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Nordic Nutrition Recommendations NNR 2004

Integrating nutrition and physical activity

4th edition

Nordic Nutrition Recommendations 2004. 4th edition
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Nordic Council of Ministers
Store Strandstræde 18
DK-1255 Copenhagen K
Phone (+45) 3396 0200
Fax (+45) 3396 0202

Nordic Council
Store Strandstræde 18
DK-1255 Copenhagen K
Phone (+45) 3396 0400
Fax (+45) 3311 1870

www.norden.org

The Nordic Council of Ministers was established in 1971. It submits proposals on co-operation between the governments of the five Nordic countries to the Nordic Council, implements the Council's recommendations and reports on results, while directing the work carried out in the targeted areas. The Prime Ministers of the five Nordic countries assume overall responsibility for the co-operation measures, which are co-ordinated by the ministers for co-operation and the Nordic Co-operation committee. The composition of the Council of Ministers varies, depending on the nature of the issue to be treated.

The Nordic Council was formed in 1952 to promote co-operation between the parliaments and governments of Denmark, Iceland, Norway and Sweden. Finland joined in 1955. At the sessions held by the Council, representatives from the Faroe Islands and Greenland form part of the Danish delegation, while Åland is represented on the Finnish delegation. The Council consists of 87 elected members – all of whom are members of parliament. The Nordic Council takes initiatives, acts in a consultative capacity and monitors co-operation measures. The Council operates via its institutions: the Plenary Assembly, the Presidium and standing committees.

The Nordic Food Policy Co-operation
The Nordic Committee of Senior Officials on Food Issues is concerned with basic Food Policy issues relating to food and nutrition, food toxicology and food microbiology, risk evaluation, food control and food legislation. The co-operation aims at protection of the health of the consumer, common utilisation of professional and administrative resources and at Nordic and international developments in this field.

PREFACE

This 4th edition of the Nordic Nutrition Recommendations, NNR 2004, has been produced by a project group nominated by the Working Group on Diet and Nutrition, NKE, under the Nordic Committee of Senior Officials on Food Issues, EK-Livs. The project group was established in 2000.

The project group consisted of Wulf Becker, chair, Sweden; Åsa Brugård Konde and Eva-May Ohlander, secretariat, Sweden; Niels Lyhne and Agnes N. Pedersen, Denmark; Antti Aro and Mikael Fogelholm, Finland; Jan I. Pedersen, Jan Alexander, Sigmund A. Anderssen and Helle Margrete Meltzer, Norway; and Inga Þórsdottír, Iceland. Brittmarie Sandström, Denmark, was a member of the group, but sadly passed away in October 2002. A working group on recommendations for children was established consisting of Inga Þórsdottír, chair, Iceland; Olle Hernell, Sweden; Britt Lande, Norway; Olli Simell, Finland; Kim Fleischer Michaëlsen, Denmark; and Åsa Brugård Konde, secretariat, Sweden. The following experts were engaged for specific chapters: Nils-Georg Asp, Sweden (carbohydrates), Ingegerd Johansson, Sweden (caries, fluorine), Rune Blomhoff, Norway (vitamin A, antioxidants), Lars Dragsted, Denmark (antioxidants), Susanne Højbjerg Bügel, Denmark (copper), Lars Ovesen, Denmark (iodine), Maria Lennernäs, Sweden (eating pattern), and Ingibjørg Gunnarsdóttir, Iceland (pregnancy, lactation). Food-based recommendations were evaluated by a working group consisting of Ellen Trolle, Denmark; Liisa Valsta, Finland; Holmfriður Þorgeirsdóttir, Iceland; Lars Johansson, Norway; and Heléne Enghardt Barbieri and Wulf Becker, Sweden.

Valuable comments and contributions were received from a large number of nutrition experts, national agencies and institutes in the Nordic countries in response to referrals in 2003 and 2004. A plenary discussion was held at the 8th Nordic Nutrition Conference in Tønsberg, Norway, in June 2004.

The Nordic Nutrition Recommendations NNR 2004 were officially approved by the Nordic Council of Ministers for Fishery, Agriculture, Forestry and Food, at their meeting on the 13th of August 2004.

This report consists of NNR 2004 and the comprehensive background documentation compiled by the project group.

DECLARATION OF INTERESTS

Members of the project group *Nordic Nutrition Recommendations 2000–2004* hereby declare that neither they nor any member of their immediate family has any direct or indirect interests relating to the work in the project mentioned above, other than the professional positions the group members hold that entitle them to membership of the said project group.

Jan Alexander *Norway*	Sigmund A. Anderssen *Norway*	
Antti Aro *Finland*	Wulf Becker *Sweden*	Mikael Fogelholm *Finland*
Niels Lyhne *Denmark*	Helle M. Meltzer *Norway*	Agnes N. Pedersen *Denmark*
Jan I Pedersen *Norway*	Inga Þórsdóttir *Iceland*	

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INTRODUCTION

The Nordic countries have for several decades collaborated in setting guidelines for dietary composition and recommended intakes of nutrients. Similarities in dietary habits as well as in the prevalence of diet-related diseases, such as cardiovascular disease, osteoporosis, obesity and diabetes, warranted a focus on the gross composition of the diet, *i.e.* the intake of fat, carbohydrate and protein as contributors to the total energy intake. Already in 1968 medical societies in Denmark, Finland, Norway, and Sweden published a joint official statement on 'Medical aspects of the diet in the Nordic countries' (*Medicinska synpunkter på folkkosten i de nordiska länderna*). The statement dealt with the development of dietary habits and the consequences of an unbalanced diet for the development of non-communicable diseases. Recommendations were given both for the proportion of fat in the diet and the fat quality, *i.e.* a reduced intake of total fat and saturated fatty acids and an increase in polyunsaturated fatty acids. Food-based guidelines were also included, aiming at an increased consumption of fruit, vegetables, potatoes, low-fat milk, lean meat and cereal products, and a limitation of the consumption of sugar and sugar-rich foods.

The first official Nordic Nutrition Recommendations (NNR), issued in 1980, emphasised a reduction in total fat intake to less than 35% of the energy consumed and an increased intake of carbohydrates and dietary fibre. Subsequent editions of NNR were published in 1989 (2nd edition) and 1996 (3rd edition) and included a further limitation of fat intake to 30% of energy intake, more detailed recommendations on fat quality and a focus on energy balance. NNR are an important basis for various uses in the area of food, nutrition and health policy, for formulation of food-based dietary guidelines and for diet and health-related campaigns.

In the present 4th edition, NNR 2004, the official Nordic Nutrition Recommendations are presented and summarized in *Chapters 1* and *2*. Subsequent chapters provide the scientific background documentation and some practical aspects of its derivation and use. The project group has reviewed and evaluated scientific work, national and international recommendations and expert reports. Changes have been introduced

only when strong scientific evidence has evolved since the 3rd edition. A Nordic perspective has been accounted for in setting the recommendations.

In the 4th edition a chapter on physical activity has been added and interaction with physical activity has been taken into account for the individual nutrient recommendations wherever appropriate. The chapter on energy requirement has been thoroughly reviewed and reference weights and physical activity levels updated. A new chapter on food-based recommendations has also been included. The chapters on eating pattern, antioxidants and breastfeeding have been expanded. Compared to the 3rd edition, the recommendations on the proportions of energy yielding nutrients remain virtually unchanged. The values for recommended daily intakes are in many cases also unchanged.

The recommended intake (RI) of vitamin A (women) has been lowered, while it has been increased for vitamin D (children and adults up to 60 y), vitamin C (adults) and folate (the same RI for all women of reproductive age; but increased for pregnant and lactating women). Regarding iron, the RI ranges for women of reproductive age included in the 3rd edition have been replaced by a single value. In many cases the values for infants and children are derived from adult data using either body weight or energy requirement as a basis for the estimations.

Recommendations for copper intake are introduced, while no recommended intakes are set for biotin, pantothenic acid, chromium, fluorine, manganese and molybdenum due to insufficient data, *i.e.* no change compared to the 3rd edition.

The primary aim of the NNR 2004 report is to present the scientific background of the Nordic nutrition recommendations and their application. In addition, the report can be used as a complement to textbooks in the field of nutrition, but it does not attempt to give a comprehensive overview of metabolism, physiology and clinical aspects of each nutrient or topic.

A secondary aim for NNR 2004 is to function as a basis for national recommendations adopted individually by the Nordic countries.

The 4th edition, the Nordic Nutrition Recommendations 2004 is published as a Nord report by the Nordic Council of Ministers. A summary and the main recommendations are also published in the *Scandinavian Journal of Nutritionm* (2004; 48 (4): 178–187).

Aims and content of NNR

The Nordic Nutrition Recommendations NNR 2004 are to be interpreted as guidelines for the nutritional composition of a diet which provides a

basis for good health. The basis for setting recommendations is defined for each individual nutrient using available scientific evidence. As new scientific knowledge emerges with time, the NNR have to be reassessed when appropriate and should therefore not be regarded as definitive.

NNR are based on the current nutritional situation in the Nordic countries and are to be used as a basis for planning a diet which:
- satisfies the nutritional needs, *i.e.* covers physiological requirements for growth and function
- is a prerequisite for an overall good health and contributes to a reduction of risk for diet-associated diseases

NNR are primarily valid for groups of healthy individuals. For individuals with disease and for groups with special needs, the dietary composition may have to be adjusted accordingly.

NNR are valid for the average intake over a longer period of time, *e.g.* over at least a week, since the dietary composition may vary from meal to meal and from day to day. The recommended intakes refer to the amounts of nutrients ingested. Losses during food preparation, cooking etc. have to be taken into account when the values are used for planning diets.

NNR can be used:
- as guidelines for planning diets for groups
- as a basis for teaching and dietary information
- as a basis for food and nutrition policy
- as a basis for evaluation of dietary intake

NNR cover recommendations and criteria to be used in planning diets for groups and in evaluating dietary intakes. The recommendations include the following components, which are presented in *Chapters 1* and *2*:

1. Recommended intake of fat, carbohydrates and protein as percentages of total energy intake (E%). Recommendations on dietary fibre.
2. Recommended intake of vitamins and minerals. The values include a safety margin accounting for variations in requirement and physiological factors influencing the requirement, which makes it likely that a diet containing these amounts will be sufficient and adequate for practically the entire population.
3. Reference values for energy intake.
4. Recommendations for physical activity.
5. Recommendations for salt intake.

6. Recommendations for alcohol consumption.
7. Reference values for evaluation of nutrient intake.

Chapter 3 deals with the background and basis of the recommendations, while *Chapter 4* gives an introduction to the practical uses and applications of NNR. Subsequent chapters deal with the scientific background for establishing recommendations for each of the components included, as well as some additional topics such as breastfeeding, food-based dietary guidelines, eating pattern and antioxidants.

CHAPTER 1

Planning diets for groups

Recommended intake of fat, carbohydrates and protein as a percentage of total energy intake (excluding energy from alcohol)

Recommendations for adults and children from 2 years of age

FAT Intake of saturated plus trans fatty acids should be limited to approximately 10% of the total energy intake (E%). Trans fatty acids from partially hydrogenated fats should be limited as much as possible. Cis-monounsaturated fatty acids should provide 10–15 E% and polyunsaturated fatty acids 5–10 E%, including approximately 1 E% from n-3 fatty acids. Fat (calculated as total fat content including glycerol and other lipid components) should provide 25–35 E%. The population goal is 30 E% from fat, which should be used for planning purposes.

The fat composition of the diet should be modified, primarily by reducing the intake of both saturated and trans fatty acids. A reduction in the intake of foods rich in saturated fatty acids is generally accompanied by a reduction in the intake of cholesterol. The saturated fatty acids lauric, myristic and palmitic acid, trans fatty acids and cholesterol increase the serum LDL-cholesterol concentration, which is a strong risk factor for coronary heart disease. For the prevention of coronary heart disease, it is most important to reduce the intake of these fatty acids. In addition, moderation in total fat intake is important for the prevention of obesity. This makes it possible to increase the consumption of low-fat foods that are rich in nutrients and other compounds that may also be important for the prevention of cardiovascular diseases and cancer.

Essential polyunsaturated n-6 and n-3 fatty acids should provide at least 3 E%, including at least 0.5 E% from n-3 fatty acids. For pregnant and lactating women the essential fatty acids should contribute at least 5 E%, including 1 E% from n-3 fatty acids. An intake of polyunsaturated fatty acids exceeding 10 E% is not recommended, because this may theoretically increase the risk of lipid peroxidation. Furthermore, there are no health benefits associated with a higher intake. Cis-monounsaturated fatty acids (oleic acid) are almost as effective in lowering serum

LDL-cholesterol concentration as polyunsaturated fatty acids when substituted for saturated fatty acids.

CARBOHYDRATES AND DIETARY FIBRE Carbohydrates[1] should provide 50–60% of the total energy intake (E%). The population goal is 55 E% from carbohydrates, which should be used for planning purposes. For adults, the intake of dietary fibre should be 25–35 g/d, i.e. approximately 3 g/MJ. Refined sugars should not exceed 10 E%[2].

This recommendation means for most people an increase in the intake of both carbohydrates and dietary fibre. The increase should consist in the first instance of foods naturally rich in carbohydrates and dietary fibre, *i.e.* cereal products and potatoes, vegetables, fruit and berries, which are also good sources of vitamins and minerals. An adequate balance between carbohydrates and fat in combination with a high fibre content in the diet contributes to a reduced risk of developing overweight and associated diseases. An adequate intake of dietary fibre reduces the risk of constipation and can most likely contribute to protection against obesity and colon cancer. Intake of appropriate amounts of dietary fibre from a variety of foods is important for children as well. From school age the intake should gradually increase to reach the recommended level during adolescence. To ensure an adequate intake of essential nutrients and dietary fibre, especially in children and adults with a low energy intake, a limitation of the intake of refined sugars[2] is necessary. Limitation of the intake of refined sugars from drinks may be important to prevent obesity. It is recommended that the intake of refined sugars should not exceed 10 E%. Frequent consumption of foods rich in sugars should be avoided in order to reduce the caries risk.

PROTEIN Protein should provide 10–20% of the total energy intake (E%). The population goal is 15 E% from protein, which should be used for planning purposes.

Protein might provide less than 10 E%, but in order to achieve a varied diet and according to Nordic dietary habits the recommendation is 15 E% for planning purposes. This intake of protein should more than adequately meet the requirements for essential amino acids.

1. Carbohydrate including dietary fibre.
2. Refined sugars include sucrose, fructose, glucose, starch hydrolysates (glucose syrup, high-fructose syrup) and other isolated sugar preparations such as food components used as such or added during food preparation and manufacturing.

At very low energy intakes (< 6.5 MJ/d), a protein content providing more than 15 E% may be necessary for planning purposes.

Recommendations for children up to 2 years of age

Exclusive breastfeeding is recommended for infants during the first 6 months. Recommendations for intake of energy yielding nutrients for children 6–23 months are given in *Table 1.1.* The energy percent from fat should decline successively from the high level during the first year of life to reach the level recommended for children and adults at the age of 2 years. During the same period protein intake should increase from about 5 E% (the level in breast milk) to the recommended content of 10–20 E% for older children and adults.

n-6 fatty acids should contribute at least 4% of the total energy intake (E%) for children 6–11 months, and 3 E% for children 12–23 months of age. n-3 fatty acids should contribute at least 1 E% for children 6–11 months and 0.5 E% for children 12–23 months. During the first year, the intake of trans fatty acids from partially hydrogenated fats should be kept as low as possible. From 12 months the recommendation for older children and adults on saturated and trans fatty acids should be used.

Table 1.1 Recommended intake of fat, carbohydrates and protein expressed as g per MJ and as E% for children 6–23 months[a]. Within the age intervals, a gradual reduction in fat intake is recommended throughout the period from the highest value to the lowest, with a corresponding increase in carbohydrates

	g per MJ	Energy percent (E%)
6–11 months		
Protein	4–9	7–15
Fat	8–12	30–45
Carbohydrate[b]		45–60
12–23 months		
Protein	6–9	10–15
Fat	8–9	30–35
Carbohydrate[b]		50–55

a As exclusive breastfeeding is the preferable source of nutrition for infants < 6 months, no recommendations for fat, protein and carbohydrate intake are given. For non breast fed infants, it is recommended that the values for infant formula proposed by the European Commission Scientific Committee on Food (2003) be used. If complementary feeding has started at 4–5 months, the intakes recommended for 6–11 month old infants should be used.

b Intake of refined sugars should not exceed 10 E%.

Table 1.2 Recommended intake of certain nutrients, expressed as average daily intake over time, for use in planning diets for groups[a]. The requirements are lower for almost all individuals

Age years	Vit. A RE[c]	Vit. D[d] µg	Vit. E α-TE[e]	Thiamin mg	Riboflavin mg	Niacin NE[f]	Vit. B_6 mg	Folate µg	Vit. B_{12} µg	Vit. C mg
< 6 mo[b]	–	–	–	–	–	–	–	–	–	–
6–11 mo	300	10	3	0.4	0.5	5	0.4	50	0.5	20
12–23 mo	300	10	4	0.5	0.6	7	0.5	60	0.6	25
2–5 y	350	7.5	5	0.6	0.7	9	0.7	80	0.8	30
6–9 y	400	7.5	6	0.9	1.1	12	1.0	130	1.3	40
Females										
10–13	600	7.5	7	1.0	1.2	14	1.1	200	2.0	50
14–17	700	7.5	8	1.2	1.3	15	1.3	300	2.0	75
18–30	700	7.5	8	1.1	1.3	15	1.3	400	2.0	75
31–60	700	7.5	8	1.1	1.3	15	1.2	300[g]	2.0	75
61–74	700	10	8	1.0	1.2	14	1.2	300	2.0	75
≥ 75	700	10	8	1.0	1.2	13	1.2	300	2.0	75
Pregnant	800	10	10	1.5	1.6	17	1.5	500	2.0	85
Lactating	1,100	10	11	1.6	1.7	20	1.6	500	2.6	100
Males										
10–13	600	7.5	8	1.2	1.4	16	1.3	200	2.0	50
14–17	900	7.5	10	1.5	1.7	20	1.6	300	2.0	75
18–30	900	7.5	10	1.5	1.7	20	1.6	300	2.0	75
31–60	900	7.5	10	1.4	1.7	19	1.6	300	2.0	75
61–74	900	10	10	1.3	1.5	17	1.6	300	2.0	75
≥ 75	900	10	10	1.2	1.3	15	1.6	300	2.0	75

a Refers to the consumed amount, *i.e.* changes during preparation, cooking etc. must be accounted for.

b Exclusive breastfeeding is the preferable source of nutrition for infants during the first six months of life. Therefore, recommendations for single nutrients are not given for infants < 6 months. If breastfeeding is not possible, infant formula composed to serve as the only food for infants should be given (see *Chapter 5* on breast-feeding: Scientific Committee on Food, 2003). If complementary feeding has started at 4–5 months, the recommended intakes for 6–11 month old infants should be used.

c Retinol equivalents; 1 retinol equivalent (RE) = 1 µg retinol = 12 µg β-carotene.

d From 4 weeks of age, infants should receive 10 µg vitamin D per day as a supplement. Elderly people with little or no sun exposure should receive a supplement of 10 µg vitamin D_3 per day in addition to the dietary intake.

e α-tocopherol equivalents; 1 α-tocopherol equivalent (α-TE) = 1 mg RRR-α-tocopherol.

f Niacin equivalent; 1 niacin equivalent (NE) = 1 mg niacin = 60 mg tryptophan.

g Women of reproductive age are recommended an intake of 400 µg/day.

Table 1.2 *cont*. Recommended intake of certain nutrients, expressed as average daily intake over time, for use at planning diets for groups. The requirement is lower for almost all individuals

Age years	Calcium mg	Phosphorus mg	Potassium g	Magnesium mg	Iron[h] mg	Zinc[i] mg	Copper mg	Iodine µg	Selenium µg
< 6 mo	–	–	–	–	–	–	–	–	–
6–11 mo	540	420	1.1	80	8	5	0.3	50	15
12–23 mo	600	470	1.4	85	8	5	0.3	70	20
2–5 y	600	470	1.8	120	8	6	0.4	90	25
6–9 y	700	540	2.0	200	9	7	0.5	120	30
Females									
10–13	900	700	2.9	280	11	8	0.7	150	40
14–17	900	700	3.1	280	15[l]	9	0.9	150	40
18–30	800[j]	600[j]	3.1	280	15[l]	7	0.9	150	40
31–60	800	600	3.1	280	15[l]/9[m]	7	0.9	150	40
61–74	800[k]	600	3.1	280	9	7	0.9	150	40
≥ 75	800[k]	600	3.1	280	9	7	0.9	150	40
Pregnant	900	700	3.1	280	–[n]	9	1.0	175	55
Lactating	900	900	3.1	280	15	11	1.3	200	55
Males									
10–13	900	700	3.3	280	11	11	0.7	150	40
14–17	900	700	3.5	350	11	12	0.9	150	50
18–30	800[j]	600[j]	3.5	350	9	9	0.9	150	50
31–60	800	600	3.5	350	9	9	0.9	150	50
61–74	800	600	3.5	350	9	9	0.9	150	50
≥ 75	800	600	3.5	350	9	9	0.9	150	50

h The composition of the meal influences the utilization of dietary iron. The availability increases if the diet contains abundant amounts of vitamin C and meat or fish daily, while it is decreased at simultaneous intake of *e.g.* polyphenols or phytic acid.

i The utilization of zinc is negatively influenced by phytic acid and positively by animal protein. The recommended intakes are valid for a mixed animal/vegetable diet. For vegetarian cereal-based diets, a 25–30% higher intake is recommended.

j 18–20 olds are recommended 900 mg calcium and 700 mg phosphorus per day.

k Supplementation with 500–1,000 mg calcium per day may possibly, to some degree, delay age-related bone loss.

l Menstrual flow and its associated iron losses may vary considerably among women. This means that some women require a larger iron supply than others. At an availability of 15%, 15 mg/d will cover the requirement of 90% of women of fertile age. Some women require more iron than the habitual diet can supply.

m Recommended intake for post-menopausal women is 9 mg per day.

n Iron balance during pregnancy requires iron stores of approximately 500 mg at the start of pregnancy. The physiological need of some women for iron cannot be satisfied during the last two thirds of pregnancy with food only, and supplemental iron is therefore needed.

Recommended intake of vitamins and minerals

The recommended intake (RI) of certain vitamins and minerals, expressed as average daily intake over time, is given in *Table 1.2*. The values for recommended intakes are intended for planning diets for groups of subjects of the specified age intervals. The values include a margin accounting for variations in requirement and physiological factors influencing the requirement, which makes it likely that a diet containing these amounts will be sufficient and adequate for practically the entire population. NNR do not cover all known essential nutrients, since the scientific basis for establishing recommendations was considered incomplete for some nutrients.

Recommendations for planning diets for heterogeneous groups

In planning diets for groups with a heterogeneous age and sex distribution, the amounts of nutrients per MJ given in *Table 1.3* are recommended. For each nutrient, the figures are based on the age and sex category of individuals 6–60 years old, for which the highest nutrient density is necessary to meet the requirements. These recommendations are not primarily aimed at pregnant and lactating women, nor at adult diets with a low energy level, *i.e.* less than 8 MJ per day. Furthermore, they are less applicable for planning diets with an energy level above 12 MJ per day, in which a lower density of many nutrients is sufficient.

A very low energy intake is defined as an energy intake below 6.5 MJ/d as a minimum daily energy intake necessary for providing adequate amounts of micronutrients from the diet. An energy intake of 6.5–8 MJ is considered a *low energy intake* with an increased risk of an insufficient intake of micronutrients.

A very low energy intake is related to either a very low physical activity level and/or to a low body weight. Low body weight is related to small muscle mass and thereby to low energy expenditure. Among healthy subjects, an actual very low habitual energy intake is probably rare – even among very inactive elderly subjects with physical activity level (PAL) of 1.4, the estimated energy requirements is 7–8 MJ/d (see *Chapter 9*). The age-related decrease in energy expenditure may result in very low energy intake in elderly subjects. Very low energy intake is also found among persons on slimming diets and among subjects with eating disorders, food intolerances, etc. When calculating the nutrient density for groups with *low* energy intake/requirement using RI in *Table 1.2,* the nutrient density may become unrealistically high. In that case the recommended nutrient density per MJ from *Table 1.3* should be followed and supplementation with a multi vitamin-mineral tablet should

be considered. For groups with a *very low* energy intake, the diet should always be supplemented with a multi vitamin-mineral tablet. The most effective way to prevent low and very low energy intake is to increase the physical activity level.

Table 1.3 Recommended nutrient density to be used for planning diets for groups of individuals 6–60 years of age with a heterogeneous age and sex distribution. The values are adapted to the reference person requiring the highest dietary nutrient density

	Content per MJ	
Vitamin A	RE	80
Vitamin D	µg	1.0
Vitamin E	α-TE	0.9
Thiamin	mg	0.12
Riboflavin	mg	0.14
Niacin	NE	1.6
Vitamin B_6	mg	0.13
Folate	µg	45
Vitamin B_{12}	µg	0.2
Vitamin C	mg	8
Calcium	mg	100
Phosphorus	mg	80
Potassium	g	0.35
Magnesium	mg	35
Iron	mg	1.6
Zinc	mg	1.1
Copper	mg	0.1
Iodine	µg	17
Selenium	µg	4

Reference values for energy intake in groups

Both excessive and insufficient energy intake in relation to requirements lead in the long term to negative consequences for health. The individual's energy intake and expenditure should therefore be equal at adult age.

In *Table 1.4,* reference values are given for energy intake for groups of adults with two different physical activity levels. An active lifestyle, corresponding to PAL 1.8, is considered desirable for maintaining good health. An activity level of PAL 1.6 corresponds to a lifestyle with sedentary work and limited physical activity level during leisure time. The reference body weights used for calculation are based on Nordic populations. The original weights have been corrected so that all individuals fall within the normal range (18.5–25) of body mass index (BMI).

Individual recommendations for energy intake cannot be given due to the large variation between individuals with respect to metabolic rate, body composition and degree of physical activity.

Table 1.5 contains reference values for energy intakes in groups of children. The reference values for energy requirements in healthy infants and children up to 6 years are based on data from studies using the doubly labelled water technique. For children 6–17 years, the reference values are based on total energy expenditure using estimations of the basal metabolic rate (BMR) and physical activity level (PAL), with values for different activity levels from 10 to 17 years.

Table 1.4 Reference values for energy intakes in groups of adults with sedentary and active lifestyle [a]

Sex and age	Body weight [b]	REE [c]	*Sedentary* Sedentary work and limited physical activity in leisure time (PAL [d] = 1.6)	*Active* Sedentary work and regular physical activity in leisure time [e] (PAL [d] =1.8)
Women [f]	kg	MJ/d	MJ/d	MJ/d
18–30 y	62	5.9	9.4	10.7
31–60 y	63	5.8	9.2	10.4
61–74 y	63	5.3	8.5	9.5
≥ 75 y	62	5.1	8.2	9.3
Men				
18–30 y	76	7.7	12.3	13.8
31–60 y	77	7.4	11.8	13.3
61–74 y	74	6.6	10.6	12.0
≥ 75 y	73	6.0	9.6	10.8

a It should be noted that these estimations have a large standard error due to inaccuracy in estimation of both REE and PAL. Therefore, the results should be used only for estimation on group level. See *Chapter 9* on Energy for more details.

b Rounded values. The estimated reference weights are based on mean population weights in Denmark, Sweden and Finland, with adjustments for individuals outside BMI range 18.5–25. The values in the tables are thus estimations assuming that all individuals are at normal weight.

c REE = resting energy expenditure.

d PAL = physical activity level; total energy expenditure divided by basal metabolism (BMR).

e Corresponding to an energy expenditure of 60 minutes brisk walking daily.

f During pregnancy the energy requirement increases, mainly during the second and third trimesters. An increase in energy intake of approximately 1.5 MJ/d in the second trimester and 2 MJ/d in the third, is applicable for both activity levels provided that the level (1.6 or 1.8 PAL) is unchanged. During lactation the energy requirement increases by approximately 2 MJ/d for the reference woman provided that the level of physical activity is unchanged. For many pregnant and lactating women, the increased energy requirement is compensated for by a decreased amount of physical activity.

Table 1.5 Reference values for energy intakes in groups of children

Age	Average weight[a] kg	Estimated energy requirements[b] MJ/d
6–11 mo	9.1	3.2
12–23 mo	11.6	4.1
2–5 y	16.1	5.3
6–9 y	25.2	7.7
Girls		
10–13 y	38.3	8.6
14–17 y	53.5	9.6
Boys		
10–13 y	37.5	9.8
14–17 y	57.0	12.3

a Values for body weight in the group 0–5 years are primarily based on the mean of reference values from Denmark, Finland, Norway and Sweden. Recent values for growth at school age show increasing weight to height and a prevalence of overweight, therefore values for the age group 6–17 y are based on mean values from 1973–1977.

b Values for children 10–17 y are based on PAL 1.75/1.80 for boys and 1.65/1.70 for girls.

Recommendations on physical activity

Adequate physical activity contributes to the prevention of lifestyle-related diseases such as cardiovascular disease, osteoporosis and certain types of cancer. Daily physical activity is therefore recommended as part of a healthy lifestyle, together with a balanced diet.

Children and adolescents

There should be a minimum of 60 minutes of physical activity every day. The activity can probably be divided into shorter intervals of physical activity during the course of the day. Activities should be as diverse as possible in order to provide optimal opportunities for developing all aspects of physical fitness including cardio-respiratory fitness, muscle strength, flexibility, speed, mobility, reaction time and coordination.

Adults

The adult population should undertake a minimum of 30 minutes of daily physical activity of moderate intensity and/or vigorous intensity corresponding to an energy expenditure of about 630 kJ. This should be

in addition to the energy expenditure through normal inactive living. The activity can probably be divided into shorter intervals of physical activity during the course of the day, for instance intervals lasting about 10 minutes. An increase in activity beyond this duration and intensity will yield additional benefits. More physical activity (about 60 minutes daily) with a moderate and/or vigorous intensity may be needed for prevention of weight gain.

Recommendations on salt intake

A gradual reduction in the intake of sodium as sodium chloride is desirable. The population target is 6 g/d salt for women and 7 g/d for men, corresponding to 2.3 and 2.8 g/d of sodium, respectively. A further decrease to 5–6 g salt per day may have additional benefits.

The salt intake of children should also be limited and for children below 2 years of age the sodium density, expressed as salt, should not exceed 0.5 g/MJ, in order to prevent children becoming accustomed to a diet with a high salt content.

Recommendations on consumption of alcohol

The consumption of alcohol should be limited and not exceed approximately 10 g alcohol per day for women and 20 g per day for men. The energy contribution from alcohol should not exceed 5 E% in adults. Pregnant and lactating women, children and adolescents are recommended to abstain from alcohol.