National Dietary Guidelines of Greece for Children and Adolescents:

A tool for promoting healthy eating habits

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ABSTRACT

Objective: Dietary guidelines are an essential policy tool for facilitating optimal dietary patterns and healthy eating behaviors. We report a) the methodological approach adopted for developing the National Dietary Guidelines of Greece (NDGGr) for Infants, Children and Adolescents, b) the guidelines for children 1-18 years.

Design: An evidence-based approach was employed to develop food-based recommendations according to the methodologies of the World Health Organization, Food and Agriculture Organization, and European Food Safety Authority. Physical activity recommendations were also compiled. Food education and healthy eating tips and suggestions were also provided.

Setting: The NDGGr encompass food-based nutritional and physical activity recommendations for promoting healthy dietary patterns and eating behaviors and secondarily to serve as a helpful tool for the prevention of childhood overweight and obesity.

Subjects: Not applicable.

Results: The NDGGr includes food-based recommendations, food education and health promotion messages, regarding: i) fruits; ii) vegetables; iii) milk and dairy products; iv) cereals; v) red and white meat; vi) fish and seafood; vii) eggs; viii) pulses; ix) added lipids, olives, and nuts; x) added sugars and salt; xi) water and beverages, and xii) physical activity. A Nutrition Wheel, consisting of the 10 most pivotal key messages was developed so as to enhance the adoption of optimal dietary patterns and a healthy lifestyle. The NDGGr additionally provide recommendations regarding the optimal frequency and serving sizes of main meals, based on the traditional Greek diet.

Conclusions: As a policy tool for promoting healthy eating, the NDGGr has been disseminated in public schools across Greece.
INTRODUCTION

Healthy eating is important in all life stages. For children and adolescents in particular, healthy eating is essential for ensuring optimal physical and cognitive development (1-3). Dietary patterns and eating behaviours established during childhood and adolescence are likely to persist into adulthood (4). Thus, promoting healthy eating as early as possible is of particular importance. Furthermore, achieving and maintaining normal body weight is vital for favorable health outcomes throughout the life-course (3, 5).

In more detail, childhood obesity is associated with a wide array of adverse health outcomes, both physical and psychosocial (6). Not only is excess weight in childhood and adolescence associated with dental caries and asthma (7, 8), but is also likely to lead to lifelong overweight and obesity (9). Furthermore, childhood obesity is associated with greater risk and earlier onset of chronic disorders such as hypertension, hypercholesterolemia and type 2 diabetes (3, 9-11).

Be that as it may, the dietary patterns of children and adolescents in Greece over the last decades are shifting away from the traditional Greek diet, towards an unhealthier direction (12-16). At the same time, approximately 40% of children and adolescents are either overweight or obese, exhibiting one of the highest prevalence rates of pediatric overweight and obesity in Europe (16-18). Hence, the promotion of healthy dietary patterns, based on the principles of the traditional Greek diet, as well as prevention and control of childhood obesity, is of notable importance in this particular European region.

Dietary guidelines constitute an essential policy tool for facilitating optimal dietary patterns and healthy eating behaviors. An evidence-based approach was employed to develop the 2014 National Dietary Guidelines of Greece (NDGGr) for adults (19), as well as for specific population groups, including a) infants, children and adolescents (20), b) women (including women during pregnancy, lactation, and menopause) (21), and c) adults aged 65 years or older (22). We report the methodology adopted for the development of the food-based National Dietary Guidelines of Greece for Infants, Children and Adolescents, as well as the innovative aspects adopted for promoting healthy eating. In
the present work we focus on the guidelines for children and adolescents aged 1-18 years. It should be also noted that through the promotion of healthy dietary patterns and physical activity, the NDGGr aim to serve as a policy tool for preventing childhood obesity.

MATERIALS AND METHODS

The NDGGr\(^{(19-22)}\) were developed under the Operational Program “Human Resources Development” 2007 – 2013 of the Hellenic Ministry of Health. The private nonprofit scientific organization Institute of Preventive Medicine, Environmental and Occupational Health, Prolepsis, was selected to develop a methodological protocol for the optimal development and to compile the NDGGr. The WHO, Food and Agriculture Organization of the United Nations (FAO), and European Food Safety Authority (EFSA) methodologies\(^{(23-25)}\) were used for the development of the food-based NDGGr, so as to take into consideration valuable experiences and relevant methodology for developing such guidelines. A multidisciplinary research team (including nutritionists, physicians, health promotion specialists, and food technologists) was selected to implement the entailed research tasks, compilation and authorship of the NDGGr, as well as its production and dissemination following Scientific Committee approval. In more detail, the synthesis and critical appraisal of the most robust peer-reviewed epidemiological evidence was undertaken by the Prolepsis team, which was responsible for compiling the final NDGGr and related health promotion materials for the general and scientific publics.

Additionally, Prolepsis selected and appointed an independent multidisciplinary Scientific Committee, responsible for the critical review and appraisal of the compiled NDGGr. The Scientific Committee consisted of 28 experts in the nutritional sciences, including physicians, research scientists and academics, as well as representatives of relevant Ministries. Financial compensation was not awarded for Committee participation. Committee members were assigned to four Subcommittees (i.e. NDGGr Subcommittees for: a) Infants, Children, and Adolescents (ages 0 to <18 years old), b) Adults; c) Women (including women during pregnancy, lactation, and menopause); and d) Adults aged 65
years or older) based on their particular field of expertise. Subcommittee members were responsible for reviewing the critically appraised literature regarding the potential etiological association between the consumption of nutrients, foods, and/or dietary patterns and subsequent risk of developing the most prevalent diet-related chronic diseases (including cardiovascular diseases, type 2 diabetes mellitus, metabolic syndrome, obesity, and most prevalent cancers) and for approving the final dietary guidelines, as will be discussed below. The Committee members met regularly with the Prolepsis team to discuss the critically appraised evidence until a consensus was reached.

**Synthesis of evidence**

Firstly, for the development of the dietary guidelines the following were taken into consideration: (a) The consumption of food items and/or food groups, particularly in relation to the traditional Greek diet, in Greece was assessed based on the Food and Agricultural Organization food balance sheets\(^{(26)}\), Hellenic National Statistics Authority household budget surveys\(^{(27)}\), and food consumption surveys\(^{(28)}\); (b) Related scientific publications, including population-based epidemiological investigations regarding the consumption of food items and/or meals at the individual level in Greece; (c) The regional seasonal availability, financial cost, and related environmental considerations (including i.e. the bioeconomy and biodiversity of foods), when applicable; (d) The pre-existing Dietary Guidelines for Adults of the Supreme Scientific Health Council of the Hellenic Ministry of Health and Welfare\(^{(29)}\). In addition, a systematic literature search was conducted to identify the most recent and related Scientific Reports and Dietary Guidelines published by international organizations, governmental entities, and scientific societies in Greece, Europe, and worldwide.\(^{(30-33)}\)

Secondly, the epidemiological trends and public health importance of nutrition-related chronic diseases in Greece was evaluated based on a systematic literature search in PubMed, as well as the WHO European Health for All Database and GLOBOCAN databases. Additionally, a systematic search was conducted to retrieve the most robust epidemiological evidence (i.e. meta-analyses of
randomized trials or prospective cohort studies) regarding the consumption of nutrients, foods, and/or dietary patterns, as well as physical activity, with the subsequent risk of developing the aforementioned most prevalent diet-related chronic diseases.

**Evidence level grading and compilation of the NDGGr**

The retrieved evidence was graded based on the methodology of the European Society of Cardiology (Recommendations for Guidelines Production www.escardiol.org/knowledge/guidelines/rules)(34), modified to accommodate for the particularities of nutritional data(35). In particular, the following three Levels of Evidence were applied: i) Level A: evidence arising from ≥1 meta-analysis of either prospective cohort studies or randomized clinical trials and/or ≥1 multicenter randomized clinical trial; ii) Level B: evidence arising from ≥2 randomized clinical trials or ≥2 prospective cohort studies or ≥5 case-control studies or ≥ 5 non-randomized clinical trials; or iii) Level C: Expert consensus and/or evidence arising from cross-sectional and/or case-control studies. The preliminary dietary guidelines were compiled based on the evidence-level grading and presented for review to all Subcommittee Members. A series of expert panel meetings among Subcommittee members was conducted for the refinement of dietary guidelines until a consensus was reached. Finally, an analytical Report was compiled detailing the retrieved findings and associated strength of recommendation for each NDGGr food item/category. This Report served as the basis for further developing two volumes of the NDGGr targeting a) the general public and b) health professionals, as detailed below.

**Development of the NDGGr**

Food-based NDGGr, with nutritional education and health promotion messages for consumers, were subsequently developed, including the following food items/categories: i) fruits; ii) vegetables; iii) milk and dairy products; iv) cereals; v) red and white meat; vi) fish and seafood; vii) eggs; viii) legumes; ix) added lipids, olives, and nuts; x) added sugars and salt; and, xi) water and beverages.
Physical activity recommendations were also compiled. To facilitate uptake, a “Nutrition Wheel” consisting of the 10 most vital nutrition and health promotion messages was developed (Figure 1). Pictorial “Healthy Meal” recommendations were incorporated regarding the optimal frequency and serving sizes of main meals, based on the traditional Greek diet (Figure 2). Specifically, the “Healthy Meal” depicts indicative serving sizes for adults and combinations of foods based on the traditional Greek diet (including a traditional main dish, salad and fruit) and prepared according to the NDGGr recommendations.

Finally, two volumes of the NDGGr were developed targeting a) the general public and b) health professionals, respectively. Regarding the NDGGr for the general public, dietary recommendations were presented analytically in text and pictorial formats, as detailed above. With respect to the NDGGr for the health professionals, a detailed description of the evidence reviewed and strength of recommendations was compiled. To enhance uptake the NDGGr was disseminated in print format and additionally made freely accessible in electronic format.

RESULTS

The NDGGr for Infants, Children and Adolescents primarily include food-based guidelines, as well as recommendations regarding the frequency of meals and parenting tips for promoting healthy dietary patterns and eating behaviours. Specifically, the NDGGr for children and adolescents (aged 1 to <18 years old) encompass age-specific recommendations regarding 10 food groups and/or items, water and/or beverages, and physical activity. Age-specific recommended dietary intakes, as well as indicative serving/portion sizes, are summarized below and detailed in Table 1. In conjunction, a “Nutrition Wheel”, consisting of the ten most pivotal recommendations, was developed (Figure 1).

Vegetables and fruits
The category “Vegetables and Fruits” encompasses all raw and cooked vegetables (including starchy vegetables, such as peas, corn, and pumpkins), as well as raw and dried fruits, inclusive of along freshly squeezed fruit juices (i.e. without added sugars). Potatoes are not included in this category. Frequent consumption of vegetables and fruits is associated with a reduced risk of cardiovascular diseases, type 2 diabetes, and gastrointestinal cancers in adulthood\(^{(36-41)}\). Additional health benefits of such consumption patterns include the prevention of overweight and obesity in both childhood and adulthood\(^{(34)}\). Hence, the NDGGr recommendation entails the consumption of a variety of fruits and vegetables (preferentially those in season) several times per day in every main meal (Figure 2).

**Milk and dairy products**

This category includes milk and dairy products, including yoghurt and cheese. Butter is excluded as it pertains to an added source of oils and fats. Moderate consumption of milk and dairy products is associated with a reduced risk of cardiovascular diseases, type 2 diabetes, and colorectal cancer in adulthood\(^{(42-45)}\). Additional health benefits include increased bone density and a reduced likelihood of hypertension\(^{(46)}\). Thus, the NDGGr recommendation endorses that children and adolescents consume milk and dairy products daily. Additionally, children >2 years old may consume either full fat or semi-skimmed milk.

**Cereals**

Rice, potatoes, cereals and grains, as well as their by-products (e.g. flour, bread and rusks, pasta, and traditional savory pies) are included in this food category. Whole grain cereals and their by-products are a rich source of carbohydrates, as well as dietary fiber, B complex vitamins, and minerals. Increased consumption of whole grains is associated with a reduced risk of cardiovascular diseases, type 2 diabetes and colorectal cancer, as well as a reduced likelihood of overweight and/or obesity\(^{(36, 47-49)}\).
The NDGGr recommends that children and adolescents consume a variety of grains and cereals (preferably whole grain) daily.

*Red meat and white meat*

This category encompasses all red (e.g. beef, pork, lamb, goat, deer, and wild boar) and white (e.g. chicken, turkey, duck, rabbit, pheasant, and game birds) meats, as well as their related processed products. While meats are a rich source of proteins, iron, vitamins B and E, magnesium, and zinc, increased consumption of processed meats is associated with several adverse health outcomes\(^{(50-53)}\). Hence, the NDGGr advises that children older than 2 years old should consume red and/or white meats 2-3 times per week. However, all processed meats should be avoided at all ages.

*Fish and seafood*

All types of fish and seafood, including shellfish, are included in this food category. Fish and seafood are a primary source of high biological value proteins (whilst concomitantly a poor source of saturated fats), and a rich source of vitamin D, selenium, and zinc. The elevated consumption of oily fish rich in omega-3 fatty acids is essential for optimal brain development and related health outcomes in adulthood\(^{(36, 54-59)}\). Thus, the NDGGr recommendation endorses children and adolescents to consume a variety of fish and seafood, corresponding to 2-3 servings per week. Additionally, at least one serving per week ought to regard the consumption of oily fish rich in omega-3 fatty acids.

*Eggs*

Eggs are a readily available protein source with high biological value. Due to their high nutrient content (e.g. vitamins A, D, and B\(_{12}\), thiamine and riboflavin, as well as carotenoids, selenium, and choline), and taking into consideration the associations of egg consumption on various health outcomes\(^{(36, 60-62)}\),
children of all ages should consume 4-7 eggs per week. It is of note that children with hyperlipidemia are advised to first consult with their physician.

**Legumes**

The “Legumes” category, an integral component of the traditional Greek diet, includes lentils, beans, chickpeas, fava beans, and broad beans. Pulses and legumes constitute a rich source of proteins and fiber, as well as several vitamins and minerals, including iron, calcium, magnesium and zinc, with favorable health outcomes\(^{48, 63-64}\). Hence, the NDGGr recommend that children and adolescents should consume pulses and legumes at least once per week.

**Added lipids, olives, and nuts**

This category includes added fats and oils (e.g. olive oil, seed and/or other vegetable oils, margarine, and butter), olives, and nuts, as well as their by-products (e.g. tahini). The consumption of added fats and oils is essential for normal childhood development. In particular, olive oil is a vital component of the traditional Greek diet, being concomitantly a rich source of monounsaturated fats, vitamin E, and polyphenols. In contrast, the consumption of saturated and trans fatty acids is associated with hyperlipidemia, cardiovascular diseases, as well as overweight/obesity\(^{36,65-70}\). Thus, the NDGGr recommends that olive oil ought to be the preferred choice of added oils in the preparation of cooked meals and/or salads. Furthermore, the consumption of added fats arising from animal sources (e.g. butter) should be limited and/or substituted with olive oil. Finally, the consumption of trans fatty acids (e.g. in prepared food products, sweets, and/or fast food items) should be avoided.

**Added sugars and salts**

The “Added sugars” and “Salt” categories encompass all added sugars (e.g. granulated white and brown sugar, cane sugar, glucose powder, and fructose powder) and honey, as well as table salt.
Consumption of added sugars, including sweetened beverages and soft drinks, is associated with an increased risk of dental caries and childhood overweight/obesity\(^{(71-73)}\). Hence, the NDGGr recommends that the consumption of foods with added sugars should be limited to a minimum. In particular, it is recommended that the consumption of sweetened beverages, soft drinks, and fruit juices with added sugars is avoided. In addition, table salt, as most often made available in the Greek market, is an essential source of iodine. However, consumption of elevated levels during childhood and adolescence is associated with an increased risk of hypertension and cardiovascular diseases in adulthood\(^{(74-77)}\). As a result, the dietary guideline developed was that total consumption of salt should be limited in children and adolescents.

**Physical activity**

Physical activity is associated with a wide array of health benefits in childhood and adolescence, including optimal physical and psychosocial development, normal body weight, and the prevention of several chronic diseases in adulthood, including hypercholesterolemia and type 2 diabetes\(^{(78, 79)}\). With respect to young children (aged 3-6 years old), the NDGGr recommends that total screen time should be limited to a minimum and children should be physically active, in a wide range of activities, for at least 1 hour per day. Within this context, parental participation is also recommended. Regarding older children and adolescents (aged 7-18 years old), it is also recommended that total screen time is limited and at least 1 hour per day is dedicated to either athletic and/or sports training activities. However, it is recommended that children aged younger than 10 years old should not be involved in high intensity training activities.

**Other recommendations**

The NDGGr include several additional recommendations regarding the types and frequencies of meals. Particular emphasis is placed on the importance of consuming a healthy breakfast, including items of
at least 3 food groups (i.e. dairy products, cereals, and fruits or vegetables). Additionally, for main meals, illustrations of a Healthy Meal (including a main dish, salad, and fruit) based on the traditional Greek diet are illustrated for clarity. Furthermore, behavioural techniques are included as a separate chapter of the NDGGr, aiming to provide practical tips to parents for the promotion of healthy eating. The issues addressed include the influence of parental behaviors (e.g. acting as role models) for encouraging healthy dietary patterns (80, 81), the importance of consuming family meals (82, 83), tips and ideas for improving the consumption of less preferred food, as well as specific tips for adolescents. The aforementioned recommendations are summarized in the Nutrition Wheel Guidelines as follows: “Be a role model for your children by encouraging healthy eating. Eat 3 main meals and at least one snack every day. Eat breakfast every day. Drink plenty of water. Eat together as a family as frequently as possible. Turn the TV off. Cook at home healthy and safe food. Choose seasonal products.”

DISCUSSION
We report the methodological approach adopted for the development of the 2014 NDGGr for Infants, Children and Adolescents. Within this context, an evidence-based approach was employed to develop recommendations for promoting healthy dietary patterns and physical activity, as well as a Nutrition Wheel, so as to ultimately enhance the adoption of the aforementioned recommendations and promote healthy eating habits. The NDGGr have been adopted by the Hellenic Ministry of Education, while the Hellenic Institute for Educational Policies has approved their use and widespread dissemination in public schools nationwide. Additionally, the Ministry of Health, as well as the Hellenic Central Health Council has endorsed their use as a tool for promoting healthy dietary patterns through their widespread dissemination to the general public (including students, parents and educators), as well as healthcare professionals. To enhance extensive uptake, the NDGGr have been disseminated nationwide and are electronically freely accessible (English summary available at: http://www.diatrofikoiodigoi.gr/?Page=summary-children). Finally, scientific volumes of the NDGGr,
including a detailed description of the evidence reviewed and strength of recommendation in both print and electronic forms, have been made accessible to nutritionists and healthcare professionals alike.

Food-based dietary guidelines for children and/or adolescents have been previously published from 29 (including Greece) out of 51 WHO European region countries (57%). Of the 28 countries (presented in Suppl. Table 1), 24 adopt a pictorial illustration for the presentation of the guidelines; 12 adopt the pyramid, 10 use other forms of pictorial models (mostly circles, plates or pies) and 2 countries (Finland\(^{(84)}\) and Slovenia\(^{(85)}\) use both the food pyramid and plate. The NDGGr also use two types of illustration; a Nutrition Wheel and pictorial “Healthy Meal” recommendations (Figures 1 and 2). Furthermore, the NDGGr are one of the few guidelines which encompass the greatest number of distinct food categories, including 10 food groups, as well as physical activity (other dietary guidelines with 8 or 9 distinct food categories are those of Belgium\(^{(86)}\), Finland\(^{(84)}\), Luxembourg\(^{(87)}\), Netherlands\(^{(88)}\) and Slovenia\(^{(85)}\)).

It should be also noted that despite different geographical, socio-economic and cultural contexts among countries, the majority of the pivotal nutritional recommendations are similar. In fact, the principal messages include daily consumption of adequate amounts of fruits, vegetables, dairy products, as well as starches, cereals and grains and moderate-to limited intake of fats. In more detail, guidelines from all countries include recommendations regarding fruit and vegetable intake and most of which suggest the intake of 5 servings per day or at least 500g/day. The NDGGr are one of the guidelines recommending the highest suggested intake of fruits and vegetables, as the lowest suggested intake of (for children 1-3 y) is >300 g/day, reaching for adolescents more than 1000 g/day. Furthermore, 19 of the 28 countries (68%) incorporate specific recommendations regarding the increased consumption of whole grains or provide the recommended dietary fiber intake. The NDGGr also promote the intake of whole grain cereals with specific tips facilitating their consumption. Furthermore, it should be noted that even if the recommended intake of protein food and red meat is more or less common in the majority of the countries, it is noteworthy that only 11 of the 28 guidelines
(39%) explicitly recommend the avoidance of processed meat. Finally, it should be mentioned that the majority of the WHO European region countries (22 out of 28) provide physical activity recommendations. Of these countries, only 11 recommend physical activity for 60 minutes per day (or longer) - the highest recommendation, similar as the NDGGr.

All things considered, the recently developed NDGGr for Infants, Children and Adolescents have employed an evidence-based approach to develop food-based nutritional and physical activity recommendations. The NDGGr novel aspects lie in the evidence-based approach applied, as well as the development of an age-specific Nutrition Wheel and indicative examples of “Healthy Meals” with pictorial depictions providing recommendations regarding the optimal frequency and serving sizes of main meals, based on the traditional Greek diet. Future longitudinal investigations are necessary to elucidate whether the application of the NDGGr is effective for promoting healthy dietary patterns, and serves as a useful tool for childhood obesity prevention and maintenance of an optimal body weight throughout adolescence and subsequent adulthood.
LEGENDS FOR FIGURES AND TABLES

Figure 1: The 2014 Greek Dietary Guidelines for infants, children and adolescents. The 2014 Greek Dietary Guidelines are depicted as a Nutrition Wheel entitled “Ten steps to healthy eating for children and adolescents”.

Figure 2: Indicative examples of the “Healthy Meals” included in the Greek National Dietary Guidelines for Infants, Children and Adolescents.

Table 1. Recommendations and indicative serving sizes* for the consumption of food items and food groups based on the 2014 Greek Dietary Guidelines for children and adolescents

Suppl. Table 1. Comparison of national dietary recommendations for children and adolescents from WHO European Region countries
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Be a good role model for your children, encouraging healthy eating.

Variety of fruits and vegetables everyday.

Physical activity everyday

Milk, yogurt or cheese everyday.

Variety of cereals everyday. Prefer whole grain.

Limit salt and added sugar intake.

Olive oil as the main added lipid.

Legumes at least once a week.

4-7 eggs per week.

Red and/or white lean meat 2-3 times per week. Avoid processed meat.

Fish and seafood 2-3 times per week. Fatty fish at least once a week.

Eat together as a family as frequently as possible. Turn the TV off.

Cook at home healthy and safe food. Choose seasonal products.

Eat 3 main meals and at least one snack every day. Eat breakfast every day. Drink plenty of water.
### Table 1. Recommendations and indicative serving sizes* for the consumption of food items and food groups based on the 2014 Greek Dietary Guidelines for children and adolescents

<table>
<thead>
<tr>
<th>Age</th>
<th>12 to &lt;24 months</th>
<th>2 to 3 years</th>
<th>4 to 8 years</th>
<th>9 to 13 years</th>
<th>14 to &lt;18 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fruits a</td>
<td>1 serving per day</td>
<td>1 serving per day</td>
<td>1-2 servings per day</td>
<td>2-3 servings per day</td>
<td>3 servings per day</td>
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<tr>
<td>Vegetables b</td>
<td>1 serving per day</td>
<td>1 serving per day</td>
<td>1-2 servings per day</td>
<td>2-3 servings per day</td>
<td>3-4 servings per day</td>
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<tr>
<td>Milk and dairy products c</td>
<td>2 servings per day</td>
<td>2 servings per day</td>
<td>2-3 servings per day</td>
<td>3-4 servings per day</td>
<td>3-4 servings per day</td>
</tr>
<tr>
<td>Cereals d</td>
<td>2 servings per day</td>
<td>3 servings per day</td>
<td>4-5 servings per day</td>
<td>5-6 servings per day</td>
<td>6-8 servings per day</td>
</tr>
<tr>
<td>Red and white meat</td>
<td>2 servings (serving size: 40-60g) per week</td>
<td>2-3 servings (serving size: 60g) per week</td>
<td>2-3 servings (serving size: 60-90g) per week</td>
<td>2-3 servings (serving size: 90-120g) per week</td>
<td>2-3 servings (serving size: 120-150g) per week</td>
</tr>
<tr>
<td>Fish and seafood</td>
<td>2 servings (serving size: 60g) per week</td>
<td>2 servings (serving size: 60-90g) per week</td>
<td>2-3 servings (serving size: 90-120g) per week</td>
<td>2-3 servings (serving size: 120-150g) per week</td>
<td>2-3 servings (serving size: 150g) per week</td>
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<tr>
<td>Eggs</td>
<td>4-7 eggs per week</td>
<td>4-7 eggs per week</td>
<td>4-7 eggs per week</td>
<td>4-7 eggs per week</td>
<td>4-7 eggs per week</td>
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<tr>
<td>Legumes</td>
<td>1-2 servings (serving size: 40-60g) per week</td>
<td>≤3 servings (serving size: 60-90g) per week</td>
<td>3 servings (serving size: 90-120g) per week</td>
<td>&gt;3 servings (serving size: 120-150g) per week</td>
<td>&gt;3 servings (serving size: 150-200g) per week</td>
</tr>
<tr>
<td>Added lipids, olives and nuts e</td>
<td>1 serving per day</td>
<td>1-2 servings per day</td>
<td>2-3 servings per day</td>
<td>3-4 servings per day</td>
<td>4-5 servings per day</td>
</tr>
<tr>
<td>Added sugars f and salt g</td>
<td>Limit intake</td>
<td>Limit intake</td>
<td>Limit intake</td>
<td>Limit intake</td>
<td>Limit intake</td>
</tr>
<tr>
<td>Fluids</td>
<td>5 glasses per day</td>
<td>5 glasses per day</td>
<td>6-7 glasses per day</td>
<td>8-10 glasses per day</td>
<td>10-12 glasses per day</td>
</tr>
<tr>
<td>Of them Water</td>
<td>3-4 glasses per day</td>
<td>3-4 glasses per day</td>
<td>4-5 glasses per day</td>
<td>6-8 glasses per day</td>
<td>8-10 glasses per day</td>
</tr>
</tbody>
</table>

*The nutritional needs of children and adolescents may differ according to sex, physical activity level and stage of development*

a 1 serving corresponds to 120-200g of fruit or 125 ml fresh fruit juice without added sugars
b 1 serving corresponds to 150-200g of raw or cooked vegetables

c 1 serving corresponds to 150ml milk or 200g yoghurt or 30g hard cheese or 60g soft cheese

d 1 serving corresponds to 1 slice of bread, or 120ml cooked rice or pasta, or 120-150g of cooked potatoes

e 1 serving corresponds to 15ml olive oil or vegetable oil, 15ml margarine or butter, or 10-12 olives

f Avoid consumption of sweetened beverages, soft drinks, and fruit juices with added sugars

g For table salt, it is recommended that infants aged 1-3 years old consume <2g/day, children aged 4-6 years old consume <3g/day, and children and adolescents aged 7-18 years old consume <5g/day
## Suppl. Table 1. Comparison of national dietary recommendations for children and adolescents from WHO European Region countries

<table>
<thead>
<tr>
<th>Country</th>
<th>Age</th>
<th>Total fat</th>
<th>Fruits and Vegetables</th>
<th>Starches, Cereals and Grains</th>
<th>Milk and Dairy Products</th>
<th>Proteins (including red and processed meats)</th>
<th>Physical Activity</th>
<th>Pictorial depiction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Albania</td>
<td>4-18 y</td>
<td>6-12 y: 25-35% daily energy intake</td>
<td>4-6 y: 250 g fruit/d and 200 g vegetables/d</td>
<td>4-6 y: bread 100-150 g/d, potatoes 150 g/d, pasta, rice 80 g/d</td>
<td>priority to integral products</td>
<td>4-6 y: 500 mL milk/yogurt, 25-30 g cheese</td>
<td>Limit processed meat</td>
<td>Food Pyramid (4 levels, 6 food groups)</td>
</tr>
<tr>
<td>Andorra</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
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<td>Armenia</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
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<tr>
<td>Austria</td>
<td>90</td>
<td>3-18 y</td>
<td>5 times/day, in every meal</td>
<td>2-3 portions fruit/d, 2-3 portions vegetables/d</td>
<td>Prefer whole grains</td>
<td>NA</td>
<td>1-2 times/day</td>
<td>Food Pyramid (6 levels, 8 food groups)</td>
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<td>Belarus</td>
<td>NA</td>
<td>NA</td>
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<td>NA</td>
<td>NA</td>
<td>NA</td>
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<tr>
<td>Belgium</td>
<td>3-18 y</td>
<td>Limit intake and prefer a variety of sources</td>
<td>5 times/day, in every meal</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
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<tr>
<td>Bosnia and Herzegovina</td>
<td>91</td>
<td>7-15 y</td>
<td>Guidelines regarding the type of fat</td>
<td>5 serv/d</td>
<td>in every meal</td>
<td>0,5L milk or dairy products</td>
<td>50-80 g/wk</td>
<td>Food Pyramid (4 levels, 4 food groups)</td>
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<tr>
<td>Bulgaria</td>
<td>92</td>
<td>7-15 y</td>
<td>Guidelines regarding the type of fat</td>
<td>5 serv/d</td>
<td>in every meal</td>
<td>0,5L milk or dairy products</td>
<td>fish: 2 times/week</td>
<td>Food Pyramid (4 levels, 5 food groups)</td>
</tr>
<tr>
<td>Croatia</td>
<td>93</td>
<td>6-12 y</td>
<td>Fruits: 2-4 serv/d Vegetables: 3 servings/d</td>
<td>6-9 servings/d</td>
<td>-</td>
<td>2-3 times/week</td>
<td>60 min/d</td>
<td>Food Pyramid (4 levels, 4 food groups)</td>
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<tr>
<td>Cyprus</td>
<td>94</td>
<td>6-12 y</td>
<td>Eat modestly</td>
<td>Fruits: 2-4 serv/d Vegetables: 3 servings/d</td>
<td>-</td>
<td>2-3 servings/d (150-180gr)</td>
<td>-</td>
<td>Food Pyramid (4 levels, 5 food groups)</td>
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<tr>
<td>Country</td>
<td>Population Details</td>
<td>Age (yr)</td>
<td>Guidelines</td>
<td>Dietary Intake and Recommendations</td>
<td>Physical Activity (min/wk)</td>
<td>Model/Pyramid Description</td>
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<tr>
<td>Czech Republic</td>
<td>NA</td>
<td>NA</td>
<td>Limit saturated fat intake. Guidelines regarding the type of fat.</td>
<td>NA</td>
<td>NA</td>
<td>Food plate model</td>
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<tr>
<td>Denmark</td>
<td>NA</td>
<td>NA</td>
<td>600 g/d of fruits and vegetables</td>
<td>NA</td>
<td>NA</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Estonia</td>
<td>General population including children and adolescents</td>
<td>&gt;3 y</td>
<td>Increase the consumption of nuts and seeds.</td>
<td>5 servings of vegetables and fruits/d Everyday Prefer whole grains Consume unsweetened milk and milk products. Red meat: 1/3 of all meat. Fish up to 3 times/week Limit processed meat &gt;60 min/d</td>
<td>NA</td>
<td>Food Pyramid (6 food groups)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Finland</td>
<td>General population including children and adolescents</td>
<td>General population including children and adolescents</td>
<td>Prefer the good fats &gt;500 g/d fruits and vegetables Prefer whole grain 25-35 g/d dietary fiber Dairy:5-6 dl/day, 2-3 slices of low fat cheese/day Fish:2-3 serv/week &lt;500 g/wk (moderate activity) 75 min/wk (brisk activity) 30-60 min/d</td>
<td>- 3/d 1-2 times/d, variety fish &gt;2 times/week avoid processed meat White (not red) meat recommended</td>
<td>NA</td>
<td>Food Pyramid (6 levels, 9 food groups) and Food plate model</td>
<td></td>
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<tr>
<td>France</td>
<td>3-18 y</td>
<td>3-18 y</td>
<td>moderation and variety &gt;5/d in every meal -</td>
<td>3/d</td>
<td>150 min/wk (moderate activity) 75 min/wk (brisk activity) 30-60 min/d</td>
<td>NA (6 levels, 9 food groups) and Food plate model</td>
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<tr>
<td>Georgia</td>
<td>NA</td>
<td>NA</td>
<td>General population including children and adolescents</td>
<td>General population including children and adolescents Eat small quantities of fat and high-fat foods. 5 servings of fruits and vegetables/d Eat plenty of cereals, preferably wholegrain, and potatoes &gt; 30 g/d dietary fiber Eat milk and dairy products every day</td>
<td>NA</td>
<td>Nutrition circle (7 food groups)</td>
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<tr>
<td>Germany</td>
<td>General population including children and adolescents</td>
<td>NA</td>
<td>Eat small quantities of fat and high-fat foods.</td>
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<td>-</td>
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<tr>
<td>Country</td>
<td>Age</td>
<td>Dietary guidelines</td>
<td>Red meat:</td>
<td>Food model and</td>
<td>Food pyramid (levels, food groups)</td>
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<tr>
<td>Hungary (99)</td>
<td>&gt; 2 y</td>
<td>Dietary guidelines for adults are provided.</td>
<td>&lt;300-600g/wk</td>
<td></td>
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<tr>
<td>Iceland (100)</td>
<td>&gt; 2 y</td>
<td>-</td>
<td>500 ml/d dairy products or 25 g/d of cheese</td>
<td></td>
<td>Food circle (6 groups) and Food plate model</td>
<td></td>
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</tr>
<tr>
<td>Ireland (101)</td>
<td>&gt; 5 y</td>
<td>In very small amounts 5-7 serv/d</td>
<td>Fish 2-3 times/week Meat in moderation</td>
<td></td>
<td>Food pyramid (6 levels, 6 food groups)</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>&gt; 5 y: 3-5 serv/d, up to 7 serv/day for teenage boys</td>
<td>500 ml/d dairy products or 25 g/d of cheese</td>
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<td></td>
<td></td>
<td>5-8 y: 3 serv/d</td>
<td>2 serv/d Oily fish, up to twice/wk</td>
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<td></td>
<td></td>
<td>9-18 y: 5 serv/d</td>
<td>Limit processed meat</td>
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<td></td>
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<td>60 min/ d</td>
<td>-</td>
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<td></td>
</tr>
<tr>
<td>Israel (102)</td>
<td>6-18 y</td>
<td>-</td>
<td>5-7 serv/day</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Bread: 3-6 serv/d, bakery products: 1-2 serv/d, pasta/rice: 1-2 serv/d, potatoes: 1-2 serv/ wk</td>
<td>&gt;3 serv/day</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Prefer whole grains</td>
<td>2 total day, 1 serv meat or poultry/d 1-2 serv/d Eggs 2-4 times/wk</td>
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<td>Milk/yoghurt: 3 serv/d</td>
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<td></td>
<td></td>
<td>Cheese: 2-3 serv/wk</td>
<td>60 min/d</td>
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<tr>
<td>Italy (103)</td>
<td>&gt; 6 y</td>
<td>3-4 serv/d</td>
<td>Avoid red and processed meat</td>
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<td>Vegetables: 5 serv/d, fruits: 3-4 serv/d</td>
<td>&gt;60 min/d</td>
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<td></td>
<td>Bread: 3-6 serv/d, bakery products: 1-2 serv/d, pasta/rice: 1-2 serv/d, potatoes: 1-2 serv/ wk</td>
<td>-</td>
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<td>Prefer whole grains</td>
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<td>Milk/yoghurt: 3 serv/d</td>
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<td>Cheese: 2-3 serv/wk</td>
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<td>Fish 2 times/wk</td>
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<td>Avoid red and processed meat</td>
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<td>Kazakhstan</td>
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<td>NA</td>
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</tr>
<tr>
<td>Latvia (104)</td>
<td>2-18 y</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
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<td>Lithuaina</td>
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Notes: NA = Not available.
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<thead>
<tr>
<th>Country</th>
<th>Age Group</th>
<th>Guidelines</th>
<th>Vegetables</th>
<th>Fruits</th>
<th>Grains</th>
<th>Meat, Fish, Fish, Fish</th>
<th>Fish</th>
<th>Pie</th>
<th>Food Pyramid</th>
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</thead>
<tbody>
<tr>
<td>Luxembourg</td>
<td>General population including children and adolescents</td>
<td>≤ 35% of total energy intake</td>
<td>≥5 serv/d of fruits and/or vegetables</td>
<td>Every meal, ≥3 times/d</td>
<td>≥3 serv/d</td>
<td>Meat, poultry, fish, eggs: 1-2 times/d Fish: ≥2t/week</td>
<td>NA</td>
<td>NA</td>
<td>Food Pyramid (6 levels, 8 food groups)</td>
</tr>
<tr>
<td>Malta</td>
<td>&gt;1 y</td>
<td>Dietary guidelines for adults are provided.</td>
<td>Vegetables: 10-150 g/day Fruits: 1.5 serv/day</td>
<td>2-3 serving spoons of whole grain cereal or 2-3 potatoes/day 70-90g whole grains/d, dietary fiber 2-3 g/d/MJ</td>
<td>-</td>
<td>Fish: 2-3 times/week, 300-450g/week</td>
<td>Limit red and processed meat, &lt;500g/week</td>
<td>60 min/d</td>
<td>No</td>
</tr>
<tr>
<td>Netherlands*</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
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<td>1.5-4.5 serv/d</td>
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<td>Pie (5-8 food groups)</td>
</tr>
<tr>
<td>Portugal</td>
<td>&gt;1 y</td>
<td>1-3 serv/d</td>
<td>Vegetables 3-5 serv/d, Fruits: 3-5 serv/d fruits</td>
<td>4-11 serv/d</td>
<td>-</td>
<td>2-3 serv/d</td>
<td>1.5-4.5 serv/d</td>
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<td>Yes</td>
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<tr>
<td>Republic of Moldova</td>
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<td>NA</td>
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<td>Food Pyramid (5 levels, 7 food groups)</td>
</tr>
<tr>
<td>Romania</td>
<td>General population</td>
<td>-</td>
<td>Vegetables: 3-4 serv/d</td>
<td>6-11 serv/day</td>
<td>-</td>
<td>2-3 serv/day, emphasizing the</td>
<td>-</td>
<td>&gt; 30 min/day</td>
<td>Food Pyramid (5 levels, 7 food groups)</td>
</tr>
<tr>
<td>Country</td>
<td>Age Range</td>
<td>Dietary Guidelines</td>
<td>Fruits: 2-4 serv/d</td>
<td>Vegetables: 250-400 g/d</td>
<td>9-17 units/d (1 unit = half slice of bread)</td>
<td>2-4 servings/d</td>
<td>importance of eggs for children</td>
<td>NA</td>
<td>NA</td>
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<td>Slovakia</td>
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<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
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<tr>
<td>Slovenia</td>
<td>&gt;2 y</td>
<td>-</td>
<td>Fruits: 150-250 g/d; Vegetables: 250-400 g/d</td>
<td>9-17 units/d</td>
<td>NA</td>
<td>NA</td>
<td>3-5 servings/day Poultry: 1-3 times/wk Red meat: 2-3 times/wk Limit processed meat</td>
<td>60 min/d</td>
<td>Food Pyramid (6 levels, 8 food groups) and Healthy Plate (5 categories) and examples of main meals</td>
</tr>
<tr>
<td>Spain</td>
<td>(111)</td>
<td>3-16 y</td>
<td>&lt;30% daily energy intake</td>
<td>5 portions of fruits and vegetables/d</td>
<td>&gt;25 g/d dietary fiber</td>
<td>&gt;500 mL/d</td>
<td>Protein from various sources, prefer fish and oily fish, &lt;4-5 eggs/d</td>
<td>-</td>
<td>Yes</td>
</tr>
<tr>
<td>Sweden</td>
<td>&gt;2 y</td>
<td>-</td>
<td>&gt;500 g/d fruits and vegetables</td>
<td>-</td>
<td>Switch to wholemeal</td>
<td>2-5 dL/d milk, or fermented milk</td>
<td>Fish: 2-3 serv/w &lt;500 g/wk, only a small amount should be processed meat</td>
<td>&gt;30 min/d</td>
<td>Keyhole symbol</td>
</tr>
<tr>
<td>Switzerland</td>
<td>(113)</td>
<td>4-12 y</td>
<td>20 g/d vegetable oil, 20 g/d nuts.</td>
<td>2 servings of fruits and 3 of vegetables/d (serving size increases with age)</td>
<td>3-4 serv/d (serving size increases with age)</td>
<td>3-4 serv/d (serving size increases with age)</td>
<td>4-6 y: 50 g/d 7-9 y: 75 g/d 10-12 y: 90 g/d</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Tajikistan</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
</tr>
</tbody>
</table>
The Former Yugoslav Republic of Macedonia (114)  

<table>
<thead>
<tr>
<th>Age</th>
<th>Percentage of Daily Energy Intake</th>
<th>Type of Food</th>
<th>Amount</th>
<th>Amount of Food</th>
<th>Type of Food</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;2 y</td>
<td>30-40%</td>
<td>Various fruits and vegetables</td>
<td>&gt;400 g</td>
<td>500 g/d</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-3 y</td>
<td>25-35%</td>
<td>45-65%</td>
<td>Daily energy intake</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4-18 y</td>
<td>50-60%</td>
<td>Whole grain cereals</td>
<td>At least half</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2-3 y</td>
<td>5-20%</td>
<td>Skimmed milk and low-fat dairy products</td>
<td>2-3 y: 450-500 mL/d</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4-18 y</td>
<td>10-30%</td>
<td>-</td>
<td>4-18 y: 600 mL/d</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5-17 y</td>
<td>&gt;60 min/d</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Turkey (115)  

<table>
<thead>
<tr>
<th>Age</th>
<th>Percentage of Daily Energy Intake</th>
<th>Type of Food</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-18 y</td>
<td>25-35%</td>
<td>50-60% daily energy intake</td>
<td>Consume whole grain cereal</td>
</tr>
<tr>
<td>4-18 y</td>
<td>25-35%</td>
<td>50-60% daily energy intake</td>
<td>Fish: 2 times/week</td>
</tr>
<tr>
<td>2-3 serv/day</td>
<td>Egg: 1 serv/day</td>
<td>-</td>
<td>General recommendations, no specific duration</td>
</tr>
<tr>
<td>4-18 y</td>
<td>2 serv/day</td>
<td>-</td>
<td>4-leaf clover (4 food groups)</td>
</tr>
</tbody>
</table>

Turkmenistan United Kingdom (116)  

<table>
<thead>
<tr>
<th>Age</th>
<th>Percentage of Daily Energy Intake</th>
<th>Type of Food</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>5 portions/d</td>
</tr>
<tr>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>Base of every meal</td>
</tr>
<tr>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>2 portions (2*140 g/wk) fish</td>
</tr>
<tr>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>Red and processed meat &lt;70 g/d</td>
</tr>
<tr>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>Eatwell Guide (6 food groups)</td>
</tr>
</tbody>
</table>

NA: Not applicable  
Serv/d: Servings per day  
‡ in Polish, detailed guidelines could not be extracted  
*Personalized guidelines are provided – Data presented here are for a 6-year old