the data outlined in Figure 2.6. does not include incidence of cancer as these figures are gathered by the National Cancer Registry and are outlined in Figure 2.7.

Figure 2.6. Selected HIPE cases for people 65-74 and 75+ in Ireland, 1997

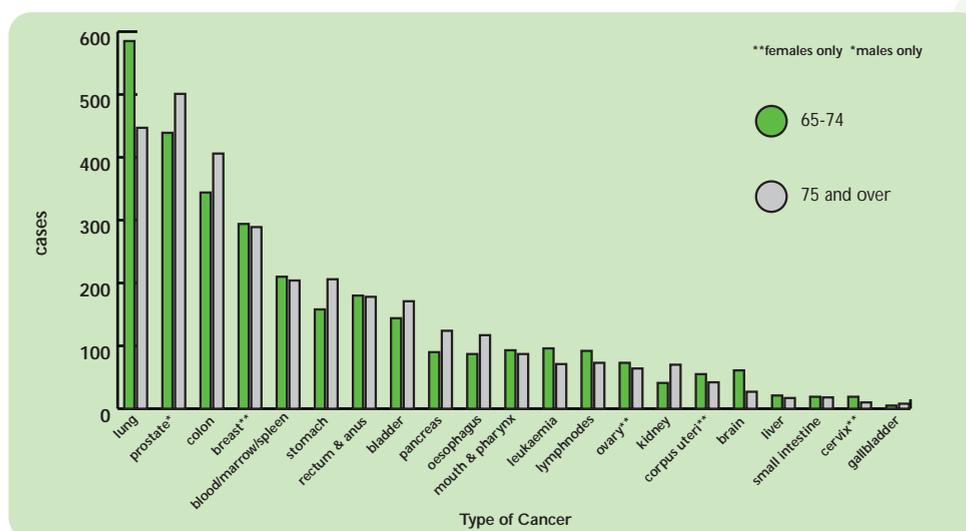


Source: ESRI 1999 (93)

b) National Cancer Registry

The National Cancer Registry of Ireland has been collecting comprehensive cancer information for the Republic of Ireland since 1994. The information collected is used in research into the causes of cancer, in education and information programmes and in the planning of a national cancer strategy to deliver cancer care to the whole population (94). Figure 2.7. presents the data for the older population in age groups 65-74 years and over 75 years, as recorded in 1995. For reasons of clarity, skin cancer cases are not included in Figure 2.7. The remaining most prevalent types of cancer in these age groups are lung cancer, prostate, female breast, blood/marrow/spleen cancers and cancer of the digestive system.

Figure 2.7. Registered cases of cancer in people 65-74 and 75+ in Ireland, 1995



Source: NCR 1998 (94)

2.5 Benefits of an adequate nutritional status

A satisfactory nutritional status is of paramount importance in establishing a good quality of life, particularly for older people (19). Food and eating can give a routine to the day and promote regular social interaction (84) while poor nutritional status can precipitate the development of both chronic and acute conditions which naturally can increase morbidity and mortality as well as prolonging the length of hospital stay (95, 96, 51, 97).

In contrast, early nutritional intervention can reduce the length of hospital stay for these older people following illness and in general can improve their overall health and well-being (98). Nutrition intervention has also been shown to be cost effective for the health care providers (99, 100).

CHAPTER 3 : NUTRITIONAL REQUIREMENTS AND DIETARY GUIDELINES

3.1 Introduction

For older people as for the general population, the maintenance of good health depends on safe, affordable and appropriate foods. Eating a balanced diet high in fresh fruit and vegetables and low in fat gives some protection against heart disease, stroke, some cancers, obesity and arthritis. The 1990 INNS (45) and the 1992 Kilkenny Health Project (102) both revealed unbalanced diets in their study populations. The Happy Heart Communities Survey (101) also revealed unsatisfactory diets in middle aged people, especially with regard to fruit and vegetable intake. Since dietary patterns are carried over into older age, it is probable that the diet of many older people is also less than optimal. In the developed countries most nutritional problems are related to eating too much or to an unbalanced diet. Among older people, under-nutrition may also be a problem (8).

3.2 Current recommended dietary allowances

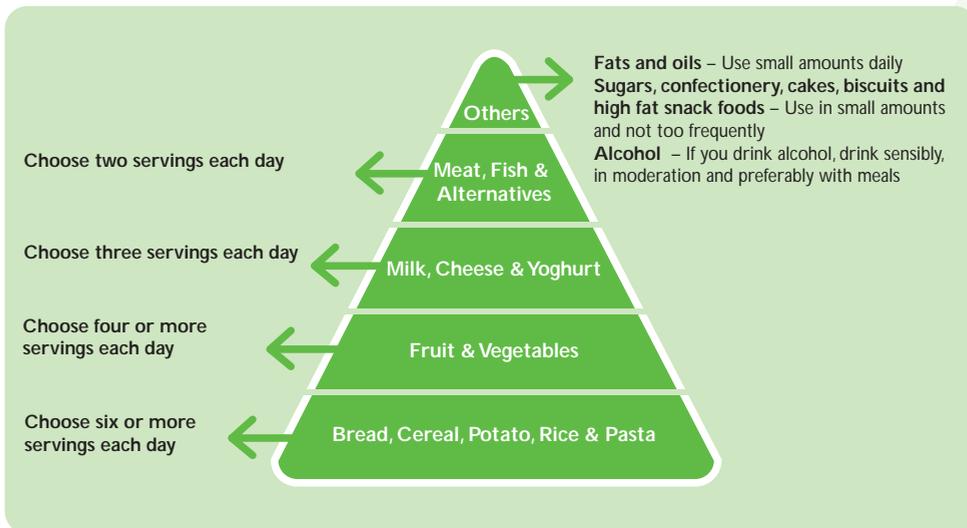
The Irish recommended dietary allowances (RDAs) have recently been updated (103) (see Appendix II). With the exception of energy and vitamin D, specific recommendations for different subgroups of older people have not been included. As in the USA (104), the EU (105) and the UK (106), specific dietary recommendations for older people have not yet been established.

The macronutrients - carbohydrate, fat, protein and alcohol - are the main sources of energy in the diet and the micronutrients, vitamins and minerals are also required for optimal metabolic function. These requirements are dependent on many factors including age, sex, physical activity and health status (see section 2.1.2.). General information on the function and sources of macro and micronutrients is outlined in the Recommendations for a Food and Nutrition Policy for Ireland (61).

3.3 The Food Pyramid

The Food Pyramid (Figure 3.1.) illustrates current recommendations for food intake for healthy people. In 1998 a survey of health related behaviours among adults in Ireland was carried out. This survey of lifestyle, attitudes and nutrition (the SLÁN survey) (107) examined amongst other criteria how these recommendations were met by the Irish population (Figure 3.2.).

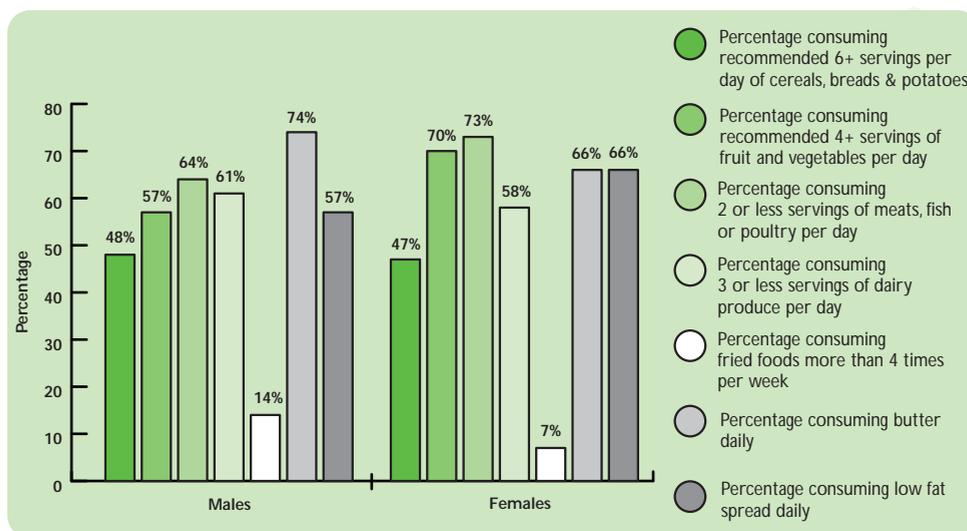
Figure 3.1. Food Pyramid



Source: Eastern Health Board and Health Promotion Unit (108)

Figure 3.2. Percentage of the Irish population over 55 years meeting Food Pyramid recommendations

(See Appendix VI for differences in social classes)



Source: The National Health & Lifestyle Surveys, 1999 (107)

Nutrient intakes and requirements

The 1990 INNS (45), which examined dietary intakes of a representative sample of the Irish population, was not designed to specifically target older people. While the survey does include people over 60 years, the data is limited. A second survey, *The North-South Food Consumption Survey*, began in 1997 and data is currently being collected. The first results from this survey are expected in 2000, but again the survey was not designed to specifically target older people.

In the UK, a recent survey was carried out which specifically targets nutrition in older people. This survey, *National Diet and Nutrition Survey: people aged 65 years and over* (NDNS) (109), was conducted in 1994/5 and comparisons to it are made widely throughout this chapter.

There is much controversy about whether or not nutritional requirements of older people are similar to those of younger adults. However, as energy intake and thus food intake of older people declines (110, 45, 55), there is an increased chance of nutritional deficiency (111) since nutrient requirements do not lessen (112).

Specific nutrient requirements are considered in detail in this chapter.

Energy

For those who are fit and healthy, energy requirements should be based on actual body weight (111) with the emphasis on the nutritional quality of the diet (109). For individuals who have an acute and/or chronic illness, energy requirements and energy intake should be based on desirable body weight (16, 111). Energy intakes should be sufficient to meet macro and micronutrient requirements, while reducing the risk of developing poor nutritional status (7).

In adults, when energy intake exceeds energy expenditure, obesity may develop. Maintaining energy balance is therefore important in limiting the risk of developing obesity and its associated co-morbidities such as diabetes and cardiovascular disease. The composition of the diet can affect whether, and to what extent positive energy balance develops and it can also affect the body's ability to maintain energy balance (114).

The recently revised Irish RDAs for energy (Table 3.1.) express energy requirements in terms of actual body weight, ideal body weight (based on a BMI of 22 kg/m²) with and without desirable activity levels, where desirable activity is that level which is being promoted by public health campaigns.

Table 3.1. Energy requirements for people 60-74 and 75 and over in Ireland

| Age (years) | Desirable body weight* (kg) | With desired physical activity (MJ/d) | Without desired physical activity (MJ/d) | Actual body weight** (kg) | With desired physical activity (MJ/d) | Without desired physical activity (MJ/d) |
|----------------|-----------------------------|---------------------------------------|--|---------------------------|---------------------------------------|--|
| Males | | | | | | |
| 60-74 | 63.5 | 9.2 | 8.5 | 73.5 | 10.0 | 9.2 |
| 75+ | 63.5 | 8.5 | 7.5 | 73.5 | 9.1 | 8.0 |
| Females | | | | | | |
| 60-74 | 55.5 | 7.8 | 7.2 | 66.1 | 8.5 | 7.8 |
| 75+ | 55.5 | 7.6 | 6.7 | 66.1 | 8.3 | 7.3 |

* Desirable body weight – desirable weights for observed heights were calculated taking a body mass index (BMI) of 22.

** Actual body weight – weighted median weights observed in several studies (105).

Source: FSAI 1999 (103)

A combination of actual body weights (see Table 3.1.) and the intake data, as calculated in the 1990 INNS, suggests that in Ireland we have a coexisting problem of both over and undernutrition in the older population.

Several international surveys (Norwich (115), SENECA (116), Boston (117) and NDNS (109)) also found inadequate energy intakes in older people (see Tables 3.2. and 3.3. for free-living and institutionalised older people respectively).

Table 3.2. Average daily energy intakes for older people found in the INNS, the Norwich, Seneca, Boston and NDNS surveys (adapted from 1998 NDNS)

| | Norwich (1990/91)(UK) | | Seneca (1988/9) | | NDNS: 65 and over (1994/5) (UK) | | USDA Boston survey (1981-4)** (USA) | | 1990 INNS (Ireland) | |
|------------------------|-----------------------|-------|--|-----------|---------------------------------|-------|-------------------------------------|-------|---------------------|-------|
| Living status | Free living | | Free living | | Free living | | Free living | | Not recorded | |
| Age (years) | 68-90 | | 70-75 | | 65 and over | | 60 and over | | 60 and over | |
| | Men | Women | Men | Women | Men | Women | Men | Women | Men | Women |
| Energy intake (MJ/d) | 8.1 | 6.4 | 8.2-12.7* | 6.3-10.9* | 8.02 | 5.98 | 7.92 | 6.26 | 9.5 | 7.2 |
| SD | N/A | N/A | - | - | 1.95 | 1.41 | 2.11 | 1.58 | 3.1 | 2.5 |
| Number of participants | 60 | 85 | 1217 | 1241 | 632 | 643 | 237 | 449 | 82 | 84 |
| Methods of measurement | 7-day diaries | | 3 day estimated record by diet history | | 4 day diet diaries | | 3 day weighing method | | 7-day diet history | |

N/A: not available

SD: Standard Deviation

*Figures for the SENECA survey show the range of average intakes for the 18 towns in which the survey was carried out, together with the total number of participants for all the towns.

** a factor of 4.184 has been used to convert kcalories to KJ

Source: Maisey *et al* (1995) (115), SENECA-Investigators (1991) (116), USDA (1992) (117), MAFF (1998) (109), INNS (1990) (45)

Comparisons made for institutionalised older people included in the 1998 NDNS (109) and the Boston survey (117) also showed an inadequate energy intake (see Table 3.3.):

Table 3.3. Average daily energy intakes for older institutionalised people found in the NDNS (UK) and Boston survey (USA) (adapted from 1998 NDNS)

| | NDNS (1998) (UK) | | USDA Boston survey (1981-4)* (USA) | |
|------------------------|--------------------|-------|------------------------------------|-------|
| Age (years) | 65 and over | | 60 and over | |
| | Men | Women | Men | Women |
| Energy intake (MJ/d) | 8.14 | 6.94 | 8.05 | 7.19 |
| SD | 1.95 | 1.55 | 1.54 | 1.46 |
| Number of participants | 204 | 208 | 103 | 163 |
| Methods of measurement | 4 day diet diaries | | 3 day weighing method | |

SD: Standard Deviation

* a factor of 4.184 has been used to convert kcalories to KJ

Source: MAFF (1998), USDA (1992)

Providing an adequate nutrient intake for older people becomes difficult once body weight and physical activity start to decline. Many older people spend only about 1 hour per day on their feet. Given low body weights and low activity levels, the opportunities for dietary modification to increase nutrient intakes are very limited if the overall food consumption is low (7). As energy requirements are reduced, the food older people eat must be of good nutritional value.

3.4.2 Protein

The primary function of protein in the body is growth and repair of body tissues. However, the body also requires a constant source of glucose as a fuel for many chemical processes. If the diet is low in carbohydrate, a greater percentage of dietary protein is used to provide glucose and subsequently less is available to carry out its primary function (118).

In order to minimise protein loss, it is important that older people maintain an adequate energy intake, especially during episodes of ill health when energy requirements may rise (7). The average protein intake recorded in the INNS in adults 60 years and over (Table 3.4.) was above the Irish RDA of 0.75g/kg body weight/d.

Table 3.4. Average daily protein intake in older people (60 years and over) in Ireland

| | Average daily protein intake (g/d) | Average weight observed in this section of the population (kg) | Average daily protein intake (g/kg body weight/d) | % RDA (0.75g/kg body weight/d) | % Total energy derived from protein |
|-----------------------|------------------------------------|--|---|--------------------------------|-------------------------------------|
| Males (60 and over) | 84 | 74.7 | 1.125 | 150 | 15 |
| Females (60 and over) | 67 | 65.4 | 1.025 | 137 | 16.4 |

Source: INNS 1990 (45), FSAI 1999 (103)

The average daily protein intakes for men and women reported in the 1998 NDNS were similar to those reported in the 1990 INNS.

In the healthy older population protein intake has been found to be sufficient to meet requirements (111, 7). A higher protein intake may be necessary for those who have an acute and/or chronic illness and who are homebound or in a long term care facility (7).

3.4.3 Carbohydrates

Carbohydrates are a major source of energy, providing approximately 17 kJ per gram. The average daily intake of carbohydrates observed in the 1990 INNS was 292g for men (aged 60 and over) and 226g for women (aged 60 and over). This intake constitutes 48.6% of total energy intake for men and 49% for women. There are currently no quantitative guidelines for carbohydrate intake in Ireland.

Table 3.5. Daily carbohydrate intake as % of food and total energy intake in older people in Ireland and the UK

| | 1998 NDNS (UK) | | 1998 NDNS (UK) | | 1990 INNS (Ireland) | |
|---------------------------------------|----------------|-------|-------------------|-------|---------------------|-------|
| | Free living | | Institutionalised | | Not recorded | |
| | 65 and over | | 65 and over | | 60 and over | |
| Age group (years) | Men | Women | Men | Women | Men | Women |
| Average daily carbohydrate intake (g) | 232 | 175 | 256 | 222 | 292 | 226 |
| % of food energy | 48.2 | 47.5 | 50.8 | 51.3 | N/A | N/A |
| % of total energy | 46.4* | 46.9* | 50.4* | 51.2* | 48.6 | 49 |

Source: INNS 1990 (45) and MAFF 1998 (110)

* Note dietary UK recommendations: Dietary Reference Values (DRV) for % total energy derived from carbohydrate is 47% (106).

Carbohydrates in the diet are principally made up of sugars, starches and dietary fibre (non-starch polysaccharides).

a) Sugars

Sugars are soluble carbohydrates. They have been classified into two types:

- 1) Those sugars that are incorporated naturally into the cell structure of the food, e.g. fruit or vegetables and are known as intrinsic sugars.
- 2) Those sugars that are not incorporated (naturally or artificially) into the food's cellular structure, e.g. honey, fruit juices, table sugar, preserves and confectionery, and are known as extrinsic or free sugars. Extrinsic sugars in milk and milk products were deemed to be a special case, so in general sugars found in honey, fruit juice etc are referred to as non-milk extrinsic sugars (119).

Extrinsic sugars (principally sucrose) are associated with the development of dental caries (61) and a diet high in non-milk extrinsic sugars may also displace foods that are more nutrient dense. Intakes in the 1998 NDNS (110) were found to exceed the UK recommendations for non-milk extrinsic sugars in both free-living and institutionalised older people.

b) Starch

Starches are the major carbohydrates of the human diet and are required as the primary energy source. Some very high starch diets may be associated with low intakes of some vitamins and minerals and when other sources of food energy are unavailable this can lead to nutrient deficiency (61).

c) Dietary fibre

Dietary fibre is a non-specific term for that fraction of dietary carbohydrate that cannot be digested in the human small intestine. An adequate intake of dietary fibre is required to maintain bowel function. It has a laxative effect and a high fibre diet can be used in the treatment of constipation.

3.4.4 Alcohol

Alcohol yields 29 kJ of energy per gram and most alcoholic beverages are high in energy. In addition to its contribution to energy and to body weight, alcohol intake raises blood pressure and can also influence nutrient intake (61).

Table 3.6. Alcohol intake as % of total energy in the UK and Ireland

| Living status Age group (years) | 1998 NDNS (UK) | | 1998 NDNS (UK) | | 1990 INNS (Ireland) | |
|------------------------------------|----------------|-------|-------------------|-------|---------------------|-------|
| | Free living | | Institutionalised | | Not recorded | |
| | 65 and over | | 65 and over | | 60 and over | |
| | Men | Women | Men | Women | Men | Women |
| Alcohol (g/d) | 21.5 | 8.6 | 10.3 | 3.9 | 9.7 | 1.6 |

Source: INNS 1990 (45) and MAFF 1998 (110)

Recommendations for alcohol for older people are similar to those for the general adult population (120). Healthy limits of alcohol intake are 14 units per week for women and 21 units per week for men (1 unit: 8g alcohol). Findings in the 1990 INNS revealed intakes below these limits.

3.4.5 Fat (saturated and unsaturated)

Fat is a concentrated source of energy yielding 37 kJ per gram. Foods that are high in fat provide a lot of energy and are good sources of vitamins A, D, E and K and provide the essential fatty acids.

The building blocks of fat are triglycerides made up of three fatty acids and one glycerol and the body can make the fatty acids it needs with the exception of *alpha linolenic acid* (n-3) and *linoleic acid* (n-6). These are the essential fatty acids and belong to the group of polyunsaturated fatty acids (PUFAs) and must be supplied in the diet (see Table 3.11 below and Appendix II) (121).

The nature of the fat depends on the types of fatty acids which make up the triglycerides. If the fatty acid has all the hydrogen atoms it can hold it is said to be saturated. If some of the hydrogen atoms are missing and have been replaced by a double bond between the carbon atoms, then the fatty acid is said to be unsaturated. If there is one double bond, the fatty acid is known as a monounsaturated fatty acid. If there is more than one double bond, then the fatty acid is known as a polyunsaturated fatty acid. All fats contain both saturated and unsaturated fatty acids but are sometimes described as saturated or unsaturated depending on the proportions of fatty acids present.

A high fat intake, and in particular a high intake of saturated fatty acids, has been associated with a raised blood cholesterol level, which is one of the risk factors for coronary heart disease (121).

Table 3.7. reveals average daily fat intakes as found in the 1990 INNS and 1998 NDNS. There are currently no quantitative recommendations for fat intake provided in Ireland.

| | | n-6 PUFA | n-3 PUFA |
|-----------------|-------|------------------|------------------|
| | | % dietary energy | % dietary energy |
| Males (years) | 18-64 | 2 | 0.5 |
| | 65+ | 2 | 0.5 |
| Females (years) | 18-64 | 2 | 0.5 |
| | 65+ | 2 | 0.5 |

Source: FSAI 1999 (103)

Intakes of n-6 and n-3 PUFA as observed in the 1998 NDNS (Table 3.8.) were found to be well above the Irish recommendations in both free-living and institutionalised older people.

Table 3.8. Daily intake of fat in Ireland and the UK

| | 1998 NDNS (UK) | | 1998 NDNS (UK) | | 1990 INNS (Ireland) | |
|---|----------------|-------|-------------------|-------|---------------------|-------|
| | Free living | | Institutionalised | | Not recorded | |
| | 65 and over | | 65 and over | | 60 and over | |
| Age group (years) | Men | Women | Men | Women | Men | Women |
| Average daily total fat intake (g/d) | 74.7 | 58 | 76.9 | 65.5 | 85 | 65 |
| % of total energy | 34.4 | 35.6 | 34.8 | 34.7 | 33.4 | 33.8 |
| Average intake of saturated fatty acids (g/d) | 30.6 | 24.7 | 33.4 | 28.9 | N/A | N/A |
| Average daily intake of total cis PUFAs (g/d) | 12.20 | 9.05 | 10.90 | 9.05 | N/A | N/A |

Source: INNS 1990 (45) and MAFF 1998 (110)

3.4.6 Vitamins

Vitamins are organic compounds required in small amounts to assist in energy production and in cell growth and maintenance. They are essential to life and with the exception of vitamin D, cannot be synthesised in the body. They must therefore be obtained from food or from dietary supplements (109). See Table 3.9. for the recently revised Irish RDAs for vitamins and Table 3.10. for average daily intake of vitamins in older people in Ireland and the UK.

Table 3.9. Recommended dietary allowances for vitamins in Ireland

| | Vitamin A* µg/d | Thiamin µg/MJ (mg/d) | Riboflavin mg/d | Niacin mg/MJ (mg/d) | Vitamin C mg/d | Vitamin B ₆ µg/g protein (mg/d) | Folate µg/d | Vitamin B ₁₂ µg/d | Vitamin D µg/d |
|-----------------|-----------------|----------------------|-----------------|---------------------|----------------|--|-------------|------------------------------|----------------|
| Males (years) | | | | | | | | | |
| 18-64 | 700 | 100 (1.1) | 1.6 | 1.6 (18) | 60 | 15 (1.5) | 300 | 1.4 | 0-10 |
| 65+ | 700 | 100 (1.1) | 1.6 | 1.6 (18) | 60 | 15 (1.5) | 300 | 1.4 | 10 |
| Females (years) | | | | | | | | | |
| 18-64 | 600 | 100 (0.9) | 1.3 | 1.6 (14) | 60 | 15 (1.1) | 300 | 1.4 | 0-10 |
| 65+ | 600 | 100 (0.9) | 1.3 | 1.6 (14) | 60 | 15 (1.1) | 300 | 1.4 | 10 |

* Retinol equivalents (µg/d)

Source: FSAI 1999 (103)

Table 3.10. Average daily intake of vitamins in older people in Ireland and the UK

| Living status Age group (years) | 1998 NDNS (UK) | | 1998 NDNS (UK) | | 1990 INNS (Ireland) | |
|------------------------------------|----------------------------|-------|----------------------------------|-------|-----------------------------|-------|
| | Free living 65 and over | | Institutionalised 65 and over | | Not recorded 60 and over | |
| | Men | Women | Men | Women | Men | Women |
| Vitamin A (µg/d) | 1262 | 1073 | 1062 | 974 | 1128 | 1228 |
| Thiamin (mg/d) | 1.56 | 1.73 | 1.35 | 1.16 | 1.5 | 1.2 |
| Riboflavin (mg/d) | 1.82 | 1.76 | 1.8 | 1.65 | 1.8 | 1.6 |
| Niacin (mg/d) | 32.7 | 26.1 | 27.3 | 23.6 | 36.8 | 30 |
| Vitamin B ₆ (mg/d) | 2.4 | 2 | 1.9 | 1.6 | 1.6 | 1.3 |
| Vitamin B ₁₂ (µg/d) | 6.1 | 4.6 | 4.9 | 4.6 | 4.6 | 4.8 |
| Folate (mg/d) | 279 | 220 | 235 | 200 | 189 | 177 |
| Biotin (mg/d) | 33 | 26 | 30 | 26 | N/A | N/A |
| Pantothenic acid (mg/d) | 4.5 | 3.9 | 33 | 26 | N/A | N/A |
| Vitamin C (mg/d) | 71.5 | 68.1 | 52.1 | 54.9 | 60.8 | 58.4 |
| Vitamin D (mg/d) | 4.56 | 3.44 | 3.87 | 3.36 | 1.9 | 1.9 |
| Vitamin E (mg/d) | 10.1 | 10.4 | 7.8 | 6.7 | 3.6 | 3.1 |

Source: INNS 1990 (45) and MAFF 1998 (110)

Intakes found in the 1990 INNS (Table 3.10.) were found to be insufficient for folate, vitamin D and vitamin C when compared to the Irish RDAs. See Appendix IV.

a) Retinol (Vitamin A)

In general, studies of the diets of older people have found intakes of vitamin A to be adequate (45, 122, 123, 109). However when it does occur, low serum vitamin A levels are generally associated with chronic liver disease (124). Hypervitaminosis A has been observed in this age group as a result of over-use of vitamin A supplementation (124).

b) Thiamin (Vitamin B₁)

Vitamin B₁ deficiency has been noted in older people both in Ireland and the UK (125, 126). In general, if overall food intake declines as a consequence of decreasing energy intake, vitamin B₁ intake may not be adequate. Further studies on vitamin B₁ status in the older person are necessary (7).

c) Riboflavin (Vitamin B₂)

Low dietary vitamin B₂ intakes are common among the older population (127). Biochemical deficiencies of vitamin B₂ have been noted in both independent older people and those in long term care facilities (126, 7). A low energy intake may be responsible for low vitamin B₂ levels (128).

d) Pyridoxine (Vitamin B₆)

There is a strong relationship between vitamin B₆ and protein metabolism, and so requirements for vitamin B₆ are directly related to protein intake and intakes should remain

similar to those of the younger population (126). Several studies have found the older population to have low plasma levels of this vitamin related to both low dietary intakes and underlying health problems (126, 123).

e) Cyanocobalamin (Vitamin B₁₂)

It has been shown that serum levels of vitamin B₁₂ decline with age (7, 129). Many cases of low serum vitamin B₁₂ levels are known to be associated with age related decreased absorption due to gastric atrophy (88).

f) Folic Acid

Folic acid deficiency is common amongst the older population (129, 125, 130). With lower energy intakes, older people have difficulty achieving requirements for folic acid from food alone (123) and many do not reach the recommended intakes for this vitamin (45, 131, 123).

This folic acid deficiency may be due to poor food choice e.g. "tea and toast" type of diet and prolonged cooking of foods (7). Alcoholism, depression, polypharmacy (the use of several prescribed and/or non-prescribed drugs at the same time) and acute or chronic medical conditions (127) may also contribute to deficiency. Low intakes have also been reported among older people in long-stay and acute hospital care (132). A recent joint study of the Mercer's Institute for Research on

Ageing and the Department of Haematology at Saint James's Hospital, Dublin, has shown that fortified milk helped maintain serum and red cell folate levels in an older population (130).

g) Biotin

No RDAs for biotin currently exist in Ireland. There is little information concerning human biotin requirements and no evidence on which to base recommendations. Average intake of biotin in the EU is approximately 28-42 µg/d, but individuals may consume between 15 and 100 µg/d (105).

h) Pantothenic acid

There are currently no RDAs for pantothenic acid in Ireland and from the limited studies which have been performed it is not possible to establish requirements. Average intakes in adults are about 4-7 mg/d, but some individuals consume 3-12 mg/d (105).

i) Ascorbic acid (Vitamin C)

Research indicates that vitamin C intake in an apparently healthy older population is adequate for males but not for females (45). Intakes have also been found to be sub-optimal in those who have an acute and/or chronic illness or are in long term care facilities (133). Fruit, vegetables and potatoes provide vitamin C but older people may have difficulty preparing, peeling and chewing these foods (7). In residential care accommodation, where

food is produced on a large scale and may take longer to reach its final consumer, vitamin (particularly vitamin C) content may be depleted by the time it is consumed. It has been estimated that meals provided in residential accommodation, e.g. meals on wheels, may lose up to 90% of vitamin C content by the time of delivery (7, 84).

j) Calciferol (Vitamin D)

Sub-optimal vitamin D status in the older person is due to a number of age-related changes in synthesis and metabolism (81, 16, 127). With age, exposure to sunlight is often reduced and particularly in the homebound or those in long-term care facilities (83, 134, 135), there is a lessened capacity of the skin to produce vitamin D (136, 135, 7) and dietary intakes are low (135, 134). In addition, compromised liver and kidney function often occurs which decreases the level of vitamin D synthesised/stored in the body and interferes with calcium absorption (110, 127).

Supplementation with vitamin D can correct deficiencies and reduce the incidence of fractures in the older population (137, 138, 139).

k) Vitamin E

The most active of the series of vitamin E compounds is α-tocopherol which accounts for 90% of the vitamin E present in human tissues. Vitamin E requirements are

determined, to a large extent by the PUFA content of the diet. A guideline of 0.4 mg α -tocopherol equivalents :g PUFA was proposed in the RDAs for Ireland (103).

3.4.7 Minerals

Minerals are inorganic elements. Those that are essential for the body's normal function include iron, calcium, phosphorus, potassium, magnesium, sodium and chloride. Trace elements are also minerals but are required only in minute amounts and include zinc, copper, iodine and manganese (109). See Table 3.11. for the recently revised Irish RDAs for minerals and Table 3.12. for average daily intakes for several minerals as observed in the 1990 INNS (45) and the 1998 NDNS (110).

Table 3.11. Recommended dietary allowances for minerals in Ireland

| | Calcium (mg/d) | Phosphorus (mg/d) | Potassium (mg/d) | Iron (mg/d) | Zinc (mg/d) | Copper (mg/d) | Selenium (μ g/d) | Iodine (μ g/d) |
|-----------------|-------------------|----------------------|---------------------|----------------|----------------|------------------|--------------------------|------------------------|
| Males (years) | | | | | | | | |
| 18-64 | 800 | 550 | 3100 | 10 | 9.5 | 1.1 | 55 | 130 |
| 65+ | 800 | 550 | 3100 | 10 | 9.5 | 1.1 | 55 | 130 |
| Females (years) | | | | | | | | |
| 18-64 | 800 | 550 | 3100 | 14 | 7 | 1.1 | 55 | 130 |
| 65+ | 800 | 550 | 3100 | 9 | 7 | 1.1 | 55 | 130 |

Source: FSAI, 1999 (103)

Table 3.12. Average daily intake of minerals in older people in Ireland and the UK

| Living status Age group (years) | 1998 NDNS (UK) | | 1998 NDNS (UK) | | 1990 INNS (Ireland) | |
|------------------------------------|----------------------------|-------|----------------------------------|-------|-----------------------------|-------|
| | Free living 65 and over | | Institutionalised 65 and over | | Not recorded 60 and over | |
| | Men | Women | Men | Women | Men | Women |
| Iron (mg) | 11.6 | 8.9 | 9.6 | 8.3 | 11.2 | 9.8 |
| Calcium (mg) | 837 | 697 | 954 | 865 | 958 | 831 |
| Phosphorus (mg) | 1237 | 898 | 1199 | 1055 | 1506 | 1210 |
| Magnesium (mg) | 254 | 197 | 215 | 194 | N/A | N/A |
| Sodium (mg) | 2695 | 2053 | 2714 | 2207 | N/A | N/A |
| Chloride (mg) | 4099 | 3116 | 4053 | 3299 | N/A | N/A |
| Potassium (mg) | 2715 | 2208 | 2429 | 2148 | N/A | N/A |
| Zinc (mg) | 8.9 | 7 | 8.4 | 7.1 | 11.2 | 9.1 |
| Copper (mg) | 1.12 | 0.87 | 0.94 | 0.84 | N/A | N/A |
| Iodine (µg) | 187 | 149 | 193 | 174 | N/A | N/A |

Source: INNS 1990 (45) and MAFF 1998 (110)

Average daily intakes found in the 1998 NDNS (UK) are lower than the Irish RDAs for iron, potassium, calcium, zinc and copper.

(a) Calcium

Ninety nine percent of calcium in the body is in the bones and teeth where its primary role is structural. Several studies have shown relationships between dietary calcium intake and bone status while calcium absorption has been shown to decline with age (140). However, there is debate as to whether taking additional calcium in old age will help prevent osteoporosis (see section 2.3.). The average adult human has approximately 1kg of calcium in the bones. It is difficult to separate the influence on the bone metabolism of dietary calcium from that of other nutrients since adequate intakes of protein, energy and many other nutrients are also necessary for bone growth.

(b) Iron

Iron intakes of healthy older people are generally adequate (83, 45, 19). In both men and women, a progressive increase in iron stores occurs with advancing age. However, the incidence of anaemia in otherwise healthy older people varies between 5-6% (91).

For those who are homebound or in long-term care facilities, dietary intakes and iron stores were found to be low (83, 7). Iron deficiency was identified as a common problem in the institutionalised older person (19). This low iron status was associated with a reduced food intake and gastrointestinal blood loss (16). Other pathologies for anaemia e.g. blood loss associated with peptic ulcer, diverticular disease, haemorrhoids and use of medication should be investigated before the assumption is made that it is due to nutritional deficiency (7).

(c) Potassium

Potassium, together with sodium, provides a route for the cellular uptake of molecules against electrochemical and concentration gradients. Deficiency in this mineral alters the electrophysiological characteristics of cell membranes and causes weakness of skeletal muscle. Results of a recent study by Tucker K, *et al* (141) support the hypothesis that alkaline-producing dietary components, specifically potassium and magnesium, contribute to maintenance of bone mineral density.

(d) Zinc

Zinc deficiency is associated with impaired cell mediated immune response and with reduced wound healing. In zinc deficient subjects, supplements (see 3.2.8) can lead to improvements in these parameters (7).

(e) Copper

Copper deficiency is usually the consequence of decreased copper stores at birth, inadequate dietary copper intake, poor absorption, elevated requirements induced by rapid growth or increased copper losses. Copper deficiency has been reported in subjects with malabsorption syndromes, during total parenteral nutrition, during high oral intakes of zinc and iron and in subjects receiving cation-chelating agents or high doses of oral alkalis. The most frequent clinical manifestations of copper deficiency are anaemia, neutropenia and bone abnormalities (142).

(f) Magnesium

Despite the low intake seen in most studies of diets of older people, primary magnesium deficiency is uncommon. However, deficiency does occur in association with gastrointestinal malabsorption, renal dysfunction and alcoholism (140).

3.4.8 Supplementation

There are certain circumstances where the use of a combined vitamin and mineral supplement may be required to compensate for the decline in total food intake (16). It is important to emphasise the danger of this recommendation being interpreted to mean 'mega' doses of self-prescribed individual supplements (110). Such self-prescription may not provide protection and if taken in excess



may either cause toxic reactions or nutrient imbalance. Research has shown that individuals who select their own supplements without the benefit of professional nutritional assessment seldom select the nutrients that are already below recommended levels in the diet (110).

Commercial companies producing oral proprietary nutritional supplements employ qualified nutritionists/dieticians who visit community hospitals, nursing homes and other long-term care facilities in both the private and public sector. However, these visits are usually to discuss the use of their company's product and assist with the practicalities of enteral feeding. This does not replace the need for access to nutrition and dietetic services.

3.4.9 Discussion

While adequate nutritional status is vital for any age group, it is particularly important for older people. The vast majority of older people in Ireland are well nourished. However, there are those who are housebound, living in poor social circumstances or cognitively impaired who are at a significant risk of developing nutritional deficiencies (143). At-risk nutrients include energy, vitamin D, vitamin C, folic acid, iron, potassium, calcium, zinc, magnesium and copper. See Table 3.13. for rich sources of nutrients.

Table 3.13. Rich sources of nutrients

| | |
|-------------------------|--|
| Carbohydrates | Cereal, pulses, potatoes, milk, fruits, vegetables |
| Protein | Meat, fish, eggs, milk, cheese, cereals, nuts, pulses |
| PUFAs | Oily fish, fish oils, vegetable oils, walnuts |
| Vitamin A | Liver, whole milk, cheese, butter, carrots, dark green leafy vegetables, orange coloured fruits |
| Vitamin C | Citrus fruits, juices, kiwi fruits, blackcurrants, green vegetables, tomatoes, potatoes, blackcurrants |
| Folic acid | Offal, green leafy vegetables, breakfast cereals, potatoes, bread, yeast extract |
| Vitamin D | Sunlight, oily fish, liver, eggs, fortified margarines and milk, fortified breakfast cereals |
| Thiamin | Whole grains, nuts, meat (especially pork) |
| Vitamin B ₆ | Beef, fish, poultry |
| Vitamin B ₁₂ | Fortified cereals, offal, meat, eggs, milk |
| Vitamin E | Vegetable oils, nuts, vegetables, cereals |
| Vitamin K | Dark green leafy vegetables |
| Niacin | Liver, beef, pork, mutton, fish, fortified cereals |
| Riboflavin | Liver, milk, cheese, yoghurt, eggs, green vegetables, yeast extract, fortified cereals |
| Iron | Offal, all red meat, egg yolk, wholegrain cereals, dried fruits, pulses, fortified breakfast cereals |
| Calcium | Milk, cheese, yoghurt, bones of tinned fish, dark green vegetables |
| Potassium | Vegetables, potatoes, fruit (especially bananas), juices |
| Magnesium | Wholegrain cereals, nuts, spinach |
| Phosphorus | Milk, cheese, meat, fish, eggs |
| Iodine | Milk, seafood, seaweed |
| Selenium | Cereals, meat, fish, offal, cheese, eggs |
| Copper | Green vegetables, fish, liver |
| Zinc | Unrefined cereals, milk, cheese, meat, eggs, fish, wholegrain cereals, pulses |
| Dietary fibre | Wholemeal bread, pasta, wholegrain rice, high fibre cereals, vegetables, pulses, fruit, dried fruit |

Source: Rafferty, S (1996) (143), British Nutrition Foundation (1998) (144)

3.5 Dietary guidelines

3.5.1 Variety of food

Advancing age can be a time of lifestyle change for many people. Routines may change and this can alter the eating pattern of the retired person and their household. Low energy intake increases the risk of concurrent vitamin and mineral deficiency. With an adequate energy intake and by incorporating a wide variety of nutrient dense foods in the diet most nutritional requirements should be met. The diet should be based on fresh foods as far as possible with eating patterns similar to those recommended for younger adults. It is important to taste food before seasonings are added. Herbs and spices including pepper can enhance the flavour of the food, however, reliance on salt to flavour is not recommended.

For those who have an acute and/or chronic illness, are homebound or are in long-term care facilities, emphasis should be placed on consuming foods with a high energy and nutrient density (foods which contain a concentration of energy and nutrients) to achieve energy and nutrient requirements.

Guideline 3.5.1.

Eat a wide variety of foods and include foods with a high nutrient density.

3.5.2 Energy and physical activity

Food provides energy or fuel for the body.

Some form of physical activity should be incorporated as part of the daily routine. This will not only improve physical fitness but also accommodate higher energy consumption and thus allow for adequate nutrient intakes. Regular physical activity can enhance bone density and hence assist in the prevention of osteoporosis (see section 2.4.1)

Guideline 3.5.2.

Energy intake should be balanced with adequate physical activity.

Starchy foods

Starchy foods include bread, potatoes, rice, cereals and cereal-based foods, some fruit and pulse vegetables. These are a good source of energy, vitamins and dietary fibre. For the fit and healthy older person, starchy foods should be included daily at each meal. However, it may be difficult for those who have an acute and/or chronic illness to eat large quantities of these foods (84). This group of older people may find these foods too filling and may need to rely on other macronutrients as well as starch, to achieve an adequate energy intake. Excessive consumption throughout the day of foods containing a high sugar content could blunt the appetite for a more varied diet and should be avoided. However, for those older people with limited appetite and therefore at risk of insufficient energy and nutrient intake, intake of sugar should be modified to suit their needs.

Guideline 3.5.3.

Starchy foods should be eaten throughout the day. For those who have an acute and/or chronic illness with a limited appetite, intake of starchy foods should be modified to suit individual needs. Excessive consumption throughout the day of sugar dense foods should be avoided.

3.5.4 Fruit and vegetables

Intakes of fruit and vegetables among the older population in Ireland are low compared to those in other European countries (145). Fruit and vegetables are rich sources of key micronutrients such as folic acid and the antioxidant vitamins, beta-carotene, vitamin E and vitamin C in addition to dietary fibre. Four or more portions/servings of fruit and vegetables per day are likely to ensure adequate intakes of these nutrients.

Guideline 3.5.4.

For those who are healthy, 4 or more portions* of fruit and vegetables should be eaten daily. For those who have an acute and/or chronic illness, fruit and vegetable intake should be modified to meet individual needs.

** 1 portion/serving = 1/2 glass fruit juice, 2 tablespoons cooked vegetables or salad, 1 small bowl of homemade vegetable soup, 1 medium sized fresh fruit or 2 tablespoons of cooked fruit.*

3.5.5 Dietary fibre

For older people, fibre is particularly important in the prevention of constipation. Adequate intakes of fruit, vegetables (especially legumes and pulses, e.g. peas, beans and lentils), wholemeal bread and breakfast cereals will increase fibre content in the diet as well as providing other nutrients. An adequate fluid intake and regular physical activity in conjunction with a high fibre diet can help alleviate constipation.

Guideline 3.5.5.

An adequate intake of high fibre foods should be maintained on a daily basis.

3.5.6 Fluid

A regular and adequate intake of fluid is extremely important for older people. Many older people have an impaired sense of thirst and do not drink enough throughout the day. Insufficient fluid intake results in dehydration and constipation. Drinks such as water, milk, tea and/or juices are suitable depending on the needs of the older person and 8 cups of fluid should reduce the risk of dehydration and constipation. Alcoholic drinks should not be included in the 8 daily cups (see Section 3.3.10.).

Guideline 3.5.6.

Eight cups/glasses* of fluid should be drunk per day.

**This is equivalent to about 1.5 litres daily.*

3.5.7 Fat

Fat provides the most concentrated form of energy. A reduction in fat intake (particularly saturated fat) is recommended for the general population (61). The use of unsaturated oils or spreads when adding fat to foods will improve the fat balance in the diet. Oily fish for example is a good source of unsaturated fat.

Fat intakes should be tailored to meet the needs of each individual. Older people who are fit and healthy should adopt guidelines as for the general population (61). In addition to providing an excellent source of energy, fat also enhances food palatability. For this reason and in order to ensure adequate energy intake, it may be prudent not to restrict fat intake to the same degree for those who have an acute and/or chronic illness and those who are homebound or in long term care facilities.

Guideline 3.5.7.

For those who are healthy, a moderate fat intake including a mixture of fats should be included in the diet. For those who have an acute and/or chronic illness fat intakes should be modified to meet individual needs.

3.5.8 Meat, fish, poultry and dairy foods

Meat is a rich source of nutrients such as protein, iron, vitamin B₁₂, zinc and nicotinic acid. Meat and alternatives such as fish and poultry

should be eaten regularly. Dairy foods such as milk, fortified milk, yoghurt and cheese are important sources of energy, protein, calcium, zinc, vitamins A, B₂, B₁₂ and B₆ and may also contribute significantly to the intakes/absorption of niacin, thiamin and folate. A recent joint study of the Mercer's Institute for Research on Ageing and the Department of Haematology at Saint James's Hospital, Dublin, has shown that fortified milk helps maintain serum and red cell folate levels in an older population (126).

Guideline 3.5.8.

Meat, poultry and fish should be eaten regularly. Dairy foods such as milk, yoghurt and cheese should be eaten daily. For those who have an acute and/or chronic illness an increased intake of dairy foods may be recommended. Fortified milk should be consumed by all older people unless otherwise specified.

3.5.9 Food modification: enriched foods, fortified foods and dietary supplements

Food modification, i.e. changing food by adding extra nutrients, preservatives, etc., may be required to meet the individual needs of some specific older people. Individual energy and nutrient needs will vary and should be assessed (see section 2.3.1.).

- **Enriched foods**

Everyday foods may be enriched with additional energy or nutrient dense foods that do not increase the volume of the meals (e.g. milk powder added to ordinary milk, cream added to porridge or butter/margarine added to potatoes). This is a useful way of increasing the energy and nutrient content of a snack or meal without increasing food volume.

- **Fortified foods**

Certain foods such as milk, margarines, some breakfast cereals and breads may be fortified with vitamins and minerals (e.g. breakfast cereals fortified with folic acid, milk fortified with vitamin D and calcium). The consumption of fortified breakfast cereal is associated with a higher intake of a range of micronutrients (146).

- **Dietary supplements**

Ideally dietary supplements should be recommended for use by qualified health professionals.

(a) Vitamin and mineral supplements

Vitamin and mineral supplementation should not be seen as an alternative to consuming an adequate and varied diet. If supplements are being used they should not exceed the recommended dietary allowances for any vitamin or mineral unless specifically prescribed for an individual.

(b) Oral proprietary nutritional supplements

These are concentrated sources of macro and micronutrients in varying proportions usually consumed in liquid form (i.e. nutritionally complete powdered meal replacers made up on milk) and are readily digested and absorbed. They should ideally be prescribed under dietetic/medical supervision and have their use reviewed regularly.

Guideline 3.5.9.

A nutritional assessment is required prior to a recommendation for food modification or proprietary product supplementation. Enriched and fortified foods can be used where indicated specifically for an individual. The use of proprietary product supplementation should be rationalised and reviewed by qualified health professionals.

Alcohol

To reduce the risk of developing alcohol related problems it is advisable to develop sensible drinking practices. Moderation is the key to sensible drinking. Recommendations for older people are similar to those for the adult population (120) and healthy limits of alcohol intake are 14 units per week for women and 21 units per week for men.



Guideline 3.5.10.

If alcohol is consumed, it should be done so in moderation. Healthy limits of alcohol intake are 14 units* per week for women and 21 units* per week for men.

**1 unit = 1/2 pint of beer, 1 glass of wine, 1 spirit measure or 1/8 gill.*

CHAPTER 4 : ACCESS TO HEALTHY AND APPROPRIATE FOOD CHOICES FOR OLDER PEOPLE

4.1 Access to healthy and appropriate food choices for older people

Making healthy food choices is one part of achieving healthy eating guidelines. Measures to improve access to healthy and appropriate food choices for older people will be considered under the following headings:

- Public health policy
- Supportive environments
- Community action
- Health services
- Developing personal skills

4.1.1 Public health policy

There is a compelling need to promote healthy ageing with the overall aim of 'adding life to years' through a variety of intervention strategies including nutrition.

Recent public health policy documents (147, 148, 8) emphasise a good nutritional status as having a very important role in preventing many diseases e.g. diabetes, cancer, CVD, etc. Nutrition is also recognised as a component in the therapeutic treatment of acutely ill or rehabilitating older people.

4.2 Supportive environments

4.2.1 Transport

The ability to shop can be limited by reduced mobility. Lack of transport particularly in rural areas, can contribute to high levels of dependency on others, which ultimately reduces access to shops (8). Groceries can be bulky and heavy to carry without adequate transport.

4.2.2 Housing

Adequate housing is a basic requirement for health (8). Kitchen facilities and basic equipment such as refrigerators, cookers and ovens are all required for food storage and preparation.

4.2.3 Income

The association between poor health and low socio-economic status is well documented (149). Older people on a pension are one of the groups likely to have a low income (150). Low income groups have been shown to have a less healthy diet and spend a smaller proportion of their income on food (151). Deprivation among older people can affect the availability of household amenities and food.

4.2.4 Food retailers

In recent decades there have been substantial changes in the type and distribution of retail outlets in Ireland. The grocery trade is dominated by large supermarkets – in 1993, 5% of retail outlets accounted for 60% of total business (152). Supermarkets tend to be located on the periphery of towns and cater primarily for family needs. Architects and planners should take the needs of older people into account when developing new shopping centres. Transport facilities should be provided in response to such new developments (149).

Food retailers are recognising the increasing age profile of the consumer and are responding progressively to their needs. A large supermarket chain in the UK noted that the 'over 60s' make up 16% of total customer numbers and contribute to 11% of overall spending (153). In response, some food retailers are accommodating the older consumer by providing more suitable shallow trolleys, larger signs, and smaller portion sizes. Improvements in packaging to facilitate easier handling are also being considered (154). Some stores provide a home delivery service for older customers and this valuable service should be made more widely available.

4.2.5 Catering

There is an increased prevalence of eating outside the home e.g. in restaurants and cafés.

Caterers may use techniques such as ingredient manipulation, food selection, cooking and marketing methods to provide the consumer with healthy food choices. The Irish Heart Foundation in association with the Health Promotion Unit (HPU) of the Department of Health and Children has developed an initiative "Happy Heart Eat Out" which provides caterers with appropriate information on healthy eating. This should increase the availability of healthy food choices for older people (155).

Older people can avail of meals-on-wheels and luncheon-clubs. Food provided should take account of the specific nutritional needs of this age group. The environment where meals are provided should be conducive to eating and the enjoyment of food (84).

4.2.6 Food safety

Foodborne disease that may be a mild illness for a robust adult can be a life threatening illness for a frail older person. Several factors contribute to the increased susceptibility to foodborne infections as well as other infections in older populations. These include an age-associated decrease in immune functions, age-related changes in the gastrointestinal tract, malnutrition, lack of exercise, entry into nursing homes and excessive use of antibiotics. Data from foodborne outbreaks associated with nursing

homes in the US indicate that older people are more likely to die from foodborne *Campylobacter*, *Clostridium perfringens*, *Escherichia coli* O157:H7, *Salmonella* and *Staphylococcus aureus* infections than the general population. Infections by *Salmonella* species are the most common cause of illness and death in nursing homes, with *Salmonella enteritidis* as the major cause of both morbidity and mortality (156).

Data from the surveillance scheme of all general outbreaks of infectious intestinal disease in England and Wales revealed that outbreaks in residential institutions accounted for more than one fifth of all general outbreaks of infectious intestinal disease. The most common causes for these were *Salmonella*, *Clostridium perfringens* and SRSV (small round structured viruses). Many outbreaks in residential institutions go unrecognised and of those detected only a proportion are investigated. However, it was concluded that the sample obtained, although incomplete, was representative of all general outbreaks investigated in England and Wales and therefore served to highlight the magnitude and serious nature of infectious intestinal disease in residential institutions (157). High rates of morbidity and mortality have been associated with outbreaks in residential homes and hospitals both in Ireland and the UK.

Laboratory reports of infectious intestinal disease in people aged 65 years or over in England and Wales show that foodborne disease is the most common cause of infective diarrhoea in older people. 76 % of the deaths associated with infectious intestinal diseases in England and Wales from 1990 to 1994 occurred in people aged 65 years and over. In an outbreak of *E. coli* O157:H7 in central Scotland in December 1996, 501 people fell ill and 21 people died. All of these who died were over 69 years, emphasising how vulnerable older people are.

The introduction of care in the community has resulted in an increased proportion of older people living independently. However, the quality of their food may be poor due to their inability to obtain and prepare it. Immobility makes it difficult to shop regularly for fresh food, visual impairment reduces the capacity to see if food is going off and fatigue or arthritic hands may discourage older people from preparing food adequately. Food stored, cooled, or heated inappropriately may become a source of infection (158).

All members of the community should be able to make safe food choices when eating inside or outside their homes. Older people who have an acute and/or chronic illness may be particularly vulnerable to food poisoning. Paying attention to personal hygiene and monitoring food preparation

and handling should lead to a reduced incidence of foodborne and other infections in older people (156). Guidelines are available from the Food Safety Authority of Ireland and should be carefully adhered to when preparing food.

4.3 Community action

4.3.1 Nutrition health promotion

The principal function of the HPU of the Department of Health and Children is to develop, implement and co-ordinate national and local programmes on health promotion. The National Council on Ageing and Older People in association with the HPU has developed a Healthy Ageing Programme and has published a Health Promotion Strategy for Older People (8). Nutrition is one of the priority areas addressed in the strategy and the overall goal is “to ensure that older people have an affordable diet which provides adequate nutrition and which optimises their health status”. Current nutrition health promotion activities (aimed at the whole population) include the National Healthy Eating awareness campaigns and the provision of information to the general public and health professionals.

At local level, some health boards have a health promotion service and older people are sometimes targeted as part of their overall remit. A specific leaflet for older people entitled “Food Tips for Older People” has been developed by the Nutritional Advisory Department, Services for the Older Person in

the Eastern Health Board and Health Promotion Unit of the Department of Health and Children.

At present existing health education programmes relevant to the needs of older people are available in some health boards, e.g. “Well-Being and Empowerment for Older People” in the Southern Health Board and “Lifewise and the Older Person” in the North Eastern Health Board. A project in the North Western Health Board “Adding Life to Living” has also been completed. This project focused on the role of diet in the maintenance of health, and identified a high prevalence of risk factors for malnutrition as reported by older people (159). Further courses are available through the Vocational Education Committee (VEC) which has adult education organisers in each county. These courses could be used to incorporate information on diet and lifestyle to provide a holistic approach to health and well-being.

Pre-retirement courses run by some organisations can provide the opportunity to address some lifestyle issues such as exercise, diet and smoking (160).

4.3.2 Community meals

The term community meals includes meals-on-wheels, meals served at luncheon-clubs and community centres for the older person (16). A newer development is the delivery of frozen meals to people in their homes.

A regular review should be carried out of the nutritional content of meals provided for the older person. Voluntary organisations providing meals should receive advice and support on an ad hoc basis from health boards. To support these voluntary services, the Nutritional Advisory Department, Services for the Older Person in the Eastern Health Board, has initiated one day seminars providing information on nutrition, food safety and hygiene for voluntary agencies in each community care area of the Eastern Health Board to support these services.

4.3.3 Family carers and home help service

The home help service, care assistants and family carers have a major role to play in supporting the nutritional well-being of older people. Nutrition education and resources available to these groups are limited.

4.3.4 Primary health care

Primary health care professionals remain an important source of information about health and nutrition for older people (161). In the community, these include public health nurses (PHNs), general practitioners (GPs), practice nurses, pharmacists etc. The number of older people who are acutely and/or chronically ill and depend on community services is increasing steadily.

Given the time constraints and demands placed on professionals in the community nutrition input can be limited. In addition, the lack of consistent accurate information on all aspects of food and health for the health professional and the public is recognised as a barrier to healthy eating (90). The North Western Health Board, however, provides a comprehensive nutrition and dietetic service to primary health care (162).

4.3.5 Nutrition education

Nutrition education for health professionals, service providers and formal carers of older people is unstructured at present and varies in content and facilitation throughout the country. PHNs and GPs receive minimal education in nutrition as part of their professional training and are often the only source of nutrition information for the carers of older people and the older people themselves. PHNs are given nutrition lectures as part of their postgraduate training but course content varies, as does the qualification of the facilitator. The home-help service relies on the PHNs to provide education on nutrition for older people. Nutrition input into any course given to these groups is essential, not only to increase awareness of the role that good nutrition plays but also to enable early identification of those most at risk from poor nutritional status. A review of courses available for service providers, formal

and informal carers of older people is available in the publication 'Training Carers of Older People: An Advisory Report' (163).

4.4 Health services

A postal survey was carried out by the Working Group through the secretariat of the Food Safety Advisory Board to ascertain what nutrition and dietetic services are currently being provided in Ireland for older people. This section includes the findings of this postal survey.

The overall nutrition and dietetic services for older people in the community are limited. Community dietitians/nutritionists are employed in most health boards primarily for the general population. The Eastern Health Board has a unique service which involves two dietetic posts specifically dedicated to the care of older people. This service is mainly directed at older people in long-term care and other community settings. In addition, the nutrition services in hospitals while present, may not be dedicated to the needs of the older person.

4.4.1 Acute hospitals

Currently, there is only one acute hospital in the country with a whole-time nutritionist/dietician dedicated to the care of older people. The time allocated to the care of older people in all other acute hospital settings varies widely. This indicates a lack of equity and accessibility to nutrition and dietetic services for older people.

There has been a systematic increase in the number of specialist geriatric departments in the acute hospitals since 1988. Similarly, all health boards except the Southern, have increased the number of geriatricians employed (164). However, the provision of nutrition and dietetic services to these facilities has been limited and as a consequence, such input is often not available.

4.4.2 Day hospitals

The provision of day hospital services varies between the different health boards, with many facilities available nationally. There is no specialist in nutrition and dietetics available to these facilities.

4.4.3. Long-term care and inpatient facilities

Long-term care facilities include the hospital service, long-term care beds, welfare accommodation and the private nursing homes. The Eastern Health Board nutrition and dietetic services are available to health board facilities only. In the remaining health boards, there is a very limited service, which is provided by either community or acute hospital based dietitians/nutritionists.

Since 1986 there has been a significant increase in the provision of nursing home beds (164). It is likely that this trend will continue as the number of older people in the

population increases and volunteers who might have been available to care for older people at home opt for paid employment (165). In general there are no formal nutrition and dietetic services available to nursing homes despite the increase in the numbers of residents receiving some form of nutritional support in these facilities. The Nursing Homes (Care and Welfare) Regulations, 1993 (S.I. No. 226 of 1993) acknowledge the importance of nutrition and diet for residents. However, no recommendations are made regarding the provision of nutrition and dietetic services to these facilities.

4.4.4 Health service catering

Caterers are responsible for the provision of food in acute hospital care and long-term care facilities. National guidelines are not available for caterers preparing food for older people.

(a) Acute hospitals

In acute hospitals catering is managed to meet the needs of the general population and this often fails to meet the requirements of older patients (166). Guidelines should be developed to provide food for older people which takes into account the following groups:

- those who have therapeutic dietary requirements due to acute and/or chronic illness
- those who are nutritionally at risk.

(b) Long-term care facilities

Guidelines should be developed to provide adequate food for people in long-term care facilities. These guidelines should take into account the following:

- the need for therapeutic diets for those residents who have an acute and/or chronic illness
- the specific nutritional needs of long stay residents.

4.5 Developing personal skills

Older people should be given the opportunity to develop skills to ensure adequate food and nutrient intake. These include skills relating to food preparation, budgeting and ability to access healthy food choices. A nutrition input should be included in courses available to older people and their carers. Older people should be involved in the implementation of this policy at local level (167).

CHAPTER 5 : RECOMMENDATIONS

5.1 Government action

- Given the evidence to support the role of nutrition in promoting health and social gain for older people, the Department of Health and Children should take the lead role in co-ordinating action to improve the nutritional status of the older population.
- Communication between government departments is required on matters relevant to food and nutrition for older people. Structures exist and should be utilised to facilitate implementation of the recommendation of this document.
- Specific resources should be allocated for the implementation of the recommendations in this document.

5.2 Implementation of policy

- The Department of Health and Children should oversee the implementation of policy at national level. At local level, a co-ordinated multi-agency approach should be taken and the policy should be implemented through the co-ordinators of services for older people in the health boards.
- An evaluation strategy should be put in place by each responsible agency to assess whether the implementation of the policy is effective and appropriate.

5.3 Research

- A national food and nutrition consumption survey specifically targeting the older population should be carried out. Ideally, this should become an integral part of on-going national nutrition surveys.
- Research should be carried out to establish the prevalence of poor nutritional status in older people in Ireland and identify those groups with specific nutritional deficiencies.
- A validated nutritional assessment tool needs to be developed to facilitate the practical assessment of the nutritional status of older people.
- The development of reference data for anthropometry and biochemistry for older people is urgently needed.
- Recommended dietary allowances specifically for older people need to be researched and developed.
- Research is required to investigate barriers which affect access to healthy food choices for older people.

- The requirements of older people with specific poor nutritional status, e.g. dementia, should be investigated so that specific recommendations can be developed for these groups and their carers.

5.4 Dietary guidelines

- The dietary guidelines outlined in this policy (see section 3.3) should be made available to older people so that they can be used as the basis for making healthy food choices.
- These guidelines will need to be reviewed on a regular basis taking into account the findings of scientific research.

5.5 Supportive environments

- The recommendations outlined in the document “Adding Years to Life and Life to Years: A Health Promotion Strategy for Older People” (8) should be implemented. Recommendations include those for transport, income and housing, all of which affect access to healthy food choices by older people.
- The retail sector should be encouraged to initiate and extend facilities provided for the older consumer particularly in grocer shops and supermarkets. Such facilities could include the wider availability of home delivery services.
- Caterers should be familiar with healthy eating guidelines. Catering training should include nutrition information relating to the specific needs of older people.

5.6 Community action

- A dedicated nutrition health promotion programme for the specific needs of the older person should be developed and implemented at both national and local level. Community nutritionists/dieticians can facilitate this process in each health board in association with other service providers such as public health nurses and co-ordinators for services for older people.
- Those providing community meals should be aware of the specific needs and preferences of the older person. Regular monitoring of the content of community meals should be undertaken in each health board area.
- Practical easy-to follow food based dietary guidelines should be developed and made available to those caring and providing meals for older people. Family carers and those providing the home

help service for older people should be encouraged to become familiar with the dietary guidelines for older people that are contained in this policy document.

- In order to implement this policy it is essential that health professionals are educated in the principles of nutrition for older people. This will require an increased emphasis on nutrition education and recognition of the importance of nutrition as a scientific discipline in public health and medicine. In-service training should be provided on a continuous basis in association with services for older people in each health board and care facility.

5.7 Health services

A co-ordinated nutrition service for older people should be developed as a matter of urgency. It is recommended that all health boards should establish a dedicated Nutrition and Dietetic Advisory Service for older people. The Eastern Health Board provides a model of good practice in this area.

Acute hospital setting

- Hospitals that specialise in age-related health care require a dedicated nutrition and dietetic service.
- All acute hospitals should have formal access to nutrition and dietetic services for age-related health care for a specified amount of time.
- Day hospitals for older people should have formal access to a specialist in nutrition and dietetics.

Long-term care

- Formal access to nutrition and dietetic services should be provided for community hospitals and homes to assist in the provision of therapeutic diets and nutritional support. This would facilitate the monitoring of menus regularly for nutritional adequacy and suitability to the individual needs of the older person.
- Nutritional standards should be added by statute to the standards set in the Nursing Homes (Care and Welfare) Regulations, 1993 (S.I. No. 226 of 1993).
- Primary health care professionals should have formal access to nutrition and dietetic services to assist them in supporting the acutely and/or chronically ill older people in the community.
- Caterers in acute hospitals and long-term care facilities should become familiar with the specific nutritional needs of older people.

5.8 Developing personal skills

- The implementation of this policy should include the development of groups and resources at local level that include older people themselves.

APPENDIX I

Table I.I. Centiles for ideal body weight for older people

| Percentile | 65-74 years | | Over 75 years | |
|------------|-------------|-------------|---------------|-------------|
| | Male (kg) | Female (kg) | Male (kg) | Female (kg) |
| 10 | 57 | 50 | 53 | 45 |
| 20 | 62 | 54 | 57 | 49 |
| 30 | 65 | 57 | 62 | 52 |
| 40 | 68 | 60 | 66 | 56 |
| 50 | 71 | 63 | 69 | 59 |
| 60 | 75 | 66 | 72 | 62 |
| 70 | 79 | 69 | 76 | 66 |
| 80 | 84 | 74 | 78 | 69 |
| 90 | 89 | 83 | 84 | 74 |

Adapted from Lehmann *et al*, 1991 (168)

Values below the 10th centile are the level below which medical screening is recommended.

APPENDIX II

| Table II.I. Recommended Dietary Allowances | | | | | | | | | | | | | | | | | | | | | |
|---|--------------------|-----------------------|-----------------------|------------------------|---------|------------|----------|-----------|------------------------|--------|-------------------------|-----------|---------|------------|-----------|------|------|--------|----------|--------|--|
| Age | Protein | n-6 PUFA ^a | n-3 PUFA ^a | Vitamin A ^b | Thiamin | Riboflavin | Niacin | Vitamin C | Vitamin B ₆ | Folate | Vitamin B ₁₂ | Vitamin D | Calcium | Phosphorus | Potassium | Iron | Zinc | Copper | Selenium | Iodine | |
| years | g/kg body weight/d | % dietary energy | % dietary energy | µg/d | µg/d | mg/d | mg/d | mg/d | µg/g protein | µg/d | µg/d | µg/d | mg/d | mg/d | mg/d | mg/d | mg/d | mg/d | µg/d | µg/d | |
| Children | | | | | | | | | | | | | | | | | | | | | |
| 1-3 | 1.1 | 3 | 0.5 | 400 | 100 | 0.8 | 1.6 | 45 | 15 | 100 | 0.7 | 10 | 800 | 300 | 800 | 8 | 4 | 0.4 | 10 | 70 | |
| 4-6 | 1.0 | 2 | 0.5 | 400 | 100 | 1.0 | 1.6 | 45 | 15 | 200 | 0.9 | 0-10 | 800 | 350 | 1100 | 9 | 6 | 0.6 | 15 | 90 | |
| 7-10 | 1.0 | 2 | 0.5 | 500 | 100 | 1.2 | 1.6 | 45 | 15 | 200 | 1.0 | 0-10 | 800 | 450 | 2000 | 10 | 7 | 0.7 | 25 | 100 | |
| Males | | | | | | | | | | | | | | | | | | | | | |
| 11-14 | 1.0 | 2 | 0.5 | 600 | 100 | 1.4 | 1.6 | 50 | 15 | 300 | 1.3 | 0-15 | 1200 | 775 | 3100 | 13 | 9 | 0.8 | 35 | 120 | |
| 15-17 | 0.9 | 2 | 0.5 | 700 | 100 | 1.6 | 1.6 | 60 | 15 | 300 | 1.4 | 0-15 | 1200 | 775 | 3100 | 14 | 9 | 1.0 | 45 | 130 | |
| †Females | | | | | | | | | | | | | | | | | | | | | |
| 11-14 | 0.95 | 2 | 0.5 | 600 | 100 | 1.2 | 1.6 | 50 | 15 | 300 | 1.3 | 0-15 | 1200 | 625 | 3100 | 14 | 9 | 0.8 | 35 | 120 | |
| 15-17 | 0.85 | 2 | 0.5 | 600 | 100 | 1.3 | 1.6 | 60 | 15 | 300 | 1.4 | 0-15 | 1200 | 625 | 3100 | 14 | 7 | 1.0 | 45 | 130 | |
| Males | | | | | | | | | | | | | | | | | | | | | |
| 18-64 | 0.75 | 2 | 0.5 | 700 | 100 | 1.6 | 1.6 | 60 | 15 | 300 | 1.4 | 0-10 | 800 | 550 | 3100 | 10 | 9.5 | 1.1 | 55 | 130 | |
| 65+ | 0.75 | 2 | 0.5 | 700 | 100 | 1.6 | 1.6 | 60 | 15 | 300 | 1.4 | 10 | 800 | 550 | 3100 | 10 | 9.5 | 1.1 | 55 | 130 | |
| †Females | | | | | | | | | | | | | | | | | | | | | |
| 18-64 | 0.75 | 2 | 0.5 | 600 | 100 | 1.3 | 1.6 | 60 | 15 | 300 | 1.4 | 0-10 | 800 | 550 | 3100 | 14 | 7 | 1.1 | 55 | 130 | |
| 65+ | 0.75 | 2 | 0.5 | 600 | 100 | 1.3 | 1.6 | 60 | 15 | 300 | 1.4 | 10 | 800 | 550 | 3100 | 9 | 7 | 1.1 | 55 | 130 | |
| Pregnancy* | 0.75 (+10g/d) | 2 | 0.5 | 700 | 100 | 1.6 | 1.6 | 80 | 15 | 500 | 1.6 | 10 | 1200 | 550 | 3100 | 15 | 7 | 1.1 | 55 | 130 | |
| Lactation† | 0.75 (+10g/d) | 2 | 0.5 | 950 | 100 | 1.7 | 1.6 (+2) | 80 | 15 | 400 | 1.9 | 10 | 1200 | 950 | 3100 | 15 | 12 | 1.4 | 75 | 160 | |

*Second half of pregnancy; † First six months of lactation. a Polyunsaturated fatty acids; b Retinol equivalents (µg/d)

†Neural tube defects can be prevented by periconceptual ingestion of folic acid.

Source, FSAI (103)

APPENDIX III

Table 111.1. Energy requirements for moderately active adults

| Age (years) | Desirable Body Weight* (kg) | With desired physical activity (MJ/d) | Without desired physical activity (MJ/d) | Actual Body Weight** (kg) | With desired physical activity (MJ/d) | Without desired physical activity (MJ/d) |
|----------------|-----------------------------|---------------------------------------|--|---------------------------|---------------------------------------|--|
| Males | | | | | | |
| 18-29 | 66.3 | 12.5 | 11.9 | 74.6 | 13.4 | 12.7 |
| 30-59 | 66.3 | 11.5 | 10.7 | 74.6 | 12.1 | 11.3 |
| 60-74 | 63.5 | 9.2 | 8.5 | 73.5 | 10.0 | 9.2 |
| 75+ | 63.5 | 8.5 | 7.5 | 73.5 | 9.1 | 8.0 |
| Females | | | | | | |
| 18-29 | 57.3 | 9.1 | 8.5 | 62.1 | 9.6 | 9.0 |
| 30-59 | 57.3 | 8.9 | 8.3 | 62.1 | 9.2 | 8.5 |
| 60-74 | 55.5 | 7.8 | 7.2 | 66.1 | 8.5 | 7.8 |
| 75+ | 55.5 | 7.6 | 6.7 | 66.1 | 8.3 | 7.3 |

* Desirable weights for observed heights were calculated taking a Body Mass Index (BMI) of 22.

** Weighted median weights as observed in several studies (1).

Source: FSAI (103)

It is important to note that energy requirements are calculated in terms of desirable and actual body weight, and at two levels of physical activity.

APPENDIX IV

Table IV.I. Average daily intake of vitamins in UK and Ireland expressed as % of RDA.

| Living status Age group (years) | 1998 NDNS (UK) | | 1998 NDNS (UK) | | 1990 INNS (Ireland) | |
|--|----------------------------|-----------|----------------------------------|-----------|-----------------------------|-------|
| | Free living 65 and over | | Institutionalised 65 and over | | Not recorded 60 and over | |
| | Men | Women | Men | Women | Men | Women |
| Vitamin A %RDA (%RNI) | 180 (180) | 179 (179) | 152 (152) | 162 (162) | 161 | 205 |
| Thiamin %RDA (%RNI) | 142 (174) | 192 (216) | 122 (150) | 128 (145) | 136 | 133 |
| Riboflavin %RDA (%RNI) | 114 (140) | 135 (160) | 113 (138) | 127 (150) | 113 | 123 |
| Niacin %RDA (%RNI) | 182 (204) | 186 (218) | 152 (171) | 169 (197) | 204 | 214 |
| Vitamin B ₆ %RDA (%RNI) | 160 (172) | 181 (205) | 127 (154) | 146 (162) | 107 | 118 |
| Vitamin B ₁₂ %RDA (%RNI) | 435 (409) | 329 (306) | 350 (330) | 329 (305) | 329 | 343 |
| Folate %RDA (%RNI) | 93 (139) | 73 (110) | 78 (117) | 67 (100) | 63 | 59 |
| Vitamin C %RDA (%RNI) | 119 (179) | 113 (170) | 87 (130) | 92 (137) | 101 | 97 |
| Vitamin D %RDA (%RNI) | 46 (46) | 34 (34) | 39 (39) | 34 (34) | 19 | 19 |

(% of UK RNI given in brackets for intakes observed in the UK NDNS)

Source: INNS 1990 (45) and MAFF 1998 (110)

UK RNIs are generally lower than Irish RDAs (except for potassium, selenium and iodine, where RNIs are higher and retinol and cyanocobalamin where the values are the same). Table IV.I. demonstrates that average daily intakes found in the 1998 NDNS are lower than the UK RNIs for vitamin D only, but when compared to Irish RDAs insufficient intake for folate is also observed. Intakes found in the 1990 INNS were found to be insufficient for folate, vitamin D and vitamin C when compared to the Irish RDAs.

Table IV.II. Average daily intake of minerals in older people in Ireland and the UK expressed as % of RDA)

| Living status Age group (years) | 1998 NDNS (UK) | | 1998 NDNS (UK) | | 1990 INNS (Ireland) | |
|------------------------------------|----------------------------|-----------|----------------------------------|-----------|-----------------------------|-------|
| | Free living 65 and over | | Institutionalised 65 and over | | Not recorded 60 and over | |
| | Men | Women | Men | Women | Men | Women |
| Iron %RDA (%RNI) | 116 (133) | 99(102) | 96 (111) | 92 (95) | 112 | 109 |
| Calcium %RDA (%RNI) | 105 (120) | 87 (100) | 119 (136) | 108 (124) | 120 | 104 |
| Phosphorus %RDA (%RNI) | 225 (225) | 163 (180) | 218 (218) | 192 (192) | 274 | 220 |
| Magnesium* %RNI | 85 | 73 | 72 | 70 | N/A | N/A |
| Sodium* %RNI | 168 | 128 | 170 | 138 | N/A | N/A |
| Chloride* %RNI | 164 | 125 | 162 | 132 | N/A | N/A |
| Potassium %RDA (%RNI) | 78 (88) | 63 (71) | 69 (78) | 61 (69) | N/A | N/A |
| Zinc %RDA (%RNI) | 93 (93) | 100 (100) | 88 (88) | 102 (102) | 118 | 130 |
| Copper %RDA (%RNI) | 101 (93) | 79 (73) | 86 (79) | 76 (70) | N/A | N/A |
| Iodine %RDA (%RNI) | 144 (135) | 115 (107) | 149 (138) | 134 (125) | N/A | N/A |

* no Irish RDAs established

(% of UK RNI given in brackets for intakes observed in the UK NDNS)

Source: INNS 1990 (45) and MAFF 1998 (110)

UK RNIs are lower than Irish RDAs for iron and calcium, equivalent for phosphorus and zinc and higher for potassium and iodine. Therefore %RDA and %RNI differ for several minerals. Table IV.II. reveals that average daily intakes found in the 1998 NDNS (UK) are lower than the Irish RDAs for iron, potassium, calcium, zinc and copper, whereas intakes below the UK RNIs were found for iron, magnesium, potassium, zinc and copper.

Table IV.III. Daily micronutrient intakes below Reference Nutrient Intakes^a and Lower Reference Nutrient Intakes^a in free-living older people

| Nutrient | Males | | | | Females | | | |
|--|-----------|------------|-----------|-------------|-----------|------------|-----------|-------------|
| | RNI | %below RNI | LRNI | %below LRNI | RNI | %below RNI | LRNI | %below LRNI |
| Vitamin A (µg/d) | 700 | 43 | 300 | 5 | 600 | 44 | 250 | 3 |
| Thiamin ^{b,c} (mg/d) | 0.9 (0.8) | 9 (7) | 0.5 (0.5) | <0.5 | 0.8 (0.7) | 11 (8) | 0.4 (0.4) | <0.5 |
| Riboflavin (mg/d) | 1.3 | 25 | 0.8 | 5 | 1.1 | 31 | 0.8 | 9 |
| Niacin ^c (mg/d) | 16 (14) | 1 (2) | 10 (9) | <0.5 | 12 (12) | 2 | 8 (8) | <0.5 |
| Vitamin B ₆ ^{b,c} (mg/d) | 1.3 (1.2) | 9 (8) | 0.9 (0.8) | 2 (1) | 1(1.0) | 9 (12) | 0.8 (0.7) | 2 (1) |
| Vitamin B ₁₂ (µg/d) | 1.5 | 1 | 1 | <0.5 | 1.5 | 5 | 1 | 1 |
| Folate (µg/d) | 200 | 25 | 100 | 1 | 200 | 48 | 100 | 5 |
| Vitamin C (mg/d) | 40 | 28 | 10 | 2 | 40 | 36 | 10 | 1 |
| Vitamin D ^b (µg/d) | 10 | 93 | - | - | 10 | 96 | - | - |
| Calcium (mg/d) | 700 | 35 | 400 | 5 | 700 | 57 | 400 | 9 |
| Phosphorus (mg/d) | 550 | 1 | 310 | <0.5 | 550 | 3 | 310 | <0.5 |
| Potassium (mg/d) | 3500 | 85 | 2000 | 17 | 3500 | 97 | 2000 | 39 |
| Iron (mg/d) | 8.7 | 27 | 4.7 | 1 | 8.7 | 54 | 4.7 | 5 |
| Zinc (mg/d) | 9.5 | 62 | 5.5 | 8 | 7 | 59 | 4 | 5 |
| Copper (mg/d) | 1.2 | 72 | - | - | 1.2 | 89 | - | - |
| Iodine (µ/d) | 140 | 30 | 70 | 2 | 140 | 52 | 70 | 6 |
| Magnesium (mg/d) | 300 | 72 | 190 | 21 | 270 | 87 | 150 | 23 |
| Sodium* (mg/d) | 1600 | 7 | 575 | 0 | 1600 | 22 | 575 | 0 |
| Chloride** (mg/d) | 2500 | 8 | 890 | 0 | 2500 | 25 | 890 | 0 |

*80% of men and 49% of women had intakes higher than 2000 mg/d

**83% of men and 52% of women had intakes higher than 3000 mg/d

a Values for men and women aged 50 years and over (values in brackets for people aged 75 years and over)

b Values are for men/women aged 65 years and over

c Values in brackets for people aged 75 years and over

Source: 1998 MAFF (110)

Table IV.IV. Daily micronutrient intakes below Reference Nutrient Intakes^a and Lower Reference Nutrient Intakes^a in institutionalised older people

| Nutrient | Males | | | | Females | | | |
|--|-----------|------------|-----------|-------------|-----------|------------|-----------|-------------|
| | RNI | %below RNI | LRNI | %below LRNI | RNI | %below RNI | LRNI | %below LRNI |
| Vitamin A (µg/d) | 700 | 30 | 300 | 1 | 600 | 23 | 250 | 1 |
| Thiamin ^{b,c} (mg/d) | 0.9 (0.8) | 17 (N/A) | 0.5 | <0.5 | 0.8 (0.7) | 13 (N/A) | 0.4 | <0.5 |
| Riboflavin (mg/d) | 1.3 | 26 | 0.8 | 3 | 1.1 | 14 | 0.8 | 3 |
| Niacin ^c (mg/d) | 16 (14) | 8 (N/A) | 10 (9) | <0.5 | 12 | 2 | 8 (8) | <0.5 |
| Vitamin B ₆ ^{b,c} (mg/d) | 1.3 (1.2) | 18 (N/A) | 0.9 (0.8) | 1 | 1 | 9 | 0.8 (0.7) | 2 |
| Vitamin B ₁₂ (µg/d) | 1.5 | 1 | 1 | 0 | 1.5 | 2 | 1 | 0 |
| Folate (µg/d) | 200 | 41 | 100 | 4 | 200 | 53 | 100 | 5 |
| Vitamin C (mg/d) | 40 | 37 | 10 | 1 | 40 | 48 | 10 | >0.5 |
| Vitamin D ^b (µg/d) | 10 | 98 | - | - | 10 | 99 | - | - |
| Calcium (mg/d) | 700 | 22 | 400 | <0.5 | 700 | 28 | 400 | 1 |
| Phosphorus (mg/d) | 550 | <0.5 | 310 | 0 | 550 | 1 | 310 | 0 |
| Potassium (mg/d) | 3500 | 94 | 2000 | 27 | 3500 | 98 | 2000 | 40 |
| Iron (mg/d) | 8.7 | 41 | 4.7 | 5 | 8.7 | 62 | 4.7 | 6 |
| Zinc (mg/d) | 9.5 | 65 | 5.5 | 13 | 7 | 48 | 4 | 3 |
| Copper (mg/d) | 1.2 | 86 | - | - | 1.2 | 91 | - | - |
| Iodine (µg/d) | 140 | 28 | 70 | 1 | 140 | 42 | 70 | 1 |
| Magnesium (mg/d) | 300 | 90 | 190 | 39 | 270 | 96 | 150 | 22 |
| Sodium* (mg/d) | 1600 | 10 | 575 | 0 | 1600 | 17 | 575 | 0 |
| Chloride** (mg/d) | 2500 | 11 | 890 | 0 | 2500 | 20 | 890 | 0 |

*77% of men and 53% of women had intakes higher than 2000 mg/d

**76% of men and 53% of women had intakes higher than 3000 mg/d

a Values for men and women aged 50 years and over (values in brackets for people aged 75 years and over)

b Values are for men/women aged 65 years and over

c Values in brackets for people aged 75 years and over

Source: 1998 MAFF (110)

APPENDIX V

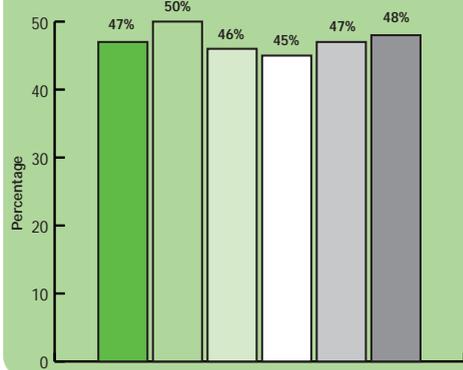
Table V.I. Percentage of Irish population over 55 years per social class meeting food pyramid recommendations

Social class distribution of SLÁN and Census 1996:

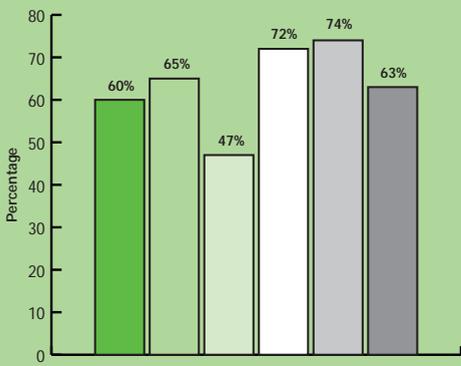
| | Census | SLÁN |
|-----------------------------|--------|------|
| | % | % |
| SC1 : Professional workers | 7 | 7 |
| SC2 : Managerial; technical | 29 | 37 |
| SC3 : Non-manual | 24 | 19 |
| SC4 : Skilled manual | 11 | 18 |
| SC5 : Semi-skilled | 17 | 13 |
| SC6 : Unskilled | 11 | 7 |

| | |
|----------------|------------------|
| ● Males SC 1-2 | ○ Females SC 1-2 |
| ○ Males SC 3-4 | ○ Females SC 3-4 |
| ○ Males SC 5-6 | ● Females SC 5-6 |

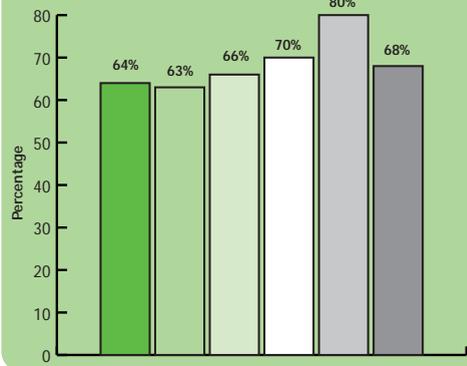
Percentage consuming recommended 6+ servings per day of cereals, bread and potatoes.



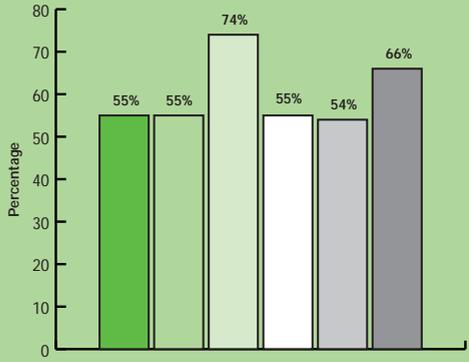
Percentage consuming recommended 4+ servings of fruit and vegetables per day



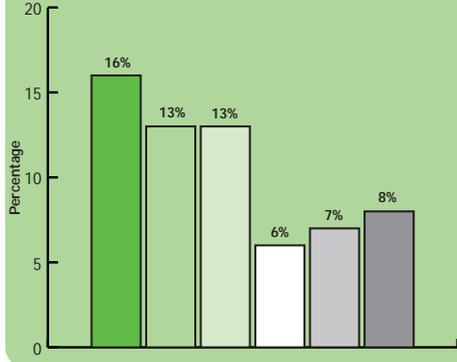
Percentage consuming recommended 2 or less servings of meat, fish or poultry per day



Percentage consuming recommended 3 or less servings of dairy products per day



Percentage consuming fried foods more than 4 times per week



Source: Health Promotion Unit, Department of Health and Children, Ireland, 1999 (107)

GLOSSARY

Alkali:

A substance (hydroxide or carbonate of an alkali metal) having marked basic properties.

Alkaline:

Of, relating to, containing or having the properties of an alkali or alkali metal; having a pH of more than 7.

Anaemia:

A condition in which the blood is deficient in red blood cells, in haemoglobin, or in total volume.

Anthropometry:

The technique whereby the composition of the body can be measured.

Antioxidant:

Any of various substances (as beta-carotene, vitamin C and alpha-tocopherol) that inhibit oxidation or reactions promoted by oxygen and peroxides, and that include many held to protect the living body from the deleterious effects of free radicals.

Arthritis:

Inflammation of joints due to infectious, metabolic or constitutional causes.

Blood pressure:

Pressure exerted by the blood upon the walls of the blood vessels, especially arteries.

BMI (Body Mass Index):

Weight in kilogram divided by height measured in meters squared. This is used to relate weight to the height of an individual.

C-reactive protein:

A protein present in blood serum in various abnormal states (as inflammation or tumorous condition).

Cardiovascular:

Of, relating to or involving the heart and blood vessels.

Cataract:

A clouding of the lens of the eye or its surrounding transparent membrane that obstructs the passage of light.

Chelate:

A compound having a ring structure that usually contains a metal ion held by co-ordinate bonds.

Cognitive:

Of, relating to or being conscious intellectual activity (as thinking, reasoning, remembering, imagining, or learning words).

Coronary Heart Disease:

A condition that reduces the blood flow through the coronary arteries to the heart muscle.

Diabetes Mellitus:

A variable disorder of carbohydrate metabolism caused by a combination of hereditary and environmental factors. Usually characterised by inadequate secretion or utilisation of insulin, by excessive urine production, by excessive amounts of sugar in the blood and urine, and by thirst, hunger and loss of weight.

Decubitus:

Prolonged lying down (as in bed).

Dementia:

A condition of deteriorated mentality that is characterised by marked decline from the individual's former intellectual level and often by emotional apathy.

Demography:

The study of mankind collectively, especially of geographical distribution and physical distribution.

DRV (Dietary Reference Value):

A term used in reference to RNI, LRNI, EAR and safe intake (see below).

Dysphagia:

Difficulty in swallowing.

EAR (Estimated Average Requirement):

Of a group of people for energy or protein or a vitamin or mineral. About half will usually need more than the EAR, and half less.

Gastrointestinal tract:

The stomach and intestine as a functional unit.

Haematology:

A medical science that deals with the blood and blood-forming organs.

Haemorrhoids:

A mass of dilated veins in swollen tissue at the margin of the anus or nearby within the rectum.

HDL (High-Density Lipoprotein):

A lipoprotein of blood plasma that is composed of a high proportion of protein with little triglyceride and cholesterol.

Incidence:

The rate of occurrence of new cases of a particular disease in a population being studied.

LDL (Low-Density Lipoprotein):

A lipoprotein of blood plasma that is composed of a moderate proportion of protein with little triglyceride and a high proportion of cholesterol.

Leukopenia:

A condition in which the number of leukocytes circulating in the blood is abnormally low and which is most commonly due to a decreased production of new cells in conjunction with various infectious diseases, as a reaction to various drugs or other chemicals, or in response to irradiation.

Lipoprotein:

Any of a large class of conjugated proteins composed of a complex of protein and lipid.

LRNI (Lower Reference Nutrient Intake):

The amount of a nutrient that is enough for only a few people in a group who have low needs.

Macronutrient:

These are nutrients which are required in large amounts and are the main sources of energy in the diet, e.g. carbohydrate, protein, fat and alcohol.

Macular degeneration:

A loss of central vision in both eyes produced by pathological changes in the macula lutea and characterised by spots of pigmentation or other abnormalities.

Malabsorption:

Faulty absorption of nutrient materials from the alimentary canal.

Micronutrient:

These nutrients are required in small amounts and are needed for optimal body function e.g. vitamins and minerals.

Mineral:

A solid homogeneous crystalline chemical element or compound that results from the inorganic processes of nature.

Morbidity:

The incidence of disease: the rate of sickness (as in a specified community or group).

Mortality:

The number of deaths in a given time or place; mortality rate/death rate: the proportion of deaths to population.

Neutropenia:

Leukopenia in which the decrease in white blood cells is chiefly in neutrophils.

Nutritional Assessment:

Methods used to determine the nutritional status of an individual.

Obesity:

A condition characterised by excessive bodily fat.

Osteoporosis:

A condition that is characterised by decrease in bone mass with decreased density and enlargement of bone spaces producing porosity and fragility.

Parenteral:

Situated or occurring outside the intestine (parenteral drug administration by intravenous, intramuscular or subcutaneous injection).

Prevalence:

The percentage of a population that is affected with a particular disease at a given time.

Peptic Ulcer:

An ulcer in the wall of the stomach or duodenum resulting from the digestive action of the gastric juice on the mucous membrane when the latter is rendered susceptible to its action.

Polypharmacy:

The use of several prescribed and/or non-prescribed drugs at the same time.

RDA (Recommended Dietary Allowance):

The level of intake of nutrients that, on the basis of scientific knowledge, are judged to be adequate to meet the known nutrient needs of practically all healthy persons.

RNI (Reference Nutrient Intake):

The amount of a nutrient that is enough or more than enough for about 97% of people in a group.

Safe Intake:

A term used to indicate intake or range of intakes of a nutrient for which there is not enough information to estimate RNI, EAR or LRNI. It is an amount that is enough for almost everyone but not so large as to cause undesirable effects

Stroke:

Sudden diminution or loss of consciousness, sensation and voluntary motion caused by rupture or obstruction (as by a clot) of an artery of the brain.

Trace element:

A chemical element present in minute quantities; one used by organisms and held essential to their physiology.

Vitamin:

Any of various organic substances that are essential in minute quantities to the nutrition of most animals and some plants, act especially as coenzymes and precursors of coenzymes in the regulation of metabolic processes but do not provide energy or serve as building units, and are present in natural foodstuffs or are sometimes produced within the body.

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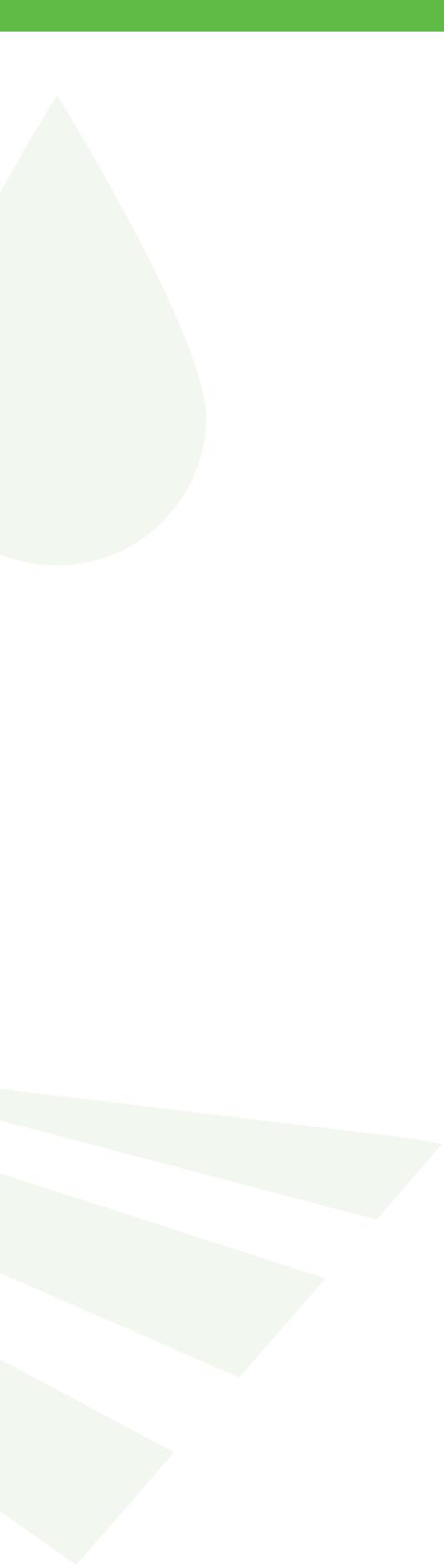
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*Note: Mr Mulkerrin resigned from the
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NOTES

NOTES



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