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## **ANNEX 3**

# **Food-based dietary guidelines for older adults**

Healthy ageing and prevention of chronic noncommunicable diseases

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## **A3.1 Introduction**

Instead of making recommendations about the dietary advice that older persons should receive, this section concentrates on some of their key nutritional problems which should be taken into account when developing country- and cuisine-specific food-based dietary guidelines. Australia, Japan and the USA are used as examples given the number of relevant studies available for these countries. The process by which food-based dietary guidelines should be developed, implemented and monitored is discussed in greater detail elsewhere (1).

The nutritional needs of an ageing population require special attention. Energy expenditure declines with age; thus, to achieve energy balance, less energy needs to be consumed. This reduction in energy intake can have an adverse effect on the nutritional status of older people unless high nutritional quality foods are eaten, such as fish, lean meat, eggs, low-fat dairy products, whole-grain cereals, seeds, nuts, legumes, fruits and vegetables.

Consuming foods that are rich in nutrients and other bioactive components (such as phytochemicals) may also help to protect against major age-related disorders such as immunocompetence and cognitive impairment (2–3). However, being free of illness does not necessarily ensure good quality of life as one ages. Mobility, independence, cognitive function, psychological state, and social relations and networks are also very important (4–8), and they need to be maintained—in part through good nutrition—well into old age.

## **A3.2 Is it too late to give dietary advice to older persons?**

At age 65 men and women in high-income countries still have a life expectancy of around 15 and 19 years, respectively. The older one becomes, the longer one is likely to live, and thus, by the time men and women reach age 75, life expectancy is still 9 and 11 years, respectively. A common assumption is that changes in lifestyle

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to improve health are no longer worthwhile in old age, and that the remaining years are insufficient to reap the benefits of dietary modifications. Yet the prevalence of heart disease, diabetes, hypertension, obesity and arthritis is highest in the older population. Intervention trials demonstrate that there are still worthwhile health advantages for older persons in changing risk factors—e.g. smoking cessation, weight reduction, sodium restriction, saturated fat reduction—and that these changes make later years healthier, more active and less dependent (9).

### **A3.3 Food-based dietary guidelines**

Most dietary guidelines are based on individual nutrients (fat, alcohol, salt, sugar, calcium and iron) and food groups (e.g. eat more vegetables and cereals, consume less fat). However, food-based dietary guidelines go beyond nutrients and food groups; they include the way foods are produced (agriculture), prepared (cuisine), processed (the food industry) and developed (novel/functional foods). Such guidelines are both practical and user-friendly because they consider traditional foods and dishes and, most importantly, specific cuisines. This paradigm shift is likely to make a significant contribution to human health, to help maintain cultural diversity and to optimize nutritional status in a sustainable environment. The aim of food-based dietary guidelines is to reduce chronic malnutrition, micronutrient malnutrition, and diet-related communicable and noncommunicable diseases (1, 10).

National nutrient-based dietary guidelines have met with only moderate success since they fail to include key factors such as traditional foods and dishes, eating patterns, food availability and sustainable food production. Furthermore, providing consumers dietary guidelines that are primarily nutrient focused can have unintended consequences. For example, advice to avoid too much fat can be interpreted as guidance to eliminate *all* sources of dietary fat rather than to choose leaner versions of foods that remain important nutrient sources.

Food-based dietary guidelines provide an opportunity to improve the effectiveness of nutrition education for the general public. They do this by taking into account information concerning both food consumption and nutrient intake and by incorporating this knowledge within a culturally sensitive framework (11). Food-based dietary guidelines allow the principles of nutrition education to be expressed, qualitatively and quantitatively, mostly as foods and culture-specific dishes, thereby making them as practical as possible. Since the guidelines are intended for use by individuals, they can largely avoid using technical terms of nutritional science.

Country- and cuisine-specific food-based dietary guidelines focus directly on diet and disease relationships of particular relevance to individual countries. For example, specific priorities to be addressed through food-based dietary guidelines depend on whether public health concerns relate to dietary insufficiency or excess

or, indeed, to a combination of both. They also need to consider social, economic, agricultural and environmental factors affecting food availability and eating patterns, while recognizing that more than one dietary pattern is consistent with health (10).

Food-based dietary guidelines encourage the maintenance of healthy traditional dishes and cooking practices. They are sensitive to local agriculture and whether it can support the guidance provided. Such guidelines can also take into account the positive and negative nutritional effects that follow changes in dietary patterns, e.g. post-migration changes to traditional diets and acculturation to mainstream diets. Food-based dietary guidelines can be structured to enable a population to meet recommended dietary intakes of all known essential nutrients, especially where nutrient deficiency has been linked to diet-related public health problems, e.g. essential fatty acids or folic acid and cardiovascular disease (12, 13).

Furthermore, diet-related disorders are dependent not only on increased intakes of detrimental foods, e.g. fatty meat, full-fat dairy products, but also on reduced intakes of protective foods such as fish (14, 15), fruits and vegetables, and beverages such as tea (16, 17). Because the protective-food approach to chronic noncommunicable diseases (CNCD) is poorly developed in nutritional science, the food-based dietary guideline approach has a considerable advantage over the nutrient-based approach. Food variety is probably the best available encapsulation of the food-based dietary guideline approach to reducing detriment to health and enhancing health protection through diet (18–20).

In addition to national food-based dietary guidelines, policy-makers and health care professionals can use dietary guidelines expressed in terms of quantitative nutrient and food component recommendations. Government bodies responsible for developing food-based dietary guidelines are encouraged to integrate these messages with other health-related policies, e.g. smoking cessation, increased physical activity and lowered alcohol consumption. To review these issues in practical policy terms, FAO and WHO jointly organized a consultation on the preparation and use of food-based dietary guidelines. The consultation's report provides for a reorientation from nutrients to foods in developing dietary guidelines (10); their implementation is discussed elsewhere (1).

### **A3.4 Selecting a target group for food-based dietary guidelines**

Selecting a target group for establishing food-based dietary guidelines will have a major influence on their form and content mode of dissemination. Target groups can be categorized according to three levels (21):

- General, e.g. older children and adults.
- Specific, e.g. pregnant/lactating women, infants, preschool children, older persons, vegetarians.

- Patients with certain disorders or diseases, e.g. diarrhoea, atherosclerosis, and liver and renal diseases.

Food-based dietary guidelines need to show that, although serving sizes will vary according to age groups, a family can eat together from a common plate. Foods and snacks eaten alone may have to be targeted. It may be better to have one set of guidelines within which special mention is made of specific age, or otherwise vulnerable, groups, or that deal with their needs via supplementary guidelines. Health professionals can use therapeutic or curative guidelines on a one-to-one basis or for small-group counselling for patients with certain disorders or diseases. If therapeutic or curative guidelines are developed, they probably should not be referred to as dietary guidelines. Another name, for example therapeutic guidelines, would be preferable.

In Australia there are specific dietary guidelines for adults and children, and working groups that deal with aboriginal nutrition and obesity. Dietary guidelines for older persons and pregnant women have also been identified as priority areas. However, Japan is the only country with specific dietary guidelines for older persons (22), including the following main recommendations.

Beware of undernutrition; a decrease in weight is a warning sign.

- Make your diet more enjoyable through appropriate cooking; eat a variety of foods and avoid overeating.
- Start with entrees and vegetable dishes; entrees and vegetable dishes are nutritionally more important.
- Eat regularly; take your time to finish each meal; do not skip meals.
- Be active; food tastes better when you are hungry.
- Increase your nutritional knowledge; nutritional knowledge keeps you young and healthy.
- Enjoy your life and enjoy your food; live a full and healthy life.

### A3.5 Health concerns covered by food-based dietary guidelines for older adults

As socioeconomic circumstances have improved and effective disease-control programmes have been implemented, survival beyond childhood has increased. The resulting demographic transition (23) is characterized by increased life expectancy and a larger proportion of the population moving into the age range where CNCDs became the major cause of ill-health and death. At the same time, there has been an epidemiological transition in diseases due to dietary shifts and a higher prevalence of other risk factors for CNCDs.

A recent report on the global burden of disease (24) forecast that deaths from communicable, perinatal, maternal and nutritional conditions will decrease globally

by one-third between 1990 and 2020. In contrast, deaths from CNCDs, including heart disease and depression, will *increase* twofold, as will deaths from injuries due to accidents. By 2020, tobacco is expected to cause more premature deaths and disability than any other single factor. These forecasts are conditioned by the rapid ageing of populations in low-income countries. As birth rates fall, the number of adults increases relative to the number of children, and the most common health problems become those of older adults.

Many countries face health risks that are associated with traditional environmental exposures (e.g. poor sanitation), modern agricultural hazards (e.g. pesticide contamination of water and food) and urbanization and industrialization (e.g. CNCDs). While some populations are grappling with problems of undernutrition (e.g. Papua New Guinea, Philippines) still others are beset more by health problems associated with over-nutrition (e.g. Australia, Hong Kong Special Administrative Region of China, New Zealand and Singapore). Countries undergoing nutrition transition are confronted simultaneously by both the old problems of nutrient deficiencies and the new problems of overnutrition (e.g. China, Malaysia, Thailand and China (Province of Taiwan)) (25). Currently, dietary guidelines around the world typically tend to focus on specific CNCDs (26):

- Obesity (especially abdominal)
- Diabetes (or impaired glucose tolerance)
- Cardiovascular disease
- Certain cancers (lung, breast, colorectal, prostate, pancreas and brain)
- Osteopenia and osteoporosis

A new wave of health problems and diseases requires nutritional analyses and a systematic review of dietary guidelines (1, 2); they include:

- Ageing and age-associated frailty
- Protracted menopause with increased longevity in women
- Cognitive impairment and dementia
- Behavioural and psychological disorders (especially in the light of increasing urbanization)
- New infectious diseases
- Environmental diseases (due to chemical residues, atmospheric pollution and damage to the ecosystem)
- Risks and benefits of new foods.

The challenge is to minimize new health problems through environmentally sensitive food-based dietary guidelines, which people themselves understand and control. The quest for new foods to improve health (e.g. in relation to certain

CNCDs) may create new problems where risk-benefit analysis has been inadequate or where consequences are unintended.

There is growing awareness of nutrition's contribution to the major health problems of older persons (1, 2), including:

- Protein-energy dysnutrition
- Immune dysfunction
- Macrovascular diseases
- Insulin resistance syndromes
- Renal impairment
- Arthritis
- Osteopenia and fractures
- Neoplastic disease
- Cognitive impairment
- Mood disturbance and depression
- Visual impairment

Several health problems and bodily changes that are typically attributed to the normal ageing process are increasingly recognized as being linked to lifestyle or environmental factors. For example, the decline in lean body mass and the increase in body fat that tend to occur as people age cannot be entirely attributed to the ageing process *per se*. The decline in physical activity with advancing age contributes to a loss of muscle and a decline in basal metabolic rate. Not only is the burden of CNCDs among older persons generally greater than in younger age groups, but associated body compositional disorders, together with loss of lean and bone mass, also contribute to frailty.

#### A3.5.1 *Compression of morbidity towards the end of life*

Buskirk's review of data on health maintenance and exercise (27) supports the assumption that regular exercise blunts many aspects of the psychological decline associated with ageing and improves a sense of well-being and quality of life. Adoption of a healthy physically active lifestyle contributes to a principal health goal for successful ageing, which is to compress morbidity towards the end of life (28).

Physical activity among older persons is associated with greater energy intakes, improved nutrient intakes and better quality of life (29). Prospective studies show that greater energy intakes balanced with adequate physical activity contribute to decreased cardiovascular disease (30–32), total mortality (33) and improved life expectancy (34). Increasing energy intake runs counter to the disturbing view that restricting energy somehow prolongs life. Rats have been subjected to energy-

restricting diets for this purpose, but this approach has no direct application to humans (35). Furthermore, energy restriction in older persons may contribute to frailty and loss of lean mass.

#### A3.5.2 *Frailty and sarcopenia*

Frailty is the most usual descriptor of reduced quality of life and morbidity among older persons; it is more likely to be avoided where physical activity (simple endurance activity such as walking combined with strengthening exercises) and adequate food intake are combined (36). Loss of lean mass, accompanied by falls and fractures and proneness to infection (37, 38), is the principal nutritional concern for older persons worldwide (39, 40). The decline in lean body mass is due largely to a loss in skeletal muscle known as sarcopenia (41), whose prevalence, incidence and cause require further study (42).

Protein requirements of older people may be higher than currently recommended levels (0.75 g protein/kg per day). An estimated mean protein requirement (for older people) of 0.91 protein/kg per day was calculated after reassessing data from three retrospective N-balance studies of older subjects and new data from Campbell et al. (43). In another study, older women were shown to adapt to marginal protein intakes (0.45 g protein/kg per day) by moving towards N equilibrium after 9 weeks. However, during this period there was a decline in lean tissue, immune response and muscle function. In the same study, women in N balance consuming 0.92 g protein/kg per day showed improvements in immune response and muscle function (44).

#### A3.5.3 *Disordered eating*

Disordered eating differs from established eating problems. In older adults, there may be an inappropriate sense of a need for weight change. However, excess fat for older people, although contributing to certain health problems, may be of less concern than a loss of lean mass. Factors contributing to disordered eating behaviour include prolongation of a minor eating disorder from earlier in life, preoccupation with the major morbidities and mortalities associated with later life, social isolation, physical handicaps, emotional difficulties and impaired cognitive function (45, 46).

#### A3.5.4 *Immune dysfunction*

The decline observed in immune function with ageing may be prevented with nutrient intakes greater than those currently recommended for normal health (37). Nutrients which are especially important in immune function include protein (44, 47), zinc (48), vitamin C, vitamin B6 and tocopherols (49). Other food components not usually considered to be essential for health may become so with age. For example, glutamine, which is a non-essential amino acid stored primarily in skeletal

muscle (50), is utilized by intestinal cells, lymphocytes and macrophages, and is required for DNA and RNA synthesis (51). The rate of glutamine formation and availability can be compromised in older persons as a consequence of the reduced contribution of skeletal muscle to whole-body protein metabolism, thereby adversely affecting immune function and resulting in a less favourable response to infection or trauma (51). Glutamine can be synthesized from glutamic acid found in wheat, soybeans, lean meat and eggs. Glutathione (52) and flavonoids (53) also appear to play a role in immune function. Meat is a good source of glutathione, and moderate amounts are also found in fruits and vegetables. Whey proteins, although low in glutathione, are capable of stimulating endogenous glutathione production (54).

### A3.5.5 Cognitive impairment

Long-term moderate (i.e. subclinical) nutrient deficiencies appear to contribute to memory impairment and declining immunity in older adults. On the other hand, dementia may result in nutritional deficiencies. Rosenberg & Miller (41) point to the growing evidence supporting the view that good nutritional status is an important determinant of quality of life because of its effect on the nervous system. For example, a healthy nervous system will maintain physical mobility, cognitive, psychological and visual function. Vitamins B6, B12 and C, and folate, riboflavin, thiamine and iron are needed for physical mobility and cognitive function (55). In a 20-year follow-up study of a community of older residents, cognitive function (independent of age, illness, social class or other dietary variables) was poorest in those persons with the lowest vitamin C status, whether measured by dietary intake or plasma ascorbic acid concentration (56). Vitamin K may also protect against cognitive decline and Alzheimer dementia (57).

Using the Mini-Mental State Examination and Pfeiffer's Mental Status Questionnaire developed by Folstein et al. (58), the cognitive status of a group of older adults from Madrid was found to be better in those consuming a more satisfactory diet (59), i.e. greater total food intake, especially of fruits and vegetables. Prevention of cognitive loss or dementia poses a particular challenge in older people. Some deterioration can be attributed to atherosclerotic disease and thus interventions such as aspirin usage or particular dietary patterns that reduce cardiovascular risk may also help prevent dementia.

### A3.5.6 Mood disturbance and depression

There is a growing body of evidence suggesting that  $\omega$ -3 polyunsaturated fatty acids play an important role in the etiology of depression (60, 61). Two studies have shown a positive correlation between the ratio of arachidonic acid to eicosapentaenoic acid (in plasma and erythrocyte membrane phospholipids) and the severity of depression (62, 63). In another study, a significant negative correlation

was found between dietary  $\omega$ -3 intake and the severity of depression (64). Fish and leafy vegetables (especially wild leafy greens) are a good source of  $\omega$ -3 polyunsaturated fatty acids. Caffeine ingested either as tea or coffee has been shown to improve mood and reduce anxiety (65).

## A3.6 Developing food-based dietary guidelines for older adults

### A3.6.1 The value of traditional cuisine

It is clear that people of all nations and food cultures can enjoy comparable life expectancy and morbidity rates (10, 40, 65). The challenge lies in identifying those common food factors and patterns that reduce morbidity and mortality, thereby enabling the development of culture-specific food-based dietary guidelines that promote healthier traditional foods and dishes. Some adverse characteristics of traditional diets may have developed due to a lack of refrigeration and other food-preservation methods, or because of the limited availability of certain foodstuffs.

In the 1960s Greeks, followed by the Japanese, had the longest life expectancy in the world. The traditional Greek diet was associated with very low rates of coronary heart disease and cancers of the colon and breast (17). The intake of fish, legumes, cereals and alcohol in both countries was probably protective against coronary heart disease, whereas a high intake of salty foods/dishes contributed to increased risk of stroke and stomach cancer in Japan. Today the Japanese have the world's longest life expectancy, which has been attributed in part to their increased intake of fruit and fat and reduced intake of salty traditional dishes.

Prospective cohort studies conducted among older people in rural Greece (67), and in urban Australia (Melbourne) (68) and Denmark (Roskilde) (69), found that adherence to the traditional Greek food pattern was associated with lower overall mortality and longer survival. With a final score ranging between 0–8, the traditional Greek food pattern was rated in terms of eight variables: high consumption of vegetables; high consumption of legumes; high consumption of fruits; high consumption of cereals; low consumption of dairy products; low consumption of meat and meat products; moderate ethanol consumption; and a high mono-unsaturated: saturated fat ratio. A high score for the Greek food pattern was significantly associated with a sharply reduced risk of death, by 17–23% per one-unit increase and by more than 50% per four-unit increase in the different cultural settings. Whether further mortality benefit would have been obtained in the non-Greek cohorts if foods had been prepared according to Greek cuisine standards requires further study. Nevertheless, these studies suggest that the traditional Greek food pattern is transplantable to other dietary cultures and may have a substantial beneficial impact on the general mortality of older people with westernized dietary habits (70).

Traditional cuisines are often endangered cuisines because they are regarded as too old fashioned or time-consuming to prepare. With the submergence of

traditional cuisines by other, more dominant, contemporary cuisines, we are increasingly witnessing a kind of culinary imperialism. This dilution of culture is occurring all over the world, especially in low-income countries (71). The younger generation, especially in urban regions of low-income countries, appears to be rejecting traditional foods in favour of western high fat convenience foods (72). Whether this trend is correlated with anecdotal evidence that cooking skills are being lost, or that there is no time to cook, requires further investigation.

Multicultural Australia is a melting pot of culinary influences without a distinct Australian cuisine identity. However, Mediterranean and Asian cuisines are very popular. For example, the average Australian consumes Italian pasta dishes, pizza, and Asian stir-fry and noodle dishes throughout the week. Innovative Australian chefs are creating new dishes by combining the two cuisines where East meets West. It is forecast that the Eurasian cuisine developing in Australia and on the west coast of Canada and the USA will profoundly influence twenty-first century global cuisine. This has important implications for food-based dietary guidelines since it provides an opportunity to develop a super diet that includes the healthiest traditional foods and dishes from Asia and the Mediterranean region, and novel Eurasian dishes. The hope is that this will translate into longer and healthier lives for greater numbers.

### A3.6.2 Food habits of older persons, today and in the future

Contrary to the popular tea and toast myth, it appears that most older persons residing outside of institutions eat reasonably well (9, 40, 66, 73). Energy intakes fall with advancing age, but average protein intakes remain adequate. The dietary patterns of older adults have generally been found to be similar to, or even healthier than, those of the younger generation (Table 1 and Table 2). Compared with their younger counterparts, and after controlling for energy intake, Australians aged 60 years and over were found in 1993 to have (74):

- A higher dietary density of breakfast cereals, breads and crackers (women only), fruit and fruit juice, vegetables, chicken, fish and eggs.
- A lower dietary density of rice and pasta, take-away foods and soft drinks.
- A similar dietary density of cakes, biscuits, confectionery, dairy, ice cream, processed meats, red meat, organ meats, spreads and sauces.

In contrast, in the USA there appears to be a stronger preference for sweets, cakes, pies, and some vegetables and fruits among older adults than in younger age groups (79). The analysis reported by Popkin et al. (80) indicates that older Americans have made dietary changes during the last decade that parallel those made by the rest of the population, i.e. a decreased intake of meat, and an increased intake of low-fat milk, low calorie beverages and take-away foods.

Some subgroups within older populations (e.g. older men living alone, those

Table 1.<sup>a</sup> Mean daily food intakes of older Australians, compared to their middle-aged counterparts, in 1995<sup>1</sup>

N	65 and over		25-44 years		Recommended intake (g/day) <sup>2</sup>
	M 3337	F 2926	M 4189	F 3321	
Cereals (e.g. rice, cakes)	200	150	230	170	> 210 g
Fruit (not juice)	179	176	127	132	300 g
Vegetables (not juice)	282	244	275	220	300-375 g
Milk products	340	300	390	300	450 g
Meat/poultry	146	95	212	121	85 g <sup>3</sup>
Fish & seafood	26	20	28	20	40 g <sup>4</sup>
Legumes (+ tofu)	9	3.6	11	8.4	> 30 g <sup>4</sup>
Nuts/seeds (e.g. peanut butter)	3	2	7	4	> 10 g <sup>4</sup>
Egg products	14	10	16	12	30 g or 2-4 eggs/ week
Snack foods (e.g. crisps)	0.8	0.4	4	4.4	
Sugar products (jam, sherbet)	28	17	22	14	
Confectionery (e.g. chocolate)	4	4	11	10	
Fats/oils	17	12	14	9	1-2 table- spoons (~30g)
Soup	77	69	40	53	
Savoury sauces	25	20	37	27	
Non-alcoholic beverages (e.g. tea, juice, water)	1644	1714	2162	2004	
Alcohol (pure)	15	5	20	8	men 20 g; women 10 g

<sup>a</sup> Reproduced from reference 110 with the permission of the publisher.

<sup>1</sup> Australian Bureau of Statistics (77).

<sup>2</sup> Cashel & Jefferson (75); Wahlqvist & Kouris-Blazos (76). Foods were converted to equivalents in core food groups as follows: 30 g bread is equivalent to 90 g cooked rice/pasta or 20 g breakfast cereal; 150 g fruit is equivalent to one medium fruit (apple, orange, banana, 2 apricots, 1 cup diced pieces, edible portion); 75 g cooked vegetables is equivalent to 1/2 cup or 1 cup salad vegetables; 250 ml milk is equivalent to 1/2 cup evaporated milk or 40 g cheese or small tub (200 g) of yoghurt.

<sup>3</sup> In core food groups, 85 g/day of meat and meat equivalents are recommended. This includes red and white meat, eggs and legumes, e.g. 35 g cooked meat is equivalent to 40 g cooked fish fillet or 1/4 cup cooked beans or 1/3 cup nuts.

<sup>4</sup> Based on epidemiological studies of long-lived populations e.g. Greeks in Greece (Crete) in the 1960s, Greek-Australians, Japanese and vegetarians.

Table 2.<sup>a</sup> Mean daily nutrient intakes of older Australians, compared to their middle-aged counterparts, in 1995<sup>1</sup>

N	65 and over		25–44 years		Recommended Intake <sup>2</sup>	
	M 3337	F 2926	M 4189	F 3321	65+ 19–64 years	19–64 years
<b>Nutrients</b>						
Energy kJ	8510	6370	11725	7875		
Protein % E	17	17.6	17	17	10–15	10–15
Total Fat % E	32	32	33	33	< 30	< 30
Saturated % E	2	12	13	13	< 10	< 10
Monounsaturated % E	11	11	12	12	10–15	10–15
Polyunsaturated % E	5	5	5	5	6–10	6–10
Carbohydrate % E	46	47	45	47	50–60	50–60
Total sugars % E	21	22	19	20	< 15	< 15
Total starch % E	25	26	26	26	40–50	40–50
Dietary fibre g	24	20	26	20	> 30	> 30
Alcohol % E	5	2	3	4	< 3	< 3
Vitamin A RE (µg)	1310	1064	1334	1038	750	750
Thiamin (mg)	1.6	1.2	2.1	1.4	0.9,0.7	1.1,0.8
Riboflavin (mg)	2.0	1.6	2.5	1.8	1.3,1.0	1.7,1.2
Niacin equivalent	39	39	54	35	16,11	19,13
Folate (mg)	280	225	311	227	200	200
Vitamin C (mg)	127	111	133	108	40,30	40,30
Calcium (mg)	796	686	990	762	800,1000	800
Phosphorus (mg)	1420	1132	1867	1300	1000	1000
Magnesium (mg)	334	268	392	284	320	320
Iron (mg)	14	11	17	12	7, 5–7	7, 12–6
Zinc	11	9	15	10	12	12
Potassium (mg)	3232	2626	3818	2816	1950–5460	1950–5460

<sup>a</sup> Reproduced from reference 111 with the permission of the publisher.<sup>1</sup> Australian Bureau of Statistics (77).<sup>2</sup> National Health & Medical Research Council (78); Wahlqvist & Kouris-Blazos (76).

with low socioeconomic status, the socially isolated, the institutionalized, the recently bereaved, the physically and socially inactive and the lonely) appear more likely to have inadequate diets (9, 81–83). Participation in fewer activities outside the home has also been linked to higher mortality in old age (84). In these subgroups there is greater risk of inadequate intakes of calcium, zinc, magnesium, vitamin B6 and folate (9, 40, 74, 85). Low intakes of these nutrients have important implications for bone health (calcium), wound healing (zinc), impaired immune response (zinc, vitamin B6) and vascular disease due to elevated homocysteine levels (folate). Other negative influences on dietary intake include physical disability, problems with chewing (loss of teeth and poorly fitting dentures), shopping difficulties and depression (87). Food-based dietary guidelines need to take account of the potential nutritional deficiencies that may occur in these subgroups.

Longitudinal changes (1988–1993) in the vitamin and mineral intakes of 2458 older Europeans born between 1913 and 1918 living in 18 towns in 12 countries (including the USA) were recently reported (86). In all towns, an increasing percentage of older adults did not meet the recommended nutrient densities and intakes for most nutrients (especially B vitamins, iron and calcium). This was accompanied by a reduced energy intake with 10% of the men and 30% of the women having energy intakes below 1500 kcal<sub>in</sub> (6.3MJ/day). The investigators concluded that older Europeans were at risk of malnutrition. In contrast, intakes of older Americans from the 1987–1988 National Food Consumption Survey were found to be adequate for most key nutrients. However, more detailed analyses are required to identify problem nutrients and the extent of deficient intakes in specific population subgroups (79). In particular the risks to the nutritional status of older persons in low-income and transitional countries need to be taken into consideration (72, 85, 87).

### A3.6.3 The demand for healthier fast foods

Over the last decade, there has been a significant decline in the proportion of raw food grocery purchases in Australia. Simultaneously, the proportion of grocery expenditure on semi-prepared and high-convenience foods has increased considerably. In contrast to many low-income countries, a recent market survey of 1500 Australians aged 15 years and over found that the intake of high-fat western-style fast foods is on the decline. Australians are eating fewer hamburgers and less fried chicken and fried fish, and more fruit, vegetables and dairy products. Almost all consumers reported that fast food is fattening, suggesting changing preferences and an increasing demand for healthier fast foods.

High-fat fast foods have been replaced with healthier pre-packaged meals/snacks—known as Meal Solutions or Home Meal Replacement—now available in supermarkets, and their heavy promotion is expected to have an impact on independent fast-food outlets. Changes in meal preparation from do it yourself to

do it for me, where people are neglecting food preparation as part of daily life, have been attributed to time famine. As a result, new apartments are now being built in Australia and the USA without kitchens (71, 88). This trend, if confirmed, is likely to alter what people eat and thus have an impact on their health.

In contrast to younger adults, older persons are more likely to hold fast to traditional cuisines, including retention of cooking skills and a preference for home-cooked meals over take-away food (72, 73, 89). Studies in Japan indicate that older adults have a strong preference for low-fat traditional dishes containing fish and vegetables, and for traditional entrees as opposed to fast food, which tends to be higher in fat. However, preferences in Japan are expected to change since tomorrow's older person will have had greater exposure to higher-fat, non-traditional foods compared to today's (89). Food labels are diversifying rapidly and the market-place is replete with new products and the information that goes with them (2). Staying within one's traditional food culture may help to simplify nutritional decisions.

A recent market survey in Australia found that 34% of 1500 respondents reported buying freshly prepared take-away food from supermarkets during the previous 12 months, with younger people more likely to be purchasers of these foods. Market surveys are being conducted in Australia to determine to what extent older adults rely on pre-packaged meals from supermarkets and if there will be an increasing demand for them as the population ages. Ready-made meals for re-heating are reportedly widely used by older Europeans, while at the same time two-thirds of subjects consumed home-produced foods (90). This is an important signal for the processed-food industry that implies a multifaceted approach to nutrition in older adults. The use of convenience foods also confirms an earlier observation—that older adults introduce novel foods in their diet as often as younger adults do (91).

Should we be alarmed over the death of the family kitchen and loss of traditional cooking skills and recipes? Is it more rational to let the market supply many of these goods and services, especially for subgroups either who do not know how to cook or who cannot cook because of physical disabilities or lack of motivation, e.g. because they are living alone (90)? Time will tell. What is clear, however, is that if these trend forecasts are accurate they have important implications both for the development of food-based dietary guidelines and the role nutritionists and governments play in ensuring that consumers of all ages can make healthy choices when selecting pre-prepared foods (79, 89).

#### A3.6.4 Nutrient needs

Since older adults have reduced energy needs, they presumably receive lower amounts of the vitamins involved in energy metabolism. Lower energy needs are the result of a decline in metabolic rate (secondary to reduced lean muscle mass) and activity levels. Morbidity and mortality can be reduced in old age if lean body mass and physical activity are maintained at more youthful levels. The increased

food intake needed to balance a higher energy expenditure will help to ensure adequate intakes of essential nutrients. It is important that older adults with low-energy intakes consume nutrient-dense foods in preference to those with low nutrient density contributed by refined sugars, fats and alcohol.

Post-menopausal women have lower iron needs due to cessation of menstrual blood losses. However, chronic blood loss from gastrointestinal ulcers or other diseases, poor iron absorption or use of medications such as aspirin, which can cause blood loss, increase their risk of iron deficiency. Higher calcium requirements in estrogen-deprived post-menopausal women are reflected in recommendations for increased calcium intakes for this group.

There is also evidence that older persons have an increased need for vitamins B6, B12 and D, and a decreased need for vitamin A, than younger adults. In old age, the skin has a reduced capacity to synthesize previtamin D3, the kidneys experience impaired vitamin D3 hydroxylation and sun exposure tends to be reduced. Low serum vitamin A levels appear to be rare among older adults despite a high prevalence of dietary intakes below recommended levels (9, 35, 92). Trials of antioxidant vitamin supplementation (e.g.  $\beta$ -carotene, vitamin E) have shown no effect, or no adverse effect, in terms of cardiovascular disease, cancer or total mortality (35) that would justify increased intakes of these vitamins by older adults. Food-based dietary guidelines need to cover specifically  $\omega$ -3 fats ( $\alpha$ -linoleic acid, DHA and EPA) because of the role they are believed to play in:

- blood lipids (reduced triglycerides),
- blood clotting (reduced platelet aggregation),
- arthritis (reduced inflammation (93, 94)),
- depression (61), and
- abdominal obesity (95).

In summary, most older adults require the same intakes for most nutrients as younger adults, although this usually needs to be done through substantially lower overall food intakes. A nutrient-dense diet for older persons should thus be given high priority in any food-based dietary guidelines.

#### A3.6.5 Process and implementation

##### Designating a working group

An interdisciplinary, intersectoral working group or technical committee should undertake the development and implementation of food-based dietary guidelines. The expert advice of nutritionists and social scientists familiar with local culture and conditions is invaluable for identifying appropriate foods to promote and problems to avoid. Expertise beyond nutrition and public health should also be included, e.g. food science and technology, and the educational, behavioural, social, agricultural and environmental sciences (96).



### Evaluating the major causes of morbidity and mortality and their dietary contributions within the older population

The process should begin with identifying relevant public health problems for older persons and determining the dietary and non-dietary factors that influence their incidence. More than simply identifying gaps between actual and recommended nutrient intakes, focusing on relevant public health problems requires an evaluation of the major causes of morbidity and mortality among older persons. As urban settings evolve, food-health relationships can be expected to vary as well, thereby requiring progressive reformulation of food-based dietary guidelines (1). Likely patterns of change include (97):

- increased rates of diabetes and ischaemic heart disease as modernization proceeds,
- a higher prevalence of obesity,
- the spread of fast-food outlets and an increase in food eaten outside the home, and
- increased fat consumption from foods eaten away from home.

### Identifying foods, nutrients and phytochemicals associated with reduced morbidity and mortality in older adult

Once target nutrients and phytochemicals have been identified, a process should be implemented to identify appropriate foods for inclusion in food-based dietary guidelines. Information necessary for this analysis includes food choices permitting both high and low consumption of nutrients and phytochemicals, foods that are high in the selected nutrient or phytochemical, and the main dietary sources of these foods. The last group is not necessarily made up of foods with the highest nutrient concentrations, rather those that are most frequently consumed. The impact of these modifications on total nutrient and phytochemical profiles should also be considered.

### Promoting healthy culture-specific traditional dishes and modern foods

Dietary advice that undermines trust in local cuisine, especially among people who have little manoeuvrability in terms of changing their practices, will be rejected or, worse still, diminish confidence in food selection and preparation (98). This impact can be of particular importance where food choices are changing under pressure of delocalization and globalization of the food supply (99, 100). Promoting traditional food choices and patterns is usually more effective than asking people to change their dietary habits. Assessing dietary intake, local cuisine, and food beliefs and practices to identify health-sustaining traditions is a good place to start promoting messages based on food-based dietary guidelines. Distinguishing traditional and modern foods/dishes as healthy or unhealthy can assist those

responsible for developing food-based dietary guidelines at a time when dietary patterns are undergoing rapid change. Strategies to support retention of healthy traditions while encouraging healthy changes can be developed in this context.

### Making sure that recommended foods/dishes are sustainable and do not harm the environment

Food-based dietary guidelines should accurately reflect a region's agricultural policies. Foods that are recommended in food-based dietary guidelines should be readily produced or obtained in the region without negative consequences for the environment or international trade.

### Getting the message across to the target group

Food-based dietary guidelines should be developed in each country, and different sets may be required for specific geographic regions or socioeconomic groups within the same country. Food-based dietary guidelines should be seen within the broader community context. By combining information from different sources people may come up with quite a different message from the one health workers seek to promote. Thus, culturally appropriate models for presenting main messages should be sought, pre-tested, evaluated and revised before being disseminated widely.

## A3.7 Principles governing food-based dietary guidelines for older adults

Probably the single most important health message for older persons is to achieve or maintain moderate levels of physical activity. There are similarities between the deterioration that occurs with ageing and that accompanying physical inactivity. Preventive measures to reduce diet-related disease should begin early in life, but it is never too late to start, even in old age. Given the behavioural risk factors (e.g. not eating breakfast, lack of regular physical activity, overweight and smoking) that have been shown to be predictors of 17-year mortality in individuals aged 70 and over, positive changes in lifestyle are worthwhile at every age.

Because older persons are more heterogeneous than any other age cohort, the individual's judgement plays a crucial role where acceptance of dietary and lifestyle changes is concerned. Physiological, psychological and sociological differences should thus be carefully considered. At one end of the spectrum are independent, vigorous and healthy people in their 70s, 80s and 90s. At the other are frail and dependent older persons with multiple diseases. Advice for the second group should probably focus mainly on function and quality of life rather than on diet or lifestyle.

There are five main ways to compress morbidity as near as possible to the end of life, and food-based dietary guidelines for older persons can help to promote all of them:

- Maintain social networks and social activity levels.
- Encourage physical activity throughout life.
- Discourage substance abuse.
- Encourage consumption of nutrient- and phytochemical-dense foods.
- Provide relevant, efficient and caring health services.

Each of these approaches requires sensitivity in culturally pluralistic societies and regions, as in the case of Australia and the Asia-Pacific Region generally.

The main nutritional factors to be considered in formulating food-based dietary guidelines for healthy ageing include:

- Food variety (18, 20) (Table 3).
- Nutrient density (101) (Table 4). Include culture-specific foods/dishes that are important sources of calcium, zinc, magnesium, vitamin B6, folate, vitamin D.
- Phytochemical density (102, 103) (Tables 5 and 6).

Fruits and vegetables can have special value for compressing morbidity (104, 105). High fruit and vegetable intakes have been most consistently associated with protection against macular degeneration, visual loss, cataracts, respiratory disease, and breast, stomach and colorectal cancer (35).

The minor components of cuisines, e.g. herbs and spices, may favourably influence health. For example, in older Greeks, a higher well-being and general health score and lower triglyceride concentrations were associated with a greater use of parsley, oregano and mint. Herbal tea (camomile, sage) was inversely related to abdominal fatness. Higher intakes of oregano and olive oil were associated with lower fasting blood glucose in subjects without diabetes (Kouris-Blazos et al., unpublished data).

Consumption of specific foods may also have a beneficial effect on health, e.g. fish (14, 106), lean meat (76), low-fat dairy products, tea (107), soy, legumes and nuts (104, 108), and unrefined fat from whole foods such as nuts, seeds and fatty fish. Where refined fats need to be used for cooking, it is preferable that they come from a variety of sources, including those that are high in  $\omega$ -3 and  $\omega$ -9 fats, i.e. canola, olives (preferably cold pressed or extra virgin) and soy bean. Fatty spreads should be avoided.

Food-based dietary guidelines may also need to consider the timing, frequency and size of meals for older adults. For example, in older Greeks, body fat mass has been negatively associated with greater meal/snack frequency, the consumption of two cooked meals daily, or when the main meal was taken at lunchtime and breakfast was eaten earlier rather than later in the morning.

Later dinner times were positively correlated with higher fasting blood glucose levels in people without diabetes. A more varied diet was positively associated

Table 3. *Weekly food variety score (1–57)*

Biologically distinct food groups	Score
1. Eggs (all varieties)	
<b>DAIRY</b>	////
2. Milk, ice-cream, cheese	
<b>LIVE CULTURES</b>	////
3. Yoghurt (e.g. acidophilus, bifidobacteria)	
<b>YEAST</b>	////
4. Yeast extract	
<b>FISH (+ canned)</b>	////
5. Fatty fish (tuna, anchovies, salmon, sardines, herring, mackerel, kipper)	
6. Saltwater fish	
7. Fresh-water fish	
8. Fish Roe (caviar salad)	
9. Shellfish (mussels, oysters, squid)	
10. Crustaceans (prawns, lobster)	
<b>MEAT</b>	////
11. Ruminants (lamb, beef, veal)	
12. Monogastric (pork, ham, bacon)	
13. Poultry (chicken, duck, turkey)	
14. Game (quail, wild duck, pigeon)	
15. Game (kangaroo, rabbit)	
16. Liver	
17. Brain	
18. All other organ meats	
<b>LEGUMES (+ canned)</b>	////
19. Peas (fresh, dried, split peas)	
Chickpeas (dried, roasted)	
Beans (haricot, kidney, lima, broad)	
Lentils (red, brown, green)	
Soy products (tofu, milk)	
<b>CEREALS</b>	////
20. Wheat (bread, pasta, ready-to-eat)	
21. Corn (corn flakes, polenta)	
22. Barley (bread, barley cereal)	
23. Oats (porridge, cereal, bread)	
24. Rye (bread; ready-to-eat)	
25. Rice (grain, ready-to-eat)	
26. Other grains (millet, linseed)	
<b>FATS &amp; OILS</b>	////
27. Oils	
28. Hard/soft spreads	
<b>BEVERAGES</b>	////
29. Tea, coffee, herbal teas	
30. Wine, beer, spirits	

Table 3. Weekly food variety score (1–57) (continued)

Biologically distinct food groups	Score
<b>FERMENTED FOODS</b>	////
31. Miso, tempeh, soy sauce	
32. Sauerkraut	
33. All other variety	
<b>SUGAR/CONFECTIONERY</b>	////
34. All variety (+ soft drinks)	
<b>VEGETABLES (+ canned, frozen)</b>	////
35. Root (potato, carrot, sweet potato, beetroot, parsnip, bamboo shoot, ginger, radish, water chestnut)	
36. Flowers (broccoli, cauliflower)	
37. Stalks (celery, asparagus)	
38. Onion (spring, garlic, leeks)	
39. Tomatoes, okra	
40. Beans (green, snow peas)	
41. Leafy greens (spinach, silverbeet, endive, kale, chicory, parsley, lettuce)	
42. Peppers (capsicum, chillies)	
43. Marrow (zucchini, squash, cucumber, turnip, eggplant, swede, pumpkin)	
44. Fungi (e.g. mushrooms)	
45. Herbs/spices	
<b>NUTS &amp; SEEDS</b>	////
46. Almond, cashew, chestnut, coconut, hazelnut, peanuts, peanut butter, pine nut, pistachio, pumpkin seed, sesame seed, tahini, walnut	
<b>FRUIT</b>	////
47. Stone (peach, cherry, plums, apricot, avocado, olive, prune)	
48. Apples	
49. Pears, nashi	
50. Berries (strawberries)	
51. Grapes (and raisins, sultana)	
52. Bananas	
53. Citrus (orange, lemon)	
54. Melon (honeydew, watermelon)	
55. Kiwi, date, passion fruit	
56. Tropical (mango, pineapple)	
<b>WATER</b>	////
57. Water (and mineral water)	
<b>TOTAL WEEKLY VARIETY SCORE</b>	

**Instructions:** A score of ONE is given to each food only ONCE if consumed (> 2 tablespoons) over a 7-day period. Score of biologically different foods consumed in a week: < 20 marginal; 20–24 fair; 25–29 good; > 30 very good.

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Table 4. Nutrients, and good food sources for them, for which older persons are at risk of a deficiency

<b>Calcium</b>	Milk and milk products, calcium-enriched soy products, salmon with bones, almonds, pulses, broccoli, tahini
<b>Zinc</b>	Lean red meat, liver, eggs, seafood, pork, nuts (e.g. cashews), pulses, whole grains, wheat germ, brewers yeast
<b>Magnesium</b>	Whole grains, seafood, soybeans, nuts, banana, avocado, pulses, salmon/tuna, meat, yoghurt, seeds
<b>Vitamin B6</b>	Common in foods, e.g. meats, liver, egg yolk, whole-grain cereals, pulses, yeast
<b>Folate</b>	Fresh leafy green vegetables, broccoli, oranges, avocado, yeast, liver, pulses, whole grain cereals, nuts
<b>Vitamin D</b>	Sardines, herring, salmon, cod-liver oil, egg yolks, butter, cheese

Adapted from: C.C. Horwath (81).

with alcohol consumption with dinner, and with a greater number of daily meals/snacks (3). Schlettwein-Gsell (109), who, using cross-sectional data, showed that older subjects most frequently ate regular meals, has hypothesized that this practice promotes a higher survival rate.

Many food components, once eaten, have detectable clinical effects. Although it may not always be known precisely which food components are responsible for which effects, there is good evidence that foods themselves, rather than isolated food components, are associated with good health. Thus, for example, a high intake of vegetables reduces the risk of many forms of cancer whereas isolating nutrients and taking them as a supplement does not appear to be protective. Moreover, certain food habits are associated with longevity e.g. those of Crete and Japan. This suggests that when it comes to health and longevity, the sum of the diet is greater than its individual parts; incorporating culture-specific cuisines into food-based dietary guidelines is therefore likely to result in a more favourable outcome than the incorporation of foods alone.

### A3.8 Summary and conclusion

The main principles governing food-based dietary guidelines for older persons can be summarized as follows.

- Emphasize healthy traditional vegetable- and legume-based dishes where meat and nuts are used as condiments.
- Limit consumption of traditional dishes/foods that are heavily preserved/pickled in salt and encourage use of herbs and spices.

Table 5. Food sources of phytochemicals and their possible roles in health\*

Phytochemicals	Some important food sources	Possible roles in health
Carotenoids	Orange pigmented, and green leafy vegetables, carrots, tomatoes, spinach	Antioxidant Antimutagen Anticarcinogen Immuno-enhancing
Flavonoids, isoflavonoids and saponins	Green and yellow leafy vegetables, parsley, celery, soybean and soy products	Antioxidant Anticarcinogen Estrogen Immuno-modulating
Polyphenolics	Cranberry, raspberries, blackberries, rosemary, oregano, thyme	Antioxidant Antibacterial Reduce urinary tract infection
Catechins	Green tea	Antimutagen Anticarcinogen Anticariogen
Isothiocyanates and indoles	Cruciferous vegetables, broccoli, cabbage	Antimutagen
Allyl sulphides	Garlic, onions, leeks	Anticarcinogen Antibacterial Cholesterol-lowering
Terpenoids including limonene	Citrus, caraway seeds	Anticarcinogenic against mammary tumours
Phytosterols	Pumpkin seeds	Reduce symptoms of prostate enlargement
Curcumin	Tumeric	Anti-inflammatory
Salicylates	Grapes, dates, cherries, pineapple, oranges, apricots, gherkins, mushrooms, capsicums, zucchini	Protective against macrovascular disease Modulation of gene expression
L-dopa	Broad bean	Treatment of Parkinson disease
Non-digestible carbohydrates	Artichoke, chicory root, murrnong, maize, garlic, oats, fruit, and vegetables	Stimulate growth of microbial flora Cholesterol-lowering

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Table 6. Phytochemical-dense food checklist\*

This is not an exhaustive list of phytochemicals. Score 1 point for each food if eaten at least once a week, irrespective of serving size. If food is consumed more often, it still scores only one point.

**Whole grains (unrefined) and cereals**

Barley  
Millet  
Rice  
Sorghum  
Maize/corn  
Oats  
Rye  
Wheat

**Fruit**

Apples  
Apricots  
Other stone fruit, e.g. nectarines, peaches  
Berries, e.g. strawberries  
Citrus, e.g. orange, lemon, grapefruit  
Figs  
Currants and grapes, e.g. raisin, sultana  
Kiwi  
Melons  
Pears  
Paw-paw  
Other tropical fruit, e.g. mango, pineapple

**Vegetables**

Artichoke  
Avocado  
Broccoli/cabbage/Brussels sprouts  
Sprouts/cauliflower  
Capsicum, red/green  
Carrots  
Cucumber  
Chili  
Fresh garlic  
Onions/leeks  
Potatoes  
Pumpkin  
Radish  
Rhubarb  
Swede

**Vegetables (continued)**

Sweet potatoes  
Tomatoes  
Yams  
Dark-green leafy vegetables, e.g. spinach, endive, amaranth, silverbeet

**Legumes/pulses**

Soy beans/soy products (tofu, soy milk)  
Chickpeas  
Lentils  
Peas  
Beans, e.g. kidney, halicot

**Nuts and seeds**

Linseed  
Sesame seed  
Pumpkin seed  
Nuts  
Other nuts, e.g. peanuts, hazelnuts

**Herbs and spices**

Basil  
Oregano  
Mint  
Dill/fennel  
Parsley  
Pepper  
Ginger  
Cumin  
Turmeric  
Coriander  
Rosemary/thyme

**Beverages**

Fresh fruit juice  
Red wine  
Tea (green/black)

**Oils**

Olive (unrefined)

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- Introduce healthy traditional foods or dishes from other cuisines (e.g. tofu into Mediterranean cuisines and the tomato into Asian cuisines) to increase the variety of foods consumed.
- Select nutrient-dense foods such as fish, lean meat, liver, eggs, soy products (e.g. tofu and tempeh) and low-fat dairy products, yeast or yeast based products (e.g. spreads), fruits and vegetables, herbs and spices, whole-grain cereals, nuts and seeds.
- Consume fat from whole foods such as nuts, seeds, beans, olives and fatty fish. Where refined fats are used for cooking, select from a variety of liquid oils, including those that are high in  $\omega$ -3 and  $\omega$ -9 fats; avoid fatty spreads.
- Enjoy food and eating in the company of others, but avoid the regular use of celebratory foods (e.g. ice-cream, cakes and pastries in western food culture, confectioneries and candies in Malay food cultures and pork crackling in Chinese food culture).
- Encourage the processed-food industry and fast-food chains to make available—as alternatives to high-fat convenience foods—ready-made meals that are low in animal fats and high in nutrients and phytochemicals. The food industry can target older persons by developing a specific line of home-meal replacements fortified with the nutrients for which they are at greatest risk of deficiency. Food-based dietary guidelines can also include functional foods (e.g. bread based on whole grains and seeds such as soy and linseed).
- Several small non-fatty meals daily (5–6 eating episodes) appear to be associated with greater food variety and lower body fat, blood glucose and blood lipids, especially if food intake is curtailed in the evening hours. It is preferable to have the main meal at lunch and a light snack for dinner (3).
- As much as possible of one's food culture and health knowledge and related skills (e.g. regarding food production, choice, preparation and storage) should be transmitted both to one's children and grandchildren and to the broader community. Primary and secondary schools should be encouraged to teach all children about cooking as part of their practical survival skills.
- Older persons should be physically active on a regular basis and engage in exercises that strengthen muscles and improve balance. This will promote better energy (calorie) balance with weight maintenance, and more favourable body composition. It will also help to achieve adequate intake of nutrients and other food components since greater food intake is possible, without excessive energy intake, than would otherwise be possible with inactivity.
- To avoid dehydration, especially in warm climates, fluids should be drunk regularly and foods with a high water content eaten often.

Since these principles are to a degree technical in nature or have logistic implications, their application requires that local experts work with community elders in their implementation. As part of the new public health nutrition (1), whatever food-based dietary guidelines are developed should be subject to critical appraisal, monitoring and review, especially as regards their unintended consequences and ecological considerations.

The development of culturally sensitive food-based dietary guidelines, taking into account the best available scientific evidence, is preferable to advocating changes in food consumption patterns on the basis of studies of single food components and single disease outcomes.

Moreover, this approach is likely to result in fewer risks and greater benefits since many cultural food patterns have stood the test of time; in other words, they have been successfully established over many generations. There is still much to be distilled and learned from pooling the world's rich food-culture traditions and cuisines.

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## **Keep fit for life**

### Meeting the nutritional needs of older persons



World Health  
Organization



Tufts University  
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and Policy

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