Republic of Turkey
Ministry of Health
Public Health Agency
of Turkey

TURKEY DIETARY GUIDELINES

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2016
ANKARA

Work Name : Turkey Dietary Guidelines

Turkey ISBN : 978-975-590-619-5

Ministry of Turkey Health Publication No: 1046

Production:
Alban Tanıtım Ltd.Şti
Büklüm Sokak No: 45/3 Kavaklıdere / ANKARA
Tel: 0.312 430 13 15 Faks: 0.312 434 04 13
www.albantanitim.com.tr

Printing: KAYHAN AJANS

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ACKNOWLEDGEMENT

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INTRODUCTION

Nutrition is a behavior that should be performed consciously for the intake of the nutrients needed in the body in adequate amounts and at appropriate times to increase quality of life and to protect and promote health. Adequate and balanced nutrition of individuals is one of the protective factors that play a role in reducing the rate of incidence of diseases, prevention of protein-energy malnutrition and vitamin-mineral deficiencies, and minimization of nutrition-related health problems.

"Dietary Guidelines" contain a series of recommendations composed to describe all conditions related to nutrition and to provide information on adequate and balanced nutrition to the populations. They also show the practical ways to achieve nutritional goals and helps development of healthy lifestyles for the population. These guidelines show regard to traditional eating habits and draw attention to the perspectives needed to be changed. Guidelines also pay attention to the ecological environment, socio-economic and cultural factors, and the biological and physical environment where the population lives.

The Dietary Guidelines prepared for the first time in 2004 together with Hacettepe University, Faculty of Health Sciences, Department of Nutrition and Dietetics was printed and published under the title of "Dietary Guidelines for Turkey" by our Ministry.

There have been changes in the dietary habits of the population in the following years. Besides, it is now possible to obtain information from various resources regarding nutrition and health. This possibility brings concerns on accuracy and validity of such information. Therefore, scientific dietary recommendations need to be updated to be beneficial for the consumers.

In this context, this book and **"Dietary Guidelines for Turkey"** have been updated within the framework of "Healthy Nutrition and Active Life Program" that has been ongoing since 2010. With these updated guidelines, healthy plate and physical activity pyramid for Turkey have been developed along with the healthy nutrition pyramid.

I believe that "Turkey Dietary Guidelines" prepared by our Ministry together with the participation of Public Health Agency of Turkey, General Directorate of Health Surveys, Ministry of Food, Agriculture and Livestock, and universities will fill a significant gap. I would like to thank all employees who contributed in the preparation of these Guidelines.

Prof. Dr. Recep AKDAĞ
Minister of Health

PREFACE

Adequate and balanced nutrition is an undeniable foundation of life for growth and development, prevention, improvement, and promotion of health, and improvement of quality of life. Many diseases related to inadequate and unbalanced nutrition can cause various material,moral, and social negativities, along with adverse effects on time and quality of life. The main objective of the national health policy is to achieve a healthy population composed of healthy individuals.

According to the results of the surveys conducted on nutrition and health in Turkey, many nutritional and health-related problems are known to be experienced. Acute and/or chronic nutritional deficiencies (stunting, underweight, wasting), vitamin and mineral deficiencies (iodine, iron, calcium, zinc, folate e, vitamin D, vitamin B12, etc. deficiencies), obesity and nutrition-related non-communicable chronic diseases (cardiovascular diseases, type II diabetes, some types of cancer, etc.) are widely seen.

Inability to ensure sustainable food safety and safety, changes in nutritional habits and patterns, and losses in the traditional food culture as a result of globalization, urbanization, ignorance, and changes in lifestyles are some of the causes of nutritional problems. All these changes have caused marketing and easy accessibility of the products that are rich in saturated fat, sugar, and salt with low nutritional value and that are poor in fibers, some vitamins, and minerals; therefore, leading to increase in consumption of these products. Individuals and the population must be informed and trained on healthy nutrition and must be offered guidance and consultancy for development and improvement of food, nutrition, health, and agriculture policies in order to prevent nutrition-related diseases and to increase the quality of life.

In line with these objectives, it is an obligation to develop Food-Based Guidelines, to update them as needed, and to put them into use of the population. Food-Based Dietary Guidelines aim at giving concise and scientifically-proven messages supporting healthy nutrition and lifestyle in order to prevent all the nutrition-related problems and to ensure healthy nutrition and healthy life of the population. Dietary Guidelines offer popularized information with food-based approaches in access to energy and nutrients required based on age, gender, physiologic condition, and physical activity level.

These guidelines have been prepared in line with these purposes with the collaboration and contribution of the Ministry of Health, Public Health Agency of Turkey, Department of Obesity, Diabetes and Metabolic Diseases, Nutrition and Dietetics Departments of universities, and relevant departments of organizations. The book describes the food groups, amounts of portions and the amounts required to be consumed depending on age and gender with the principle of healthy nutrition based on food diversity. In addition, the nutrients and foods required to be reduced or increased in the diet are examined.

Furthermore, these guidelines aim at prevention of information pollution on nutrition, uniformity of healthy nutrition messages offered to people, transmission of scientifically-proved clear information to people, prevention of nutritional and health-related problems, and promotion of health. We hope that it helps all the healthcare professionals and the population in this way.

We would like to present our thanks to Ministry of Health, Public Health Agency of Turkey, Department of Obesity, Diabetes and Metabolic Diseases, which is the key organization in preparation of **Turkey Dietary Guidelines 2015** with constant support and organization it provided, Nutrition and Dietetics Departments of universities, everyone contributed from relevant departments of different organizations, and all the scientists and professionals who offered their vast knowledge to these guidelines.

Editors

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ABBREVIATIONS

AI ..... Adequate Intake

AIDS ..... Acquired Immunodeficiency Syndrome

ALA ..... Alpha Linolenic Acid

AMDR ..... Acceptable Macronutrient Distribution Ranges

AR ..... Adequate Requirement

BM ..... Body Mass Index

BMH ..... Basal Metabolic Rate

0C ..... Centigrade Degree

CDC ..... Centre for Disease Control

CHO ..... Carbohydrate

DHA, n-3 ..... Docosahexaenoic acid

DIAAS ..... Digestible Indispensable Amino Acids Score

DMH ..... Resting Metabolic Rate

DPT ..... State Planning Organization

DRI ..... Dietary Reference Intakes

DRV ..... Dietary Reference Values

EAR ..... Estimated Average Requirement

EFSA ..... European Food Safety Authority

EPA, n-3 ..... Eicosapentaenoic acid

ESPGHAN ..... European Society for Paediatric Gastroenterology Hepatology and Nutrition

FAO ..... Food anad Agriculture Organization

FNB ..... Food and Nutrition Board

g ..... gram

HACCP ..... Hazard Analysis Critical Control Point

HIV ..... Human Immunodeficiency Virus

GDA ..... Guideline Daily Amounts

IAA ..... Indispensable amino acid

ICN ..... International Conference on Nutrition

IgA ..... Immunoglobulin A

IOM ..... Institute of Medicine

IQ ..... Intelligence Quotient

IU ..... International Unit

ABBREVIATIONS

ISO ..... International Organization for Standardization

kcal ..... kilocalory

LA ..... Linoleic acid

m^2 ..... square meter

mcg ..... microgram

mg ..... miligram

MGRS ..... Multicentre Growth Reference Study

mL ..... mililiter

Na ..... Sodium

PAL ..... Physical Activity Level

PRI ..... Population Reference Intakes

RDA ..... Recommended Dietary Allowances

RI ..... Reference Intakes Ranges for Macronutrients

SB ..... Ministry of Health

TNHS ..... Turkey Nutrition and Health Survey

T.R. ..... Republic of Turkey

TDHS ..... Turkey Demographic and Health Survey

TUBER ..... Turkey Dietary Guidelines

MC ..... Mass Catering

UHT ..... Ultra High Temperature

UL ..... Tolerable Upper Intake Levels

UNICEF ..... United Nations International Children's Emergency Fund

WHO ..... World Health Organization

tbsp ..... Tablespoon

CHAPTERS

CHAPTER 1

FOOD-BASED DIETARY GUIDELINES

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Food-Based Dietary Guidelines

A. Gülden PEKCAN, Nevin ŞANLIER, Murat BAŞ

1.1. Food-Based Dietary Guidelines and its Importance

Promotion of healthy nutrition and healthy lifestyle with the prevention of diseases has an important role in populations. Increasing the awareness of nutrition of the population and all the individuals healthy diet needs to be transformed into a lifestyle in order to achieve the expected quality of life in the globalization process. Healthy life and economic development of the population depend upon the individuals health. Foundation of health is based on adequate and balanced nutrition or healthy nutrition. Accordingly, the objective is to provide lifelong protection, improvement, and promotion of health of all the individuals, improvement in quality of life, and adaptation to a healthy lifestyle (healthy eating and physical activity habits, prevention of use of alcohol and tobacco). Minimization or elimination of nutritional problems existing in population and decreasing the quality of life (wasting, stunting, iron-deficiency anaemia, iodine deficiency disorders, deficiency of folic acid and vitamin D, tooth decays, obesity, etc.) prevention of nutrition-related chronic diseases (cardiovascular diseases, hypertension, some types of cancer, diabetes, osteoporosis, etc.), by improving and developing the environmental conditions, and by ensuring accessibility and consumption of healthy food. Sustainable food safety can be possible through training and raising awareness of the public on the subjects of food security, foods, nutrition, and health with the aim to promote health.

Training and raising awareness of the population about healthy nutrition should continue throughout the life cycle. Even when the population has sustainable food security, insufficient knowledge and awareness of the population about nutrition prevent the efficient use of resources and influence individuals' health status, lead to erroneous applications, and cause negative effects on the country in economic and social aspects in the long term.

Diametrically opposite information, comments, and ideas lead to erroneous behaviour, suspicion, and indecision in people. As a natural result of this, both the individual and the whole population alongside the individual are affected adversely. Pollution of information prevents people to benefit from knowledge and misleads them. The problems experienced in accessibility of accurate and reliable data by the individuals during the transfer of information, misinforming of the public through mass media, the pollution of information caused by the different messages provided by institutions and individuals, and the lack of unity between the educational materials used are the adversely affecting the public health.

In light of the evidence-based scientific data, Dietary Guidelines need to be prepared according to the conditions in the country and nutritional advices need to be developed according to the age, gender and physiological factors.

Dietary Guidelines are based on foods rather than nutrients and are generally called as “Food-Based Dietary Guidelines”. Food-Based Dietary Guidelines must comply with the eating habits in countries, cultural structure of the country and the region, and environmental differences. The Dietary Guidelines prepared in accordance with the outcomes of the evidence-based data should be used with the aim to enable consumers, policy makers, nutritionists, and health professionals to train the population and to share advices on healthy nutrition.

1.2. Food-Based Dietary Guidelines and its history

1.2.3. Situation in the World

Improvement and promotion of health and prevention of diseases can be carried out in the most efficient way by Food-Based Dietary Guidelines. Development and implementation of dietary guidelines and monitoring of any possible positive effects thereof received support from the International Conference on Nutrition (ICN) held in Rome in 1992 by the Food and Agriculture Organization (FAO) and the World Health Organization (WHO). One of the proposals envisaged in the outcome of the conference was to develop food-based dietary guidelines for different ages, lifestyles and cultural structures in population in line with the health problems of the countries (FAO / WHO, 2006). The ICN2-Second International Conference on Nutrition held in 19-21 November 2014 by FAO re-emphasized “Food-Based Dietary Guidelines” and their importance with the theme “Better Nutrition, Better Lives”. It was also noted that 100 countries all over the world had Food-Based Guidelines and many of them were carrying out updates thereon. It was also highlighted that these guidelines would help development of food and nutrition policies and nutrition training programs of the countries, improvement of optimal health, and prevention of insufficient and unbalanced nutrition problems.

1.2.2. Situation in Turkey

The first Dietary Guidelines in Turkey is known to be published under the name of “Healthy Nutrition” by the Institute of Food and Nutrition Sciences of Hacettepe University in 1975 with the Ministry of Health and Social Welfare Issue No: 437 by the General Directorate of Health Propaganda and the Medical Statistics. In this context, we respectfully memorialize Professor Orhan Köksal who prepared these Guidelines and we present our thanks to his colleagues. In the guidelines, food groups are addressed with the symbol of “Five Leaf Clover”. Those food groups are as follows: milk and dairy products, meat and other protein foods, fresh vegetables and fruits, cereals, and fats and sugary foods. Later, food groups were discussed with the clover symbol in the “Nutrition” book written in 1974 in Turkey. The book has gained importance as a significant source in the fields of nutrition and dietetics and is currently being used as a course book in Nutrition and Dietetics Departments of all universities in Turkey. We offer our endless love, respect, and thanks to Professor Ayşe Baysal, the author of the book. In 1992, “Four-Leaf Clover Poster” was prepared by Hacettepe University Department of Nutrition and Dietetics and it was put into use as a training tool throughout the country.

Turkey had prepared the report titled “Turkey’s Nutrition and Health Status” for the International Congress of Nutrition (ICN)-1 and committed to comply with the decisions taken at the ICN 1992 conference and to prepare “National Food and Nutrition Action Plan”. National Food and Nutrition Strategy was prepared under the chairmanship of the State Planning Organization (now the Ministry of Development) in 2001. In the next stage, the necessary preparations to implement the Action Plan within the framework of the objectives set by the strategy text have been initiated. The coordination tasks of

the preparations for the National Food and Nutrition Action Plan was allocated to the State Planning Organization in accordance with the program of 2002 published in the Official Gazette dated 28 October 2001 and numbered 24567.

Converting the strategy work into the Action Plan is significant for determination of objectives and proposals for realization of the goals laid down in the strategy text, designation of the organizations and institutions, which are responsible for determination of the policies and preparation and implementation of projects, along with the parties to cooperate therewith, and determination of the source of necessary resources for practice. The first phase of the aforementioned action plan was completed in 2002 with the participation of interested parties and the results were reported to the responsible organizations. The timetable of the first phase of the Action Plan completed in coordination with SPO has been discussed under the headings of food security, food safety, and nutrition. A proposal for the preparation of "National Food-Based Dietary Guidelines" has been involved under the heading of Nutrition. In the preparation of the guidelines; The Ministry of Health has been identified as the responsible organization and the Ministry of Agriculture and Rural Affairs (now the Ministry of Food, Agriculture and Livestock), other relevant ministries, the relevant departments of the universities, professional organizations (Turkish Medical Association, Turkey Dietitians Association, et al.), international organizations (FAO, WHO, UNICEF) have been identified as the foundations for cooperation. As the calendar of the study; the guidelines was scheduled to be prepared between the years of 2002-2003 and it was planned to be updated following "Turkey Nutrition and Health Survey" to take place in 2006.

In this context, the task of preparing Turkey Dietary Guidelines was allocated to Hacettepe University Department of Nutrition and Dietetics upon a meeting held in 2001 by the Ministry of Health and SPO. The guideline prepared was presented to different institutions and organizations in 2004 and, subsequently, the national guideline was published first in Turkish and then in English in 2006 **(www.saglik.gov.tr)**. Based on the data of "Turkey Nutrition and Health Survey-2010", updating works were launched and this guideline was prepared in a workshop held by the Ministry of Health between the dates of 8-10 December 2014.

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CHAPTER 2

NUTRIENTS and FOOD GROUPS

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Nutrients and Food Groups

Meral AKSOY, Fatma NİŞANCI, Mevlüde KIZIL, Biriz ÇAKIR, Meral ÇARKÇI

Healthy living of the individuals and the population and economic development of the population depend on the health of the individuals constituting the population. Foundation of health is based on adequate and balanced nutrition. Adequate and balanced nutrition can also be defined as a healthy and optimal nutrition. Healthy nutrition is of vital importance for maintenance of life, growth and development, productivity, health, and well-being during the entire course of life from intrauterine or fetal life to infancy, childhood, adolescence, and adulthood.

Nutrition is the consumption and utilization of the foods providing nutrients and bioactive components necessary for the maintenance of life, growth and development, improvement, protection and promotion of health, promotion of quality of life, and productivity.

It is well-known that lacking, over or low intakes of nutrients found in the structure of foods affect growth and development and impair health. Food choice of individuals is closely related to many factors such as traditions, economic, cultural and environmental factors, age, gender, genetics and life style.

In human's life, **"nutrition"** is not just the consumption of foods. Nutrition also includes taking pleasure in eating, socializing, and practices performed according to customs and traditions. For healthy nutrition, all the nutrients must be taken in adequate and balanced amounts from various foods. Some foods are rich and some are poor in some nutrients. Furthermore, various processes, including cooking, that are applied to food lead to loss of some nutrients.

Food variety is the basic of healthy nutrition.

After foods are consumed and digested, they are broken down into nutrients, the smallest building blocks in the digestive system, and transported to the tissues and organs through blood after absorbed by the small bowel. Energy is produced from the macronutrients in the presence of oxygen through respiration. Broken-down small compounds ensure formation of new tissues, restoration of tissues, and protection against diseases by coming together with other structures. This entire process is called **"metabolism"**, breakdown of foods or tissues into the smallest parts through burning is called **"catabolism"**, and formation of new structures by combination of the smallest parts is called **"anabolism"**. Control and regulation of these procedures are ensured by enzymes and hormones with the help of vitamins and minerals.

There are more than 50 nutrients or chemical compounds functioning as nutrients (bioactive compounds or phytochemicals) which form the composition of food and which are necessary for human organism.

2.1. Definitions

2.1.1. Food and Nutrient

Food: Foods are edible plant and animal tissues that are included in daily dietary patterns (diets) and that contain nutrients necessary for life. Foods contain the nutrients that are essential for the body.

Nutrient: Foods are composed of the components that are called "nutrients". Nutrients in the structure of food are divided into two major groups. Those taken in high amounts in daily diet are called "macro nutrients" and those required in small amounts despite their crucial functions in the body are called "micro nutrients". Carbohydrates, fats, and proteins are macro nutrients. Carbohydrates consist of monosaccharides, proteins consist of amino acids, and fats consist of fatty acids. The main benefit of macro nutrients is to provide energy for the body and micro nutrients help formation of energy. Vitamins and minerals are micro nutrients. Water is essential for life and is considered as a nutrient.

2.1.2. Energy and Macronutrients

As mentioned above, macro nutrients are carbohydrates, fats, and proteins and micro nutrients are vitamins and minerals.

Energy: Energy is provided from macro nutrients in order to ensure functioning of the body organs and maintenance of normal temperature. Carbohydrates, as a macro nutrient, are the main source of energy and 1 gram thereof provides 4 kcal of energy. 1 gram of fat provides 9 kcal of energy. Fats are the highest energy providers among macro nutrients. Proteins are not used in the body for energy unless needed; they mainly constitute the building block of the body. 1 gram of proteins provides 4 kcal of energy.

Energy expenditure of the body is examined in three groups. These are basal metabolic rate, physical activity level, and thermic effect of foods known also as metabolic response to foods.

Nutrients are the organic compounds in foods.

The daily energy requirement varies depending on the age, gender, physical activity level, physiological condition (pregnancy and lactation), medical condition, genetic structure, and environmental conditions.

1 g of carbohydrate provides 4 kcal, 1 g of protein provides 4 kcal, and 1 g of fat provides 9 kcal of energy our body.

When the energy intake and the energy expenditure are equal; energy balance is achieved in the body. Its best indicator is the proportionality of body weight to age and height and maintenance thereof. Excess intake of energy leads to increase in body weight and low intake of energy leads to loss of body weight.

Carbohydrates: Carbohydrates are divided into two groups, simple and complex, based on the number of sugar molecules they contain.

Proportionality of body weight to age and stature/height is the indicator of energy balance.

Simple carbohydrates include single molecule or maximum two molecules of sugar. Single molecule sugars are glucose (grape sugar), fructose (fruit sugar) and galactose (milk sugar). Those including two molecule sugars are sucrose (sugar, table sugar), lactose (milk and dairy products), and maltose (some vegetables and malt). Simple sugars give sweet taste to food. They are naturally found in fruits, milk, as added sugar in soft drinks, iced teas, fruit drinks, sweets, and desserts. Simple carbohydrates are also defined as glycemic carbohydrates.

Complex carbohydrates contain starch and dietary fiber. Starch is found in many plant foods. Cereals (wheat, rye, oat, rice, barley and millet), legumes (dried beans, lentils, chick pea), and root vegetables (potato) contain starch. Fruits and vegetables, whole grains, and legumes contain fiber.

Carbohydrate is the most economical and the fastest energy source for the body. It regulates blood sugar and meets energy requirements in cases of emergency.

After digested, carbohydrates are broken into simple sugars, such as glucose, in the body. With the transfer of glucose to blood, insulin is secreted from pancreas. Insulin carries glucose to cells and glucose is used for energy. Carbohydrate is found in the blood as glucose. Normal glucose (sugar) value in the blood is 70-100 mg/100 mL. Any decrease or increase in this value creates health problems. After consumption of carbohydrates, blood insulin and glucose levels increase. Fast, medium or late increases are observed in insulin and glucose levels depending on the foods consumed.

Fats are energy sources; they provide fat soluble vitamins and are important for cells and certain hormone structures.

The foods causing fast increase in blood glucose have a high glycemic index. The carbohydrate type of the foods determines the glycemic index of the food. Glycemic index of the unrefined whole grains rich in fiber is low. Ripeness, storage time, processing, and preparation methods of food affect its glycemic index.

Carbohydrates are stored as glycogen in the liver and muscles. They are the most economical and quick energy source for the body. Muscle and liver glycogens are used as a source of energy in the heavy operating conditions and endurance exercises. After daily excess intake of carbohydrates is stored as glycogen, the remaining amount is converted into fat and stored. Therefore, it is recommended for 45-60% of the daily dietary energy coming from carbohydrates. 250-300 g of carbohydrate intake should be maintained for an adult individual requiring daily 2000 kcal of energy.

Fats: Approximately 15-20% of an adult's body consists of fat. The percentage of body fat is approximately 25% for women and 15% for men. Fats are absorbed after broken into fatty acids forming the building blocks in the digestion system. Some of which are used for energy, some are used for stored fat, and others are used in making of some hormones and cholesterol that are effective in the regular exercise of the body.

When the daily intake of energy exceeds the daily expenditure of energy, the amount of fat in our body increases; accordingly, the amount decreases in the contrary case. Body fat is the main energy storage; when sufficient amount of energy is not taken, this storage is used. The fat under the skin regulates the body temperature. Fat soluble vitamins and certain chemical structures that are important for the body are taken or transferred by fat. The fat leaves the stomach slowly, gives satiety feeling, and adds flavor and brittleness to the foods.

It is recommended for 25-30% of the daily dietary energy coming from fats and for intake of trans fatty acids to be less than 1%. As to the energy coming from fats; 10% (preferably 7-8%) must come from saturated fats (fat, butter, suet, lard that are found in food of animal origin), 12-15% must come from monounsaturated fats (olive oil, hazelnut oil, canola oil), and 7-10% must come from polyunsaturated fats (corn oil, soya, sunflower, and cotton seed oil containing n-6 fatty acid and fish, fish oil, walnut and flaxseed containing n-3 fatty acid). In total fat intake, 5-10% of the energy must be provided by

omega-6 (LA: linoleic acid) and 0.6-1.2% of it must be provided by omega-3 (ALA: Alpha linoleic acid) fatty acids.

Soft (tub) margarines do not contain trans fatty acids due to the positive changes made in today's production technology. This is indicated on labels. Trans fat intake increases with the consumption of fried foods and bakery products. Dietary intake of trans fats should be less than ≤%1 of the daily energy.

Proteins: The average 16% of a human body consists of protein. The protein storage amount in the body is very small and it is largely composed of cells operating and performing certain duties. Proteins are broken into amino acids forming the building blocks in the digestive system. They are transported to liver through blood and to organs through other tissues. They become involved in tissue and organ structures again by combining in a specific order. Certain of them are stored in the backup amino acid pool in the liver. Proteins are used for growth, development, and the regeneration of the cells in the tissues and organs. They are also required elements for the immune system and for the hormones and enzymes that are involved in the regulation of body processes. It is recommended for 10-20% of the energy in a daily diet to come from proteins.

2.1.3. Micronutrients: Vitamins and Minerals

Vitamins: Vitamins, which are among the micronutrients group, are nutrients having very significant effects despite their low intake. Vitamins are examined in two groups: fat soluble (A, D, E and K) and water soluble (B group and C) vitamins. Some of them involved in the energy metabolism, forming of blood, and immune system in the body are B group and vitamins C. Vitamins D are essential for bone formation. Vitamins A, E, and C prevent damage to body cells and help

Proteins are essential for the body's growth and development, cell renewal, immune system, and certain hormones and enzymes.

maintaining normal functions and reducing the effects of some harmful substances (as an antioxidant). Folic acid and vitamins B_6, B_{12} and C take role in making of blood. Sources and deficiency symptoms of certain vitamins are summarized in Table 2.1.

Vitamins and minerals are essential elements and help the macronutrients to carry out necessary functions for the body. The balance between the macro and micro nutrients taken into the body is important.

It is recommended for 45-60% of the daily energy to come from carbohydrates, 20-35% from fats, and 10-20% from proteins.

Table 2.1. Sources and deficiency symptoms of certain vitamins

VITAMINS	SOURCES	DEFICIENCY SYMPTOMS
FAT SOLUBLE VITAMINS		
Vitamin A	Liver, milk, butter, cheese, fortified margarine	Night blindness, dry eye, dry skin, increased susceptibility to infection, loss of appetite
Beta-caroten	Carrots, spinach, orange and green leafy vegetables and citrus fruits	
Vitamin D	Sunlight, fortified foods and margarine, Rickets, osteomalacia (softening of egg yolk	Rickets, osteomalacia (softening of bones) osteoporosis (bone loss and fractures)
Vitamin E	Vegetable oils, whole grains, nuts, almonds, walnuts etc. nuts, green leafy vegetables	Anemia, (breakdown of red blood cells), weakness, neurological problems, muscle cramps
Vitamin K	Dark green leafy vegetables	Bleeding
WATER SOLUBLE VITAMINS		
B_1(thiamine)	Whole grains, cereals (bulghur etc.), fortified bread and breakfast cereals, organ meats, nuts (hazel nut etc.), legumes	Beriberi, muscle weakness, mental confusion, anorexia, cardiac hypertrophy, nervous system disorders
B_2(riboflavin)	Milk and dairy products, fortified breads and cereals, lean meat, fish, green vegetables	Soreness and cracking in rim and lips, skin disorders, hypersensitivity to light, red purple tongue, ocular problems
Niacin	Eggs, chicken, fish, milk, whole grains, nuts (hazel nuts etc.) fortified breads and cereals, meat, meat products, legumes	Pellegra (diarrhea, dermatitis, inflammation of the mucous tissue, nervous system disorders)
Vitamin B_6	Eggs, chicken, fish, whole grains, nuts (hazel nut, etc.), liver, kidney	Anemia, convulsions, cracks in the rim, dermatitis, nausea, mental confusion
Folate	Green leafy vegetables, yeast, oranges, whole grains, legumes, liver	Anemia, weakness, fatigue, irritability, respiratory distress, large and swollen tongue, cardiovascular disease, Neural tube defect
Vitamin B_{12}	All animal foods, fortified foods	Anemia, fatigue, nervous system disorders, sore tongue, nervous system disorders
Vitamin C	Citrus fruits, strawberries, tomatoes, potatoes, cabbage, green leafy vegetables	Scurvy, anemia, susceptibility to disease, gingival and capillary bleeding, joint pain, delay in wound healing, hair loss, decrease in the absorption of iron

Minerals: The average 6% of an adult's body is composed of minerals. Minerals such as calcium, phosphorus, and magnesium are involved in the skeleton and teeth structure. Minerals such as iron and cobalt are important for production of the blood, while zinc is important for the immune system. Resources and deficiency symptoms of certain minerals are summarized in Table 2.2.

Table 2.2. Sources and deficiency symptoms of certain minerals

MINERALS	SOURCES	DEFICIENCY SYMPTOMS
Calcium	Milk and dairy products, green leafy vegetables	Growth retardation and rickets in children, bone loss in adults, nerve conduction disorder, blood clotting disorder, tetany
Phosphorus	Animal foods (milk, eggs, meat), grains	Growth retardation, abnormalities of teeth and bone structure, tetany, nervous system disorders
Magnesium	Grains, legumes, nuts, green vegetables, milk	Neurological disorders, cardiovascular problems, nausea, growth retardation in children.
Iron	Red meat and meat products, chicken, fortified cereal products, dark green leafy vegetables, dried fruits	Iron deficiency anemia, weakness, fatigue, immune system disorders
Flouride	Fluorinated water, tea, sea fish consumed with bones	Tooth decay (failure), bone structure disorder
Zinc	Whole grains, meat, eggs, liver, seafoods	Growth retardation, loss of appetite, loss of taste sensation, skin symptoms, immune system disorders, delay in wound healing
Iodine	Lodized salt, seafood products	Simple goiter, mental retardation, cretinism, growth retardation, hypothyroidism, abortions, stillbirths, low birth weight

Fluid Intake: Fluid requirement is met from water we drink, water from the food and beverages as well as from metabolic water released while obtaining energy from the foods. Water is the most essential fluid for life. Water is required for the digestion of foods, transporting of nutrients to tissues, disposal of harmful substances after used in the cells, and regulation of the body temperature. Since all chemical reactions in the body occur in solution, sufficient amount of liquid in organism is needed for life. While water constitutes 80% of the body in infancy, it decreases with the increasing age down to 60-50% in older age. Loss of 10% of the body water results in death. 20% of water is provided from the foods,, while the remaining is provided form water and other beverages. Adult individuals are required to consume 2-2.5 liters (1 mL/kcal) a day. This amount corresponds to nearly 8-10 water glasses.

Required energy and nutrients must be met depending on age, gender, physiological status, physical activity state, and genetic structure for a healthy life. Based on these properties, daily recommended intakes for Turkey are set out in

Chapter 10: Appendixes 1.1.1-1.1.4 and Appendix 1.2.1. Daily energy requirements according to physical activity level is given in Appendix 1.1.1-1.1.4; adequate amounts for protein intake are given in Appendix 1.2.1; recommended amino acid scoring pattern is given in Appendix 1.2.2; acceptable contribution rates (%) of macro nutrients to daily energy intake are given in Appendix 1.3.1; adequate amounts for intake of fatty acids, carbohydrates, and fiber are given in Appendix 1.4.1, the recommended adequate amounts for intake of vitamins and mineral are given in Appendix 1.5.1 and Appendix 1.5.2. Upper level of intakes (UL) for vitamins and minerals are given in Appendixes 1.5.3-1.5.4 and estimated average requirements (EAR/AR) are presented in Appendix 1.5.5.

Water is essential for life.

2.2. Food Groups

Healthy nutrition is based on food diversity and the energy and nutrients needed daily should be taken into the body with foods. Foods are divided into five groups according to the nutrients they contain.

These are **1) Milk and dairy products group, 2) Meat, eggs, legumes, and nuts/seeds group, 3) Bread and cereals, 4) Vegetables group, 5) Fruits group.** Vegetables and fruits may also be evaluated in the same group. However, they are discussed in different groups due to the importance of consumption of vegetables and fruits in nutrition. The amount of those food groups required to be consumed and the standard portion sizes are given in Chapter 10. The standard portion sizes and amounts are described and illustrated for milk, yoghurt and cheese in Appendix 2.1.1-2.1.2, for meat (red meat, chicken, fish), eggs, legumes, and nuts/seeds in Appendix 2.1.3-2.1.4, for bread and cereals in Appendix 2.1.5-2.1.6, for vegetables in Appendix 2.1.7-2.1.8, for fruits in Appendix 2.1.9-2.1.10, and for other optionally preferred foods in 2.1.11-2.1.12. (Appendix 2.3.2) For the foods that can be consumed as an alternative to oil, the amounts equivalent to oil are shown in Appendix 2.3.3.

The portion amounts recommended to be consumed from five food groups for children, adolescents, and adults are given in Appendix 2.1 (Appendix 2.1.1-2.1.10) and the standard portion sizes and amounts are illustrated in Appendix 2.2 (Appendix 2.2.1-2.2.11). The contents of energy and nutrients provided by the standard portion amounts of foods are also given in Appendix 2.3. "Energy and nutrient values of one standard portion amounts of foods according to food groups"

Energy requirements of individuals differ according to age, gender, physical activity status, and physiological condition. In order to help individuals, daily/weekly portion amounts according to dietary pattern within the range of 1000-3200 kcal based on different energy intake levels are given in Appendix 3.1.1-3.1.2 and nutrient contents are given in Appendix 3.2.1.

“Healthy Food Plate” and “Healthy Nutrition and Physical Activity Pyramid” are presented below based on the dietary pattern specific to Turkey.

Healthy Food Plate

Prevention of obesity and obesity-related chronic diseases and deficiency of vitamins and minerals experienced widely in today's world is of vital importance both for individuals and for the population. Healthy lifestyle is based on healthy nutrition and increased physical activity level for an active life.

The approach of healthy lifestyle has been examined with the "Plate Model According to Food Groups" in order to raise awareness of individuals and the population and to make it easy to understand. The plate includes 5 food groups. As a dietary pattern model, the plate has been arranged based on food diversity, the basic approach in healthy nutrition. Food groups have been formed based on the energy and nutrients contained in foods. In clockwise direction, the table respectively contains milk and dairy products (yoghurt, diluted yoghurt (ayran), cheese, etc.) group, meat and meat products, poultry, fish, eggs, legumes (lentil, dried beans, chick pea, etc.), and nuts/seeds (walnut, hazel nut, almond, etc.) group, fresh vegetables group, fresh fruits group, bread and cereals (bulghur, rice, macaroni, etc.) group. In order to ensure healthy selection of foods in the food groups, selection must be performed based on the color diversity and structural properties of the foods and health and disease conditions, age, gender, physical activity, and physiological (pregnancy and lactation) condition of individual, in consideration of fiber, fat, salt, and added sugar contents of foods. The objective is to consume one food from each food group in the plate. Consumption of recommended amount of water as shown next to the plate, consumption of mainly olive oil in daily diet, and supporting active life are important for supplementing a healthy lifestyle.

Figure 2.1 Healthy Food Plate: Healthy Food Plate According to Food Groups

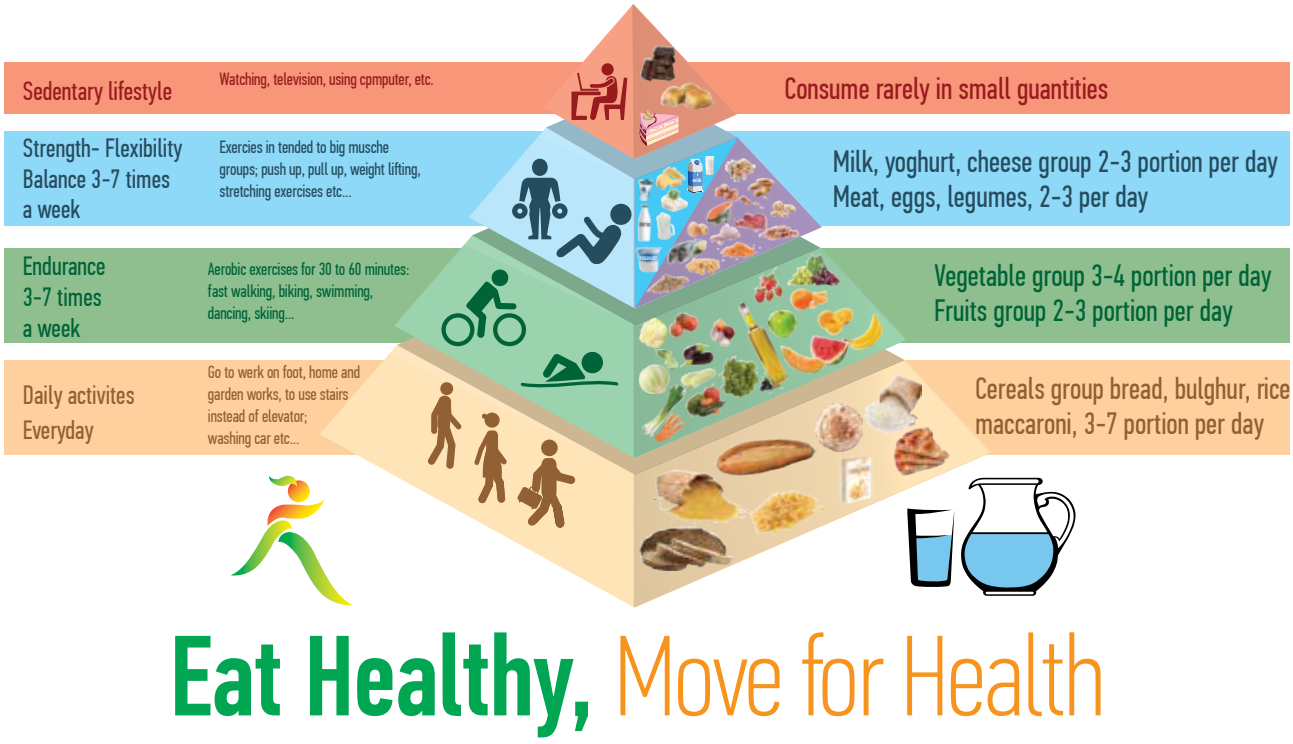

Figure 2.2. Healthy Nutrition and Physical Activity Pyramid: Healthy Nutrition and Physical Activity Pyramid based on Food Groups

Healthy Nutrition and Physical Activity Pyramid

Nutrition and physical activity pyramid for Turkey includes recommendations for nutrition along with recommendations for physical activity. The pyramid is based on the principle of healthy nutrition with food diversity and it provides the portion amounts recommended for daily consumption along with a discussion on the nutrients and foods needed to be increased and reduced in the diet.. Daily intake of fluid, especially as water, is of vital importance. Daily intake of fluid is shown next to the pyramid to emphasize its consumption along with the foods in the pyramid.

The basis of the nutrition related part of the pyramid is constituted of the foods from cereal group (bread, bulghur, rice, macaroni, etc.) that are the main source of food, that have an important role in meeting of energy requirements, and that are needed to be consumed on daily basis. Also, the foods in the milk, yoghurt, cheese group and meat products (red meat and its products, chicken, fish), eggs, and legumes group are considered in the same group due to their significant protein contents. Olive oil, a significant factor in dietary pattern of Mediterranean model, is also considered in this group since it is included in the daily nutritional pattern.

The foods containing added sugar and excessive amount of fat are located at the top of the pyramid as they are recommended to be consumed rarely or even less.

Physical activity related part of the pyramid has been developed based on the recommendations by the Physical Activity Guidelines for Turkey (2014). The basis of the pyramid consist of the activities (30-minute of walk everyday) recommended to be performed on daily basis by adults. The middle part consists of the endurance (aerobics) exercises recommended to be performed preferably every day or at least 3 times a week and strength and balance exercises recommended to be performed twice a week for 5 to 10 minutes. In this pyramid, inactive lifestyle (watching television, using computer, etc.) is located at the top of the pyramid, just like the foods with sugar and excessive fat, and indicates the habits that are needed to be decreased.

2.2.1. Milk and Dairy Products

Milk and milk group products are yoghurt, cheese, kephir, ice cream, milk pudding, milk powder, and similar products that are made from milk provided especially from various mammals (cow, sheep, goat, buffalo). Milk and dairy products are important sources of many nutrients such as high quality protein, calcium, phosphorus, zinc, B_1 (thiamine), B_2 (riboflavin), B_6, B_{12}, and niacin. Vitamins A, D, E, and K are found in milk fat. The carotenoids in the milk fat give the yellowish color to it, while riboflavins give the fluorescent color. As the milk fat decreases, the fat-soluble vitamin content decreases, too. Unfortified milk contains only a very small amount of vitamin D. Individuals of all ages, especially children, adolescents, women in reproductive age group, and elderly people, should consume milk and dairy products on daily basis.

2.2.1.1. The Importance of Milk and Dairy Products

With their rich calcium content, foods in the milk and dairy product group are important for healthy development of bones and teeth especially in children and adolescents, for prevention of cardiovascular diseases, stroke, high blood pressure, type II diabetes, osteoporosis, and colon cancer in adults, and for management of body weight. Fish (especially those eaten with their bones), dark green leafy vegetables, whole grain products, some fortified foods, seeds with like almond, and legumes, as well as milk and dairy products, also contain a certain amount of calcium. However, the bioavailability of calcium provided from plant foods is more limited compared to milk.

Milk and dairy products contain saturated fatty acids and cholesterol. Individuals who are required to limit the intake of fat and cholesterol in their diet should prefer fat-reduced or fat-free milk, yoghurt, and cheese. Fat-reduced or fat-free milk or dairy products provide the same nutrients as the whole milk and dairy products, contain less saturated fatty acids, and, therefore, provide less energy.

All age groups should consume milk and dairy products on daily basis.

Since cheese from milk products has high salt content, consumption of low salty or salt-free cheese should be preferred in order to reduce salt consumption.

Some individuals do not consume milk due to allergy, sensitivity to milk sugar (lactose intolerance) or false beliefs. Milk products with low or zero content of lactose are available for the individuals with lactose intolerance. Medical advice by a physician and dietitian should be sought in case of allergy or intolerance.

Adults should consume daily 3 portions of milk and dairy products and children, youth of adolescent period, and pregnant, lactating and post-menopausal women should consume daily 2-4 portions thereof.

2.2.1.2. Recommendation: Daily Consumption Amount of Milk and Dairy Products

Consumption of milk and dairy products in Turkey is lower than the amount recommend to be taken daily for individuals of any age and gender and this consumption is insufficient in majority of adults according to Turkey Nutrition and Health Survey (TNHS) carried out in 2010 (Chapter 10: Appendixes 4.6.1-4.6.6). It is particularly important to gain milk drinking habit in children and to maintain the habit at later ages. While fat-reduced milk is recommended for adults, it is not recommended for children under the age of 2 years.

Meat is rich in high quality protein, vitamin B_{12} and minerals such as iron and zinc.

The amount recommended to be consumed varies according to age, gender, physiological state (growth and development period, pregnancy and lactation, old age).

Adults should consume daily 3 portions of milk and dairy products and children, adolescents, and pregnant, lactating and post-menopausal women should consume daily 2-4 portions thereof. A medium sized cup of milk of 240 mL or yoghurt of 200-240 mL or cheese at the size of two matchboxes (averagely 40-60 g) constitutes a portion (Appendix 2.1.1-2.2.3, Appendix 2.2.11). Portion sizes and amounts for milk, yoghurt, and cheese are given in Appendix 2.1.1-2.1.2. The amount of portion recommended for children, adolescents, and adults are given in Appendix 2.1.2. Energy and nutrient contents provided by the standard portion amounts of foods are set out in Appendix 2.3.1.

2.2.2. Meat and meat products, eggs, legumes and nuts/seeds

This group contains meat, poultry, fish, eggs, dried beans, chickpeas, lentils as well as nuts/seeds such as walnuts, hazelnuts, and peanuts. Since nuts/seeds contain more fat compared to other foods, they should be be consumed in the recommended amounts.

Red meat, chicken, fish, eggs, nuts/seeds, legumes are the source high quality protein, of minerals such as iron, zinc, phosphorus, and magnesium and of vitamins B_1, B_6, and B_{12}, and A. Vitamin B_{12} is only found in foods of animal origin. Legumes are also good source of fiber.

2.2.2.1. The importance of consumption of meat and meat products, eggs, legumes, and nuts/seeds

Foods in this group maintain growth and development. Nutrients that play a role in cell regeneration, tissue repair, visual function, blood production, nervous system, digestive system, and skin health are grouped mostly herein. This is the most important food group that plays a role in developing resistance to diseases.

2.2.2.2. The importance of consumption of meat and meat products (red meat, poultry, fish, and seafoods)

Protein, fat, minerals, and vitamins are found in the composition of meat. Meat is one of the most important protein sources for us due to its high quality and high amount of protein content. The amount of protein and fat in meat differs in fatty meat and lean meat. Saturated fatty acid and cholesterol content of fatty meats are higher. Fish, particularly, is a significant source with its high content of omega-3 fatty acids. Meats are low in C and E group vitamins and calcium. However, they are rich in vitamin B_{12}, minerals, in particular to iron, and zinc. Since the iron in meat has a high bioavailability to be used in the body, it plays an important role in prevention of iron deficiency anemia.

Since meat is a source of high quality protein, it should absolutely be included in diet during infancy and childhood periods when protein requirements increase and rapid growth occurs.

Since saturated fatty acids and cholesterol are higher in fatty meats, individuals with diseases such as coronary artery disease, diabetes, hypertension should prefer lean meat, skinless white meat (chicken, turkey), and fish under supervision of a dietitian.

Fish contains proteins equivalent to red meat and poultry such as and chicken and turkey. Sea fish is also a good source of iodine. Oily fishes are particularly very rich in n-3 (omega 3) fatty acids and are recommended to be consumed at least 2 times a week for a healthy diet. Adequate intake of n-3 fatty acids with diet is important for prevention of cardiovascular diseases and development of brain in children.

Meat products such as fermented soudjouk, salami, sausage, pastrami are made from meat following various processes. Chemicals such as nitrites-nitrates are used in order to prevent discoloration and growth of microorganism during making of especiallysalami and sausage. Any harmful substance that may be produced by such chemicals in the body can be prevented or removed from the body

by such antioxidants as vitamin C and E. During consumption of these products, fruits and vegetables rich in vitamins C and E should be included in diet. In addition, processed products should be consumed in limited amounts due to their high rate of saturated fatty acids.

Meats checked by veterinarians should be preferred to ensure food safety. Methods such as boiling, grilling, and baking should be preferred when cooking and frying should be avoided. If there is meat in the dish, fat should not be added to it. During grilling, the distance between the meat and fire should be adjusted not to burn the meat and not to cause carbonization; otherwise, carcinogenic substances occur. Meats should not be cooked at very high temperatures and for a long time in order to reduce formation of carcinogenic substances. Meat should be bought from safe sellers and should be stored for 2-3 days in the refrigerator, if not consumed immediately, or maximum 3-4 months in deep-freezer (-180C).

2.2.2.3. The importance of consumption of eggs

Fish consumption has an important role in development of brain in children and prevention of cardiovascular disease in adults.

Other cooking methods should be preferred for meat instead of frying. During grilling, the distance between the coal fire and meat should not cause burning.

Eggs, which has an important role in our nutrition, is the food that contains protein of the highest quality. It is known that proteins of eggs converted into body proteins at the rate of 100%. Therefore, proteins of eggs are considered as reference (high quality) proteins.

33% of fat of eggs are saturated fat, 16% are polyunsaturated fat, and the remaining contains monounsaturated fatty acids. Fat becomes concentrated in eggs yolk. Eggs yolk contains high amount of fatty acids despite its high cholesterol content and it has less elevating effect on blood cholesterol compared to fatty meat and dairy products due to its lecithin content. Egg yolk is rich in iron and vitamins A and B group.

Egg, which contains protein with the highest quality, is an important source of food for the infants and children. Consumption of an egg each day by healthy individuals does not increase the risk of cardiovascular diseases.

It is healthy for infants and children to consume an egg each day as it contains high-quality protein. Egg is an important source of reference protein for the patients with diseases such as kidney or liver failure, requiring limitation in the amount of protein consumed in diet. For food safety reasons, it is not recommended to consume uncooked (raw) eggs since it is difficult to digest and decreases the bioavailabilty of biotin, a B group vitamin.

Healthy individuals may consume eggs 3-4 times a week on the days they do not consume meat and patients of cardiovascular diseases may consume eggs 1-2 times a week. One egg is equivalent to half portion of meat and meat products. Consumption of eggs together with vegetables and cereals reduces its negative effect on blood cholesterol. Lecithin contained in eggs helps keeping regular function of brain and prevention of the liver.

While purchasing, clean and crack-free eggs should be selected and they should be stored in refrigerator without being washed. If egg is not fresh and cooked for a long time, a ring of iron sulfurous is formed in green color around the egg yolk. Therefore, fresh eggs should be consumed and, for hard-boiled eggs, boiling time should be limited to 5-8 minutes after water starts boiling.

2.2.2.4. The importance of consumption of legumes and nuts/ seeds

The main legumes include chickpeas, lentil, broad beans, beans, peas, cowpeas, and soy bean. Their basic components are carbohydrates and protein since they are ripe seeds. There are fibers in their outer parts and starch in their inner parts. The fat content of legumes is low mostly consisting of polyunsaturated fatty acids and they contain high protein value. When there is no

meat and eggs or when a diet with fat and cholesterol restriction is recommended, protein requirement can be met by increasing legumes in the diet. However, they contain low-quality protein. This is because they are limited in important amino acids and sulfur containing amino acids, rich in fiber content, and difficult to digest. If legumes are mixed with specific amounts of grains and cooked well, their protein quality increases. They are rich in minerals of calcium, zinc, magnesium, and iron and in vitamins of B group excluding B12.. Well cooking and consumption together with fruits and vegetables, sources of vitamin C, increase the bioavailability (use in body) of iron and calcium.

Legumes constitute a good source of carbohydrates and vegetable proteins as well as a source of dietary fibers, oligosaccharides, and phytochemicals. While soluble dietary fiber in legumes helps regulating the level of blood cholesterol and blood sugar, insoluble dietary fiber helps regulating stomach and bowel movements.

Due to their high fiber and low fat contents, legumes should frequently take part in the diets of individuals with cardiovascular diseases and diabetes and should be consumed 2-3 times a week.

When legumes are consumed together with cereals, the quality of protein they contain increases. Their flatulent effects are minimized by soaking and well cooking. Cooking water should not be spilled, but instead, it should be consumed together with foods rich in vitamin C to benefit from the minerals in its compounds.

Legumes play regulatory role for blood cholesterol and sugar level with their fiber contents.

Foods such as hazelnut, walnut, almond, sesame are called nuts/seeds. These are rich in vitamins of B group, minerals, oils, and protein. Despite their high fat contents, they do not contain cholesterol due to their vegetable origin. Hazelnut is rich in monounsaturated fatty acids and walnut is rich in monounsaturated fatty acids as well as n-3 fatty acids. nuts and seeds reduce the risk of cardiovascular disease and cancer due to their contents of unsaturated fatty acids, vitamin E, and flavonoids. Daily amount in a healthy, adequate, and balanced diet should be 30 hazel nuts (30 g, 1 handful amount) or 4 walnuts (30 g) (Appendix 2.1.3). Amounts and weights equivalent to various portions of seeds and nuts are provided in Appendix 2.1.12.

These foods spoil and become moldy if they are not preserved in appropriate conditions. In order to prevent molding; they should be harvested at appropriate time, should not be left on the ground for a long time, and should be separated from cracked and diseased ones. During storage at home, those with shells must be kept separate from the ones without shells and they should all be stored in a dry environment. Those coated with salt and sugar should not be preferred for consumption.

2.2.2.5. Recommendation: Daily consumption amount of meat and meat products, eggs, legumes, nuts/seeds

Adult individuals and adolescents should consume 2.5-3 portions from meat-egg-legumes-nuts/seeds group each day. 80 grams of cooked red meat and chicken (3-4 grilled meatballs or at the size of 1 palm), 150 grams of fish, 130 grams of legumes (8-10 tablespoons), 30 grams of hazelnut and walnut constitutes a portion. One egg is ½ portion. The standard portion sizes and amounts for meat (read meat, chicken, fish), eggs, legumes and seeds are described and illustrated Appendix 2.2.9-2.2.10. Portion amounts recommended to be consumed by children, adolescents, and adults are given in Appendix 2.1.4. Energy and nutrient contents provided by the standard portion amounts of foods are provided in Appendix 2.3.1.

2.2.3. Fresh Vegetables and Fruits

Because of their importance in today's healthy dietary pattern, vegetables and fruits are considered as two separate food groups.

However, they have similarities in nutrient contents. In this scope, they are dealt with together.

2.2.3.1. The importance of consumption of fresh vegetables and fruits

Nuts and seeds are rich in unsaturated fatty acids, vitamin E, and flavonoids and do not contain cholesterol.

All kinds of edible parts of plants are gathered under vegetables and fruits groups. The major portion of their composition is water. Therefore, fruits and vegetables contribute slightly to the daily requirements of energy, fat, and protein. However, they are rich in minerals and vitamins, in particular to folate e (folic acid), beta-carotene which is the main element of vitamin A, vitamins E, C and B_2, calcium, potassium, iron, magnesium, fiber, and other compounds with antioxidant characteristics. These substances help disposal of certain harmful substances from the body.

This food group is effective in growth and development, cell regeneration, tissue repair, skin and eye health, dental and gingival health, blood production, and development of resistance to diseases. These food groups reduce the risk of obesity and chronic diseases (cardiovascular diseases, hypertension, stroke, and some cancer types such as colon and breast cancer) related to malnutrition. In addition, they play important role in maintenance of healthy weight and prevention of obesity in children and adults owing to the satiety feeling and less energy they provide. Besides, they help regulating bowel movements.

Vegetables of various colors and types should be consumed in healthy nutrition. As different vegetables contain different nutrients, the vegetables consumed during a day time should be diversified.

Dark yellow colored vegetables (carrot, potatoes), dark green leafy vegetables (spinach, lettuce, iceberg,chard, purslane, broccoli, etc.), starchy vegetables (peas, potatoes), and other vegetables (tomatoes, onions, green beans) should be consumed every day in a balance. Fruits are different in terms of types and amounts of nutrients they contain. Therefore, diversity should be sought in their consumption. In general, while the group of citrus and berry fruits (such as strawberries, raspberries, blackberries, blueberries, black mulberry) and other grapes are rich in vitamin C and various antioxidants; the fruits such as apple, banana, apricot, etc. are rich in potassium.

Raw consumption is preferred for fruits and vegetables. Many vitamins and minerals are generally found in the outer leaves, especially on the skin or on the part just below the skin, of vegetables and fruits. Their density is lower in the inner parts. Therefore, the fruits that can be consumed with their skin should be consumed without peeling and, if necessary, they should be peeled as thiny as possible.

Fruit juices contribute to consumption of daily energy; however, they are poor in dietary fiber. Frequent consumption of fruits may cause dental erosion as they are generally acidic. In addition, consumption fruit juice and dried fruits should be limited since dried fruits may increase the risk of tooth decays, and freshly squeezed fruit juices should be preferred for 6-12 month olds. Extra sugar should not be included in consumption of fruit juices and freshly prepared juices should be consumed.

Since fruits and vegetables that are very salty, brined, technologically processed, and added with some additives may be associated with increased cancer risk, their consumption should be limited. In addition, potato and vegetable crisps should be consumed with care as they cause gain of extra energy, salt, and fat.

2.2.3.2. Recommendation: Consumption amounts of fresh vegetables and fruits

5 portions (minimum 400 g/day) of vegetables and fruits should be consumed each day as 2.5-3 portions of vegetables and 2-3 portions of fruit. These vegetables consumed should contain at least two portions of green leafy vegetables (such as spinach, broccoli) or other vegetables such as tomatoes; while fruits should include citrus fruits such as orange and lemon or other fruits rich in antioxidants.

Given their nutritional values and economical prices, all fruits and vegetables should be consumed abundantly and in season.

The standard portion of cooked vegetables is 150 grams and provides 25-85 kcal. The standard portion of fruits provides about 50-100 kcal. The standard portion sizes and amounts are described and illustrated in Appendix 2.1.7-2.1.8 for vegetables and in Appendix 2.1.9-2.1.10 for fruits. The portion amounts recommended to be consumed by children, adolescents, and adults are given in Appendix 2.1.8 and 2.1.10. Energy and nutrient contents provided by the standard portion amounts of foods are given in Appendix 2.3.1 and the portion amounts from food groups recommended to be consumed daily and weekly are given in Appendix 3.1.1.

2.2.4. Bread and Cereals

Cereal groups include bread, rice, macaroni, noodles, couscous, bulghur, oat, barley, and breakfast cereals. These foods are made from cereals such as wheat, oat, rice, rye, barley, and corn. Cereals take an important place in human nutrition, particularly in Turkey. Cereal consumption mainly includes flour. The first thing that comes into our minds when we hear the word flour is wheat flour; other flours are also known with the name of the cereal they are obtained from.

Bulghur made from wheat is widely used in Turkey and should be preferred to rice. Bulghur does not lose its nutritional value during processing and is a good source of cereal. Starch extracted from cereals is a source of pure carbohydrates and it is poor in vitamins, minerals, and proteins. The most commonly used starch is wheat starch, although rice, corn, and potato starch are also used. Macaroni, noodles, and vermicelli which are made from white flour have low vitamin and mineral values. The most consumed cereal product is bread. Absorption of some minerals (such as zinc, copper, iron) in leavened bread is easier; making its nutritional value higher. Therefore, consumption of bread such as unleavened filo (yufka), flatbread should be avoided. The breads made by leavening from whole wheat flour or mixed whole wheat flour should be preferred for consumption. Nutritional and health protective values of such breads are higher than the breads made from white flour.

Cereal grain consists of bran, germ and endosperm. Whole grain term indicates these three components in cereals. Whole grains are the source of nutrients such as iron, magnesium, selenium, vitamin B group, and dietary fibers. It is known that consumption of whole grain can reduce the risk of cardiovascular diseases, some types of cancer, and type II diabetes; and that it is associated with low body weight. There are additional health benefits in preferring whole grains with high dietary fiber content.

Whole grains are found in unprocessed single cereal (buckwheat, brown rice), in some processed foods (bulghur, oatmeal) or as additives in some foods (bread, crackers, etc.). Refined cereal is the milled state of a grain separated from its bran and germ. The milling (refining) process is performed to give the cereal a fine texture and to increase its shelf life; however, it reduces the fiber (dietary fiber), iron, and vitamin B group it contains.

Additional various fats, sugar or salt are found in cakes, biscuits and other pastries made from cereal flours, increasing their energy amount higher.

2.2.4.1. The importance of consumption of bread and cereals

Cereals and cereal products are important foods for health due to the vitamins, minerals, carbohydrates (starch, fiber) and other nutrients they contain. They have high carbohydrate contents. Therefore, cereals constitute the main energy source for the body. They play significant role in nervous system, digestive system, skin health, and in the development of resistance to diseases. Cereals contain a small amount of protein, but only with low quality. The quality of protein can be increased when they are consumed together with legumes or foods such as meat, milk, eggs.

They also include some amount of fat. Cereal grains is rich in vitamins of B group except from fat, vitamins E and B_{12} and they consti-

tute a good source particularly for vitamin B1 (thiamine). These vitamins are mostly found in the bran and germ of the cereal grains. There is nearly no vitamin C or elements indicating activity of vitamin A in the cereals. Whole grains provide more dietary fibers, vitamins, and minerals compared to refined cereals.

2.2.4.2. Recommendation: Daily consumption amounts of bread and cereals

Daily 3-7 portions of cereals should be consumed. The amount to be consumed differs depending on an individual's body weight, age, gender, and physical activity level *(Appendixes 2.1.5-2.1.6). Minimum half of the recommended total cereal consumption should be whole grains. Standard portion sizes and amounts for bread and cereals are described and illustrated in Appendix 2.1.5-2.1.6. The portion amounts from five food groups recommended to be consumed by children, adolescents, and adults are also given in Appendix 2.1.6. Energy and nutrient contents provided by the standard portion amounts of foods are provided in Appendix 2.3.1.

Daily portion amounts from different food groups recommended to be consumed are provided according to their energy levels in Appendix 3.1.1.

Nutritional values of unrefined ones among the cereals, which constitute the primary source of energy, are higher.

Recommendations:

- Cereal products should be consumed every day and, if possible, in every meal.
- Cereal products can be consumed in 3-7 portions a day. The amount to be consumed differs depending on an individual's body weight, age, gender, and physical activity. Individuals who work in jobs requiring heavy duty and who need more energy may consume more from this group.
- One portion of cereal is equivalent to 50 g (2 thin slices of bread), 70 g (4-5 tablespoons or ½ cup) of cooked macaroni, 90 g (4-5 tablespoons or ½ cup) of cooked bulghur or rice, about 30 g or 1 cup of breakfast cereals (Appendix 2.1.5).
- Cereals should be consumed together with other foods (legumes, milk, and dairy products) in order to increase the protein and vitamin content.

2.2.5. Fats

2.2.5.1. The importance of fat consumption and types of fat

Fats are included in the macro food group and contain various fatty acids. The importance of fat comes from the high energy content, flavor, and crispness it gives to the foods. They also contain vitamins A, D, K, and E and fatty acids that are essential for health but cannot be produced by human body. The fats stored in the body regulate the heat balance of the organism, support organs, and are converted into energy if necessary. However, when the stored fats go above a certain rate, they pose risks of obesity, cardiovascular diseases, type II diabetes, and chronic inflammatory diseases such rheumatoid arthritis. The incidence rate of these diseases is lower for the individuals who consumed Mediterranean diet and the protective characteristic of this diet depends on mainly to the high consumption of fresh vegetables, fruits, and particularly olive oil.

"Olive oil" is the fat source of the traditional Mediterranean diet. In addition to olive oil, other vegetable oils include sunflower, hazelnut, corn, cotton, and sesame oil.

** Physical activity factor (PAL ≤1.5X B Basal Metabolic Rate (BMR)*

All vegetable oils are in the liquid form at room temperature and margarines do not contain cholesterol. Animal fats are in the solid form at room temperature. Usually, they do not contain additives, but contain cholesterol. Solid margarines contain larger amounts of saturated fatty acids. Soft margarines (tub) should be preferred to solid margarines.

Types of fats and their ratio in daily fat intake are as important as the amount.

2.2.5.2. Recommendation: Daily consumption amounts of fats

According to data obtained from Turkey Nutrition and Health Survey (TNHS) of 2010, daily average amount of fat consumption is 10.8 g in adult men and 7.9 g in adult women per capita; daily average amount of oil consumption is 22.1 g in men and 20.4 g in women per capita; and consumption amount of both types is 61.2 g in total. Daily average intake of cholesterol is 249.10 mg in men and 180.59 mg in women.

Daily recommended energy coming from the fat in the daily diet is between 25-30%. Distribution of this rate among the fat types includes one unit of fat, one unit of any vegetable oil, and one and a half or two units (1.5 or 2 units) of olive oil: 1; 1; 1.5/2. Intake of fat should be kept at a minimum level (energy <10%). While high levels of blood cholesterol pose risk for cardiovascular diseases, low levels also pose risk for some cancer types. Therefore, cholesterol intake with daily foods should be kept below 300 mg for adults and below 200 mg for pregnant women. Energy and nutrient contents according to types of fat are given in Appendix 2.3.2 and the intake amounts according to the energy levels are given in Appendix 3.1.1.

2.2.6. Sugars

Carbohydrates are divided into two groups: as simple and complex. Simple carbohydrates are sugars, 99.9% of which is constituted of sucrose. Therefore, they only provide energy and have no nutrient value. Sugar is obtained from sugar cane and sugar beet. However, corn syrup which contains high fructose is also used to obtain sugar in today's world.Sugar is available in the market in the forms of granulated, cube, powdered sugar.

There are two types of sugars in daily nutrition: the natural sugar found naturally in foods (e.g., lactose contained in milk, fructose contained in fruits, etc.) and others are called "added (additional) sugar" and energy providing sweeteners which are added (to beverages, various pastries, cereals etc.) during processing or preparation of food. Added (additional) sugars contain natural sugars such as white sugar, brown sugar, and honey as well as sweeteners such as chemically-produced corn syrup (starch based sugar) with energy and high fructose content. The food industry prefers corn syrup with high fructose content since it is cheaper than the sugar obtained from sugar beet and sugar cane.

Sources of added (additional, free) sugar: These are sugary drinks (cola, soft drinks, lemonade, readymade fruit juices), candies, sweets (rock candy, delight, etc.), cakes, pies, cookies, readymade fruit juices, pastry desserts, halva, milk puddings, ice cream, sweetened yoghurt, jam, marmalade, sugary ready milk, chocolate, and sugar-added cereal products.

While purchasing packaged readymade foods, the content and type of sugar should be read on labelling and preference should be made accordingly. Brown sugar, sweeteners of corn origin, corn syrup, fruit juice concentrate, high-fructose corn syrup, honey, inverted sugar, malt sugar, grape molasses, syrup, raw sugar, sugar, dextrose, fructose, glucose, lactose, maltose, sucrose indicated on the label shows that the products contains added sugar. The sweetener-free products with the phrase "Does not contain added sugar or No added sugar" on their label should be preferred.

Sugar alcohols such as sorbitol, mannitol and xylitol that give energy are frequetly used in order to give sweet taste to foods. The term alcohol is to define their chemical structures. Sugar alcohols are naturally found in many fruits and vegetables and are also added to sweetened chewing gums, sweets, jams and

jellies. When consumed too much (more than 50 g), they may lead to diarrhea by softening the stool in some people.

Starch and fiber, which are also called as "complex carbohydrates" due to their complex structure, are among the carbohydrate types other than simple carbohydrates. All carbohydrate types except from some fiber elements are broken down into simple sugars during digestion in human body. Sugars and starches are naturally found in other foods, too. These include various types of breads, cereals, legumes, seeds, dried fruits, milk, fruits, and vegetables.

2.2.6.1. The importance of sugar consumption

Carbohydrates are sources of energy. The brain and nervous system use only carbohydrates (glucose) for energy. Simple sugars are transformed into energy in the most economical and fast way, quickly increasing the blood sugar. Therefore, they are convenient for heavy physical movements (activities),, while their consumption is unfavorable for patients with diabetes. Patients with diabetes should prefer complex carbohydrates instead of simple carbohydrates, which do not quickly increase the blood sugar.

Excessive consumption of sugar and sugary foods lead to excessive and unnecessary intake of energy, increasing body weight (causing obesity) and decreasing consumption of other foods with high nutritional value. Furthermore, reduced sugar consumption is crucial due to its association with the risks of metabolic syndrome, cardiovascular diseases, diabetes, hypertension, and renal diseases.

Sugar and tooth decays: Sugar consumption is associated with the risk of tooth decay. Bacterial plaque comprised of bacteria in the mouth may form acid from the residues of sugary and baked foods inside the mouth. These acids may cause deterioration of tooth enamel by dissolving the mineral tissue of the teeth and lead to the onset of tooth decay. Frequency of sugar consumption causes risk rather than the amount.

Artificial sweeteners: Artificial sweeteners called saccharin, aspartame, acesulfame, potassium, xylitol, sucralose are used in some foods instead of sugar for the purpose of sweetening. Artificial sweeteners do not cause tooth decays, do not provide energy or provide less energy and can be used in foods for patients with diabetes and in low energy diets.

> Since simple sugars (such as table (free) sugar) easily converted into energy, they quickly increase the blood sugar. They have high energy values and are recommended to be consumed in small amounts.

Sorbitol, an artificial sweetener, contains energy. Therefore, label information of foods containing artificial sweeteners should be checked. Although labels of some products say "low sugar content", these products may contain high energy if they have high fat content. It is not possible to protect one's health or to lose weight by using only these products without reducing the energy intake in diet and increasing physical activity.

2.2.6.2. Recommendation: Daily consumption amounts of sugars

Apart from the sugar found in the natural structure of foods, daily intake of sugars added during production phase and sucrose, also called as table)free) sugar, should not excess 10% of the energy amount required daily (Appendix 3.1.2).

2.2.7. Water and Beverages

2.2.7.1. Water and other beverages

Water and other drinks are important in maintaining water balance in the body. Water that we define as an essential element for the life should be provided from clean sources. Visible/invisible water found in beverages and foods and especially water are defined as "fluid" and an individual's daily fluid requirement is met by water, beverages, and water contained in the foods consumed. Water should be preferred instead of alcoholic-nonalcoholic, soft, still, carbonated, sugary beverages and coffee and tea. Although coffee and tea provide fluid, they are not recommended for children and may cause undesirable stimulating effects in some people.

Nonalcoholic soft-carbonated beverages show negative impacts on teeth and bone health. If consumed in excessive amounts; sweetened beverages, vitamin fortifed juices, energy and sports drinks may cause undesirable weight gain for individuals at any age.

2.2.7.2. Importance of adequate consumption of water and fluid

All elements in human body except for bone, skin, connective tissue, and fat are in solution in body water. The smallest living unit of the body is cell. All biochemical reactions necessary for life in the cells occur in this solution.

Water and other beverages have an important role in digestion, absorption and transportation of the food to cells, formation of biochemical reactions necessary for life and health, operation of cells, tissues, organs and systems, transportation and disposal of harmful substances formed as a result of metabolism, control of body temperature, and lubrication of the joints. Besides, they also provide main minerals such as calcium, magnesium and fluoride.

Fulfillment of the abovementioned body functions is possible through maintaining the water balance called “hydration”. Water balance of the body is ensured by replacement of the water lost through respiration, urination, sweat and feces with the water intake from beverages and foods. The body water is kept in balance through disposal of harmful substances and other wastes with approximately 1500 mL/day from kidney, 500 mL/day from skin, 300 mL/day from intestines, and 300 mL/day from respiration, corresponding to a total water loss of 2.5 liters/day.

Dehydration is dangerous. Infants constitute the biggest risk group, since they are in the age group having the highest water content. In case of excessive water loss, blood volume decreases, circulation becomes insufficient, problems arising in transfer of nutrients to tissue and organs affect the function of these organs, and some other problems occur. 10% of water loss from the body may cause death. Different effects of dehydration levels are given in Table 2.3.

2.2.7.3. Recommendation: Daily consumption amounts of beverages

Fluid amount required to be consumed daily varies depending on physical activity level. Fluid consumption of 2-2.5 liters a day is recommended for medium-level activity. (Appendix 1.5.2). The average daily water consumption amount across Turkey is 1841.9 mL in men and 1497.2 mL in women over 19 years old according to TNHS 2010. The average daily water consumption amounts in pregnant and lactating women are respectively 1101.33 mL and 1060.15 mL, the average daily consumption amounts of nonalcoholic beverages are 389.61 mL and 580.08 mL, respectively.

Table 2.3. Different effects of dehydration levels

Loss of fluid in body (%)	Effect
0-1	Thirst
2	Severe thirst, restlessness, loss of appetite
3	Decrease in blood volume, impaired physical performance
4	Energy expenditure for physical work, nausea
5	Inability to concentrate
6-7	Inability to regulate temperature increase
8-9	Dizziness, extreme weakness, difficulty in breathing
10	Muscle spasm, insomnia,
11	Renal dysfunction, insufficiency in blood circulation

Source: Aksoy M. Ansiklopedik Beslenme, Diyet ve Gıda Sözlüğü, (Encyclopedic Nutrition, Diet and Food Glossary) 2010.

The water amounts required to be consumed daily and the amounts consumed daily are evaluated in Appendix 4.2.3. It has been determined that the water consumption is not sufficient considering the age groups.

Water loss increases in hot weather, after intense physical activity, after consumption of foods rich in protein and salt, through sweat and urine, through respiration in inflammatory diseases increasing the body temperature, through intestines during diarrhea. In such cases, the fluid / water requirement of the body will increase and the water lost should be replaced in order to preserve the fluid balance in the body.

Thirst center in the brain is stimulated in order to meet the fluid lost and the sense of thirst develops. Thirst center is stimulated when plasma density is increased by 1% as a result of water loss. Since minerals such as sodium and potassium, which have role in water balance, are lost together with water in diarrhea, the sense of thirst cannot be stimulated.

Humans meet their water need with 1500-2000 mL/day (8-10 glasses) from water, 1000 mL/day from foods and beverages, 260 mL/day from the metabolic water composed as a result of metabolism. The total fluid amounts recommended to be consumed daily are given in Table 2.4.

The water balance in the body has vital importance. Daily requirement can simply be calculated with the equation of 35 mL x body weight (kg). Darker urine color indicates that water requirement is not met.

Table 2.4. Total amount of fluid recommended to be consumed a day (mL/day) (EFSA, 2010)

Age (year)	Men	Women
0-6	100-190 mL/kg/day (met from breast milk)	
6-12 months	800-1000 mL/day	
1-2 years	1100-1200 mL/day	
2-3 years	1300 mL/day	
4-8 years	1600 mL/day	
9-13 years	2100	1900 mL/day
≥14 years	2500 mL/day	2000 mL/day
Pregnant Women	-	Addition: 300 mL/day
Lactating Women	-	700 mL/day

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CHAPTER 3

MAINTAINING AND ENSURING A HEALTHY BODY WEIGHT

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Maintaining and Ensuring Healthy Body Weight

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3.1. General Information

In today's world; urbanization, economic development and globalization have led to changes in the lifestyles and nutrition habits. One of the most important problems caused by these changes is obesity. Obesity is an energy metabolism disorder that is caused by excessive fat deposition in the body as a result of modern life problems such as sedentary lifestyle, lack of physical activity and unhealthy nutrition leading to physical and psychological problems.

Obesity is the imbalance between the energy intake through daily foods and the energy expenditure. Maintaining and ensuring healthy body weight is important for maintaining quality of life. Many factors such as behavioral, environmental and genetic factors influence the individual's body weight.

Prevalence of obesity, as well as chronic diseases, is increasing in the world and in Turkey.

3.2. Determination of Obesity

3.2.1 Evaluation based on Body Mass Index (BMI)

Body Mass Index (BMI), an index based on body height and weight, defines obesity and risk of obesity at population level.

Body weight and height are measured in accordance with the related techniques in order to calculate BMI. When the body weight (in kg) is divided to the square of the body height (in meter), the result gives BMI [BMI: Body weight (kg) / height $(m)^2$]. Evaluation of BMI in adults is given in Table 3.1.

When BMI value is under or above normal values (18.50-24.99 kg/m^2), it indicates an increase in health risk.

Table 3.1. Evaluation of Body Mass Index in adults (BMI)

CLASSIFICATION	BMI (kg/m²)	
	Principal Cut-Off Points	Additional Cut-Off Points
UNDERWEIGHT	**<18.50**	**<18.50**
Severe thinness	<16.00	<16.00
Moderate thinness	16.00-16.99	16.0-16.99
Mild thinness	17.00-18.49	17.0-18.4
NORMAL RANGE	**18.50-24.99**	**18.5-22.99**
		23.00-24.99
OVERWEIGHT	**≥25.00**	**≥25.00**
Pre-obese	25.00-29.99	25.00-27.49
		27.50-29.99
Obese	**≥30.00**	**≥30.00**
Obese class I	30.00-34.99	30.00-32.49
		32.50-34.99
Obese class II	35.00-39.99	35.00-37.49
		37.50-39.99
Obese class III	≥40.00	≥40.00

BMI can also be evaluated easily by using Figure 3.1. The body weight is found from the horizontal axis of the figure. It is marked upwards until the height on the left is reached. The cut-off point shows the BMI value the individual has and evaluates the individual's weight as underweight, normal weight, overweight and obese.

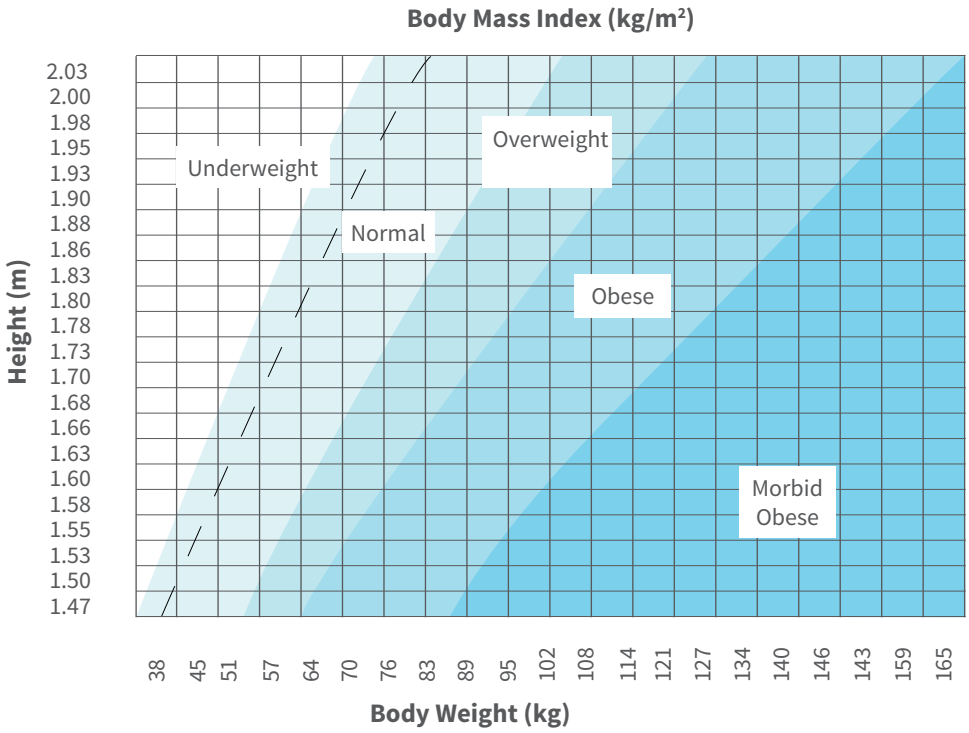


Figure 3.1. Easy evaluation of BMI by using body weight and height

3.2.2. Evaluation based on waist circumference

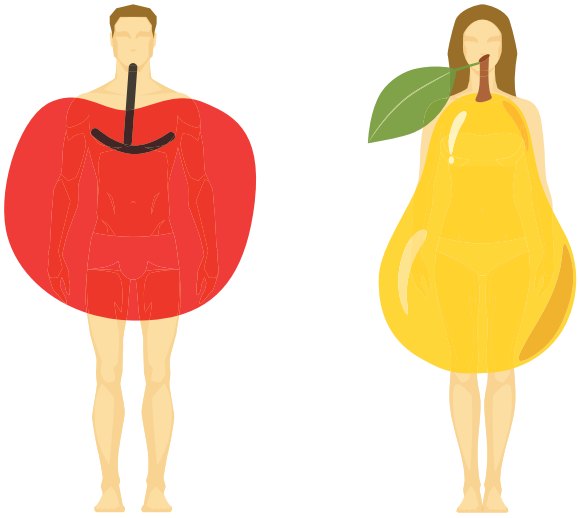
The value of waist circumference reflects abdominal fat tissue or, in other words, deposition of fat in organs. In standing position, the individual's lowest rib on the right is found and marked. Also, on the hip iliac crest is found and marked. Midpoint between the two marks is found and waist circumference is measured by passing through these points. If the value obtained from this measurement is high, the health risk increases as well (Table 3.2).

Collecting the amount of fat in the body at the upper part of the body (android/apple type/male type) is a condition that the risk of disease increases. There is less disease risk in obesity type (gynoid/pear type/female type) collecting at the lower part of the body (in hips) (Figure 3.2). Android type of obesity increases the risk of become heart disease, hypertension, diabetes and some types of cancer (breast, colon).

Table 3.2. Evaluation of the measurement of the waist circumference in adults

WAIST CIRCUMFERENCE (cm)	HEALTH RISK ASSOCIATED WITH THE BODY WEIGHT
Men: < 94 Women: < 80	Health risk associated with the body weight is low
Men: >94-102 Women: >80-88	Health risk associated with the body weight is high
Men: >102 Women: >88	Health risk associated with the body weight is very high

The increase in waist circumference is an indication the onset of forming android type obesity.



Android (Apple) Type *Gynoid (Pear) Type*

Figure 3.2. Body types based on body fat distribution

3.2.3. Evaluation based on waist / hip circumference ratio

Waist and hip circumferences are measured in compliance with the related techniques. Hip circumference is measured from the widest circumference of the hip in lateral side while the individual is in standing position. In accordance with the World Health Organization (2011), the waist / hip ratio should be below <0.90 in men and <0.85 in women

3.2.4. Evaluation based on waits circumference / body height

Waist circumference / body height ratio also indicates abdominal adiposity. Waist / height ratio is more sensitive than BMI as an indicator of health risk and easier to measure and calculate compared to BMI. It is sufficient to know the body height and waist circumference for evaluation.

Waist-hip ratio of >0.90 in men and >0.85 in women is an indication that the health risk increases.

As the waist/height ratio limits are the same for the children over five and adults, its use is practical.

Table 3.3.Classification of the waist/ height ratio (Ashwell classification)

WAIST/HEIGHT RATIO	CLASSIFICATION
< 0.4	Take care
0.4-<0.5	Normal
0.5- <0.6	Consider action (for children take action)
>0.6	Take action

The classification of the waist/height ratio is given in Table 3.3.

3.2.5. Evaluation based on neck circumference

The neck circumference is measured from just under the Adam's apple. It is highly correlated with diseases such as sleep apnea and metabolic syndrome.

Neck circumference is an indicator of abdominal obesity. When it is ≥ 37 cm in men and ≥34 cm in women, it is considered as a risk factor for obesity.

3.3. Obesity and Health Interaction

Overweight or underweight increases to risk for chronic diseases and shortens life expectancy. The health problems caused by obesity are given in Table 3.4.

3.4. Management of Body Weight and Energy Balance

Energy balance expresses the relationship between the foods consumed and the energy spent for normal body functions (e.g. metabolic processes) and physical activities. Energy intake from the foods consumed and the energy spent for physical activity can be controlled and the body of weight can be managed.

Factors affecting energy intake and expenditure are given in Figure 3.3.

Table 3.4. Health problems caused by obesity

RESPIRATORY	ENDOCRINE-METABOLIC
• Lung hypoventilation (lack of ventilation) • Snoring • Sleep apnea	• Insulin resistance • Type-2 Diabetes Mellitus • Dyslipidemia • Metabolic syndrome
CARDIOVASCULAR	**MUSCULOSKELETAL SYSTEM**
• Atherosclerosis • Congestive heart failure • Coronary artery disease • Peripheral vascular diseases • Hypertension	• Osteoarthritis • Osteoporosis • Gout
GASTROİNTESTİNAL	**SKIN**
• Reflux • Hiatal hernia • Fatty liver • Gallbladder stones	• Infections
GENITOURINARY	**CANCER**
• Pregnancy toxemia • Endometrial cancer • Infertility • Menstrual irregularities	• In obese men: Colon, rectum, prostate cancer • In obese women: Breast, gallbladder, ovary (ovarian) cancer
NEUROLOGICAL	**PSYCHOSOCIAL**
• Stroke • Subarachnoid (under pallium) bleeding	• Social isolation (ostracism) • Psychological problems (such as depression)

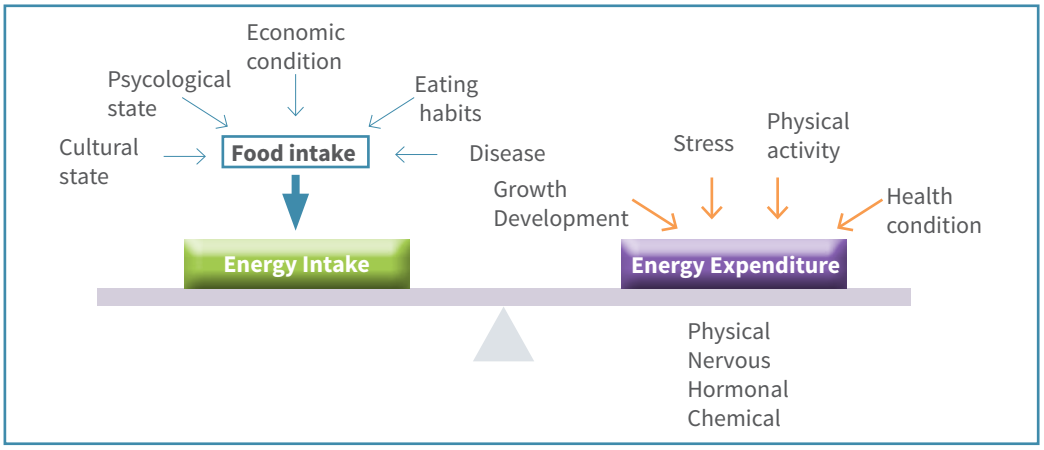


Figure 3.3. Factors affecting energy intake and expenditure

Preventing increases in the body weight and maintaining healthy body weight is important in the course of life. It takes a long time and a great deal of effort to reach the normal body weight after getting obese. Therefore, keeping an eye on the energy balance allows maintenance of body weight.

Food intake should be in line with the daily requirements recommended based on age, gender, physiological conditions (pregnancy and lactation) and physical activity level. Energy intake and energy expenditure should be equal in order to maintain the body weight. Intake of energy more than the amount spent leads to increase in the body weight and intake of energy less than the amount spent leads to loss in the body weight.

It is important to know daily energy requirements and, accordingly, maintain adequate and balanced nutrition in order to ensure energy balance and to maintain body weight management successfully. Adequate and balanced nutrition means intake and appropriate expenditure of energy and nutrients at the amount required for growth, development, and regeneration and functioning of tissues.

Individual's daily requirement of energy may vary depending on various factors such as age, gender, body height, body weight and physical activity level. (Appendix 1.1.1-1.1.4).

Long protected energy balance is the basis of the management of body weight.

- The total energy intake should be under control to manage the body weight. This means less energy intake from foods and drinks with the choice of healthy foods for overweight or obese individuals.
- Suitable energy balance should be maintained in every period of life (infancy, childhood, youth, adulthood, and special conditions such as pregnancy, lactation and elderliness).
- Physical activity should be increased and sedentary time should be reduced.

Prevention of increase in body weight can be achieved through increase in physical activity, as well as less intake of energy.

The best way to understand whether energy intake is in the proper amount is to monitor the changes in the body weight and to balance the energy received with daily diet and the energy spent for physical activities.

The energy of the daily diet should be as required by the individual to sustain healthy body weight. The dietary pattern recommended for different levels of energy intake (1000-3200 kcal) is given in Appendix 3.1. Energy and nutrient contents of the dietary patterns are indicated in Appendix 3.2.1. Different energy levels according to dietary patterns and energy requirements of children, adolescents and adults according to age, gender and physical activity level are given as matched in Appendix 3.3.1. In addition, energy and nutrient targets for adult men and women according to age and gender are given in Appendix 3.4.1-3.4.3 in order to evaluate sufficiency level of dietary patterns. After review of Appendix 3, individuals will be able to evaluate sufficiency level of their own diets and maintain easier management of their body weight.

Recommendations to help individuals control their daily energy intake and manage body weight:

- Body weight appropriate to body height should be targeted and healthy body weight should be maintained. BMI should be in between 18.5-24.99 kg/m^2.
- Three main meals should be consumed daily in compliance with the principles of adequate and balanced nutrition. Especially the breakfast should not be skipped. Skipping breakfast will prevent sustainability of a healthy body weight. Various nutrients should be consumed in meals.
- During consumption of meals, individuals should not be busy with a different interest other than meal. For example; watching television, reading newspaper, using a cell phone, etc
- Foods with low energy content (for example; fruits, vegetables, milk, ayran, etc. in recommended portions) should be consumed between meals and healthy foods should be preferred.
- Consumption of foods with simple carbohydrate, total fat and saturated fat content (sugar, chocolate, cake, pastry, muffin, fatty foods, creamy foods and all kinds of foods whose content is unknown) should be avoided.
- Beverages with high energy content (sugar added carbonated/non-carbonated beverages and ready-made fruit juices, alcoholic drinks, etc.) should be consumed in limited amounts. Instead, healthy drinks such as water, milk, ayran, freshly squeezed fruit juice should be preferred.
- Consumption of foods with high fiber content is significant for control of body weight. Therefore, whole grain products instead of white bread, bulghur pilaf instead of rice pilaf, fruit and vegetables instead of their juices should be consumed. Consumption of legumes should be increased
- Foods should be chewed thoroughly and consumed slowly.
- Attention should be paid to water consumption. Daily consumption should not be below 2.0-2.5 liters (8-10 glasses) for adults
- Weekly menu should be planned for healthy nutrition and shopping lists should be prepared accordingly. Shopping for food and drink should not be done with empty stomach.
- Attention should be paid to the amount of portion (size) to maintain energy balance.
- Healthy choices should be made when eating out. Healthy cooking methods such as grilling, boiling, steaming should be preferred; fries and foods prepared with fatty and creamy sauces should be avoided
- Food labels should be read during shopping for food and drink. The contents of energy and nutrients per portion indicated on labels should be read carefully.

3.5. Increasing the Physical Activity Level

Regular physical activity (exercises) is as important as adequate and balanced nutrition for being healthy. Physical activity allows the individuals to be energetic and fit, maintains healthy body weight, ensures appropriate body composition, and reduces the risks of occurence of chronic diseases. According to the data obtained from Turkey Nutrition and Health Survey 2010, physical activity levels are low in every age group in Turkey (Appendix 4.8.1-4.8.2).

It is necessary not only to increase planned exercise programs or life style activities but also to reduce sedentary time spend during the day for a healthy life and controlled body weight. Being busy with active interests in-sedentary time helps management of the-body weight. Physical activity level (PAL) and lifestyle classification are given in 4.8.3. “Recommendations to Reach the Physical Activity Level (PAL)” (Appendix 4.8.4), "Physical activity levels of low active adult men by age groups with the assumption that to have a habit of brisk walking every day for an hour to reach a desirable PAL" (Appendix 4.8.5), and of adult women (Appendix 4.8.6). An adult individual should exercise at least 150 minutes in moderate intensity or 75 minutes in high intensity in a week. Daily 30-minute physical activity (at least jogging) 5 days a week is enough to realize this. This period can be divided into sections not shorter than 10 minutes. The desired period of 150 minutes can be reached within several weeks through gradual increases.

Recommendations for increasing physical activity and healthy exercise:

- Individuals should walk as much as possible and increase walking time (For example; using stairs instead of elevator, getting off the bus one stop before the destination or getting on a bus after walking to next stop).

Individuals should be physically active as much as possible every day and not remain inactive more than 2 hours during the day.

- In working life, active time should be spent during lunch breaks by going out the office.
- Individuals should spend time with active people.
- Practicable and loved activities should be turned into a lifestyle.
- The time spent front of television and computer should be decreased
- Domestic works should be performed by the individual.
- When feeling tired, individuals should rest actively by taking a relaxing walk outside instead of lying or sleeping.

- **Low-intensity activities** are daily activities during which breath and heart rates are slightly higher than resting values; they require little effort (slow walking, housework, etc.).
- **Moderate-intensity activities a**re activities during which breath and heart rates are higher than normal values and muscles begin getting strained; they require moderate effort (fast walking, low paced running, dancing, etc.).
- **High-intensity activities are** activities during which breath and heart rates are much higher than normal values or muscles are strained more; they require a lot of effort (jogging, basketball, volleyball, step aerobics, etc.).

- If the exercising individual has any chronic disease such as cardiovascular disease, diabetes, etc., individual should be careful to perform the exercises recommended for such diseases.
- Exercises should not be performed with empty stomach.
- A light meal (such as 1 fruit, 1 glass of milk or ayran containing 150-200 kcal) can be consumed half an hour before exercise.
- It is not suitable to consume main meal just before a high-intensity exercise. Main meal should be consumed 3-4 hours before exercise.
- High-intensity exercises cause a large amount of fluid loss. At least 1 tea cup (100 mL) of water should be consumed once every 15 minutes. Larger amounts of fluid should be consumed in very hot and humid weather conditions. Light urine color indicates adequate consumption of fluid and dark urine color indicates adequate fluid intake.

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CHAPTER 4

THE FOODS AND NUTRIENTS REQUIRED TO BE CONSUMED MORE

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The Foods and Nutrients Required to be Consumed More

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4. Introduction

Most of the foods rich in nutrient content are easily accessible in Turkey that has a quite wide variety of foods. Macro and micro nutrients in the foods contain high amounts of bioactive substances that show positive effects on health.

Data obtained from Turkey Nutrition and Health Survey (TNHS)-2010 have been examined and food patterns are given in figures in Appendix 4.1-4.7, Chapter 10. Foods consumed less than the amount recommended, foods consumed in adequate amounts, and foods consumed in excessive amounts were examined in terms of nutrition and health interaction, based on food consumption data according to age, gender and regions. *TNHS-2010 Based analyses: current nutrient intakes from foods and beverages and food consumption patterns of Turkey population" is given in Appendix 4.1.1-4.1.14, "Nutrient intakes relative to adequate intakes (AI) and iron intake relative to Recommended Dietary Allowance (RDA/ PRI)" is given in Appendix 4.2.1-4.2.8,* "Evaluation of macronutrient inta" is given in Appendix 4.3.1.-4.3.8, "percentage of individuals with sodium intake below and equal or above the Tolerable upper ıntake Level (UL) by gender and age groups (%)" is given in Appendix 4.4.1.

Within this context, the foods and nutrients required to be consumed more are discussed in this chapter.

4.1. Fresh Vegetables and Fruits

Fresh vegetables and fruits constitute an important food group providing vitamins, minerals, fiber and many functional food components. Many vegetables and fruits have much lower energy content compared to other foods. Therefore, fresh vegetables and fruits should absolutely be included in daily diet.

Increasing the consumption of fresh vegetables and fruits allows protection against non-communicable diseases such as heart diseases, strokes and some cancer types. Vegetables, in particular, play significant role in prevention of increase in body weight due to their low energy content. Due to health interactions, salad should accompany the dishes in all meals as it provides fresh vegetable consumption.

Fiber and vitamin D intake should be increased with the consumption of daily fresh fruits and vegetables, milk and dairy products, fish and seafoods.

Fruit consumption in daily diet can also be met from dried fruits and fresh fruit juices. However, dried fruits contain higher energy levels compared to fresh fruits as they lose their water contents after dried. Therefore, adults should pay attention to the portion amount in consumption of dried fruit. Dried fruits in moderate amounts should be placed in the lunch boxes of children, instead of foods with high content of energy, fat, salt and sugar such as chocolate, chips, cakes, biscuits and so on.

Fresh fruit juices provide no benefit of fruit fiber and cause vitamin losses when not consumed in certain time. Therefore, consumption of the fruit itself, instead of fresh juices, allows benefiting from all the nutrients. However, fresh fruit juices should be preferred to sugary and carbonated beverages .

Standard portion and amounts of fresh vegetable and fruit groups required to be consumed daily according to different age groups are given in Appendix 2.1.7 and Appendix 2.1.9 and the total daily portion amounts are given in Appendix 2.1.8 and Appendix 2.1.10. The content of a portion of vegetable and fruit is demonstrated in “Energy and Nutrient Contents of Standard Portion Amounts of Foods According to Food Groups” in Appendix 2.3.1.

Appendix 3.1 sets out the portion amounts of vegetables and fruits recommended to be consumed according to "Recommended food patterns for Turkey according to the levels of energy intake (1000-3200 kcal)"

Consume the fruit itself instead of consuming fresh fruit juices.

- At least 400 g (at least 5 portions) of fresh vegetables and fruits should be consumed daily.
- Three portions out of five portions should consist of vegetables and the remaining two portions should consist of fruits.
- One portion out of three portions of vegetables should consist of green leafy vegetables and be consumed raw.
- Seasonal products should be preferred in consumption of fresh fruits and vegetables.
- Especially consumption of vegetables and fruits in different colours is important for diversity in daily diet.

4.2. Milk and Dairy Products

This group that includes foods made from milk such as yoghurt, cheese (curd, cottage cheese) and milk powder is the source of many nutrients including especially good quality protein, calcium, phosphorus, zinc, vitamin B_2 and vitamin B_{12}. Milk and dairy products are not a source of iron. All age groups, particularly adult women, children, and adolescents, should consume milk and dairy products every day. Consumption of the foods in this group helps lowering blood pressure and reducing the risks of cardiovascular diseases, some cancer types, and occurence of type-2 diabetes in adults, as well as maintaining bone and oral health in children and adolescents. Consumption of the foods in this group should be increased also to decrease the risks of rickets seen in children and osteoporosis and osteomalacia seen in postmenopausal women and in elderly.

CONSUMPTION RECOMMENDATIONS

- Unsupervised street milk with unknown source should not be purchased; pasteurized (daily milk) and ultra-high temperature-long life (UHT) milk consumption should be ensured.
- When consumption of the foods in this group is not preferred, ice cream types containing milk may be an option, especially in childhood. However, its consumption amount should be under control due to its added sugar and fat content.
- Especially the individuals diagnosed with a chronic disease such as obesity, chronic heart disease and diabetes should prefer low fat milk and dairy products.
- Cheese types with low salt content should be preferred. The salt amount in cheese can be reduced by soaking the cheese in water for a night.
- Consumption of salt-free cheese is significant for those diagnosed with hypertension.
- Lactose-free milk should be preferred for the individuals with lactose sensitivity (intolerance).
- Foods in these groups should be removed from the diets of the individuals allergic to milk proteins.
- Yoghurt and ayran are recommended to be consumed in case of diarrhea.
- During consumption of milk and dairy products fortified with calcium and vitamin D, the amount of consumption indicated on the label should be checked.

Omega-3 and omega-6 fatty acids found in vegetable oils and various plants, as well as fish and seafoods, have important role in prevention of chronic diseases when included in the diet.

In addition, milk helps managing body weight and regulating blood pressure.

The amount recommended to be consumed varies depending on age, gender, and special conditions (growth and development period, pregnancy and lactation, old age). See Appendix 2.1.1 and Appendix 2.1.2 for standard portions and amounts of milk and dairy products and the amounts required to be consumed daily. *"Energy and Nutrient Contents of Standard Portion Amounts of Foods According to Food Groups" in Appendix 2.3.1 sets out the content of a portion of milk and dairy products.*

4.3. Fish and Seafoods, Other Foods Containing Omega 3

Fish are among the foods of meat group due to their rich protein content. Though composition of fish is generally similar to compositions of red meats such as cattle, sheep, and goat and poultry meat; their content show differences in terms of fat, some minerals and vitamins contents. While fish species show no significant difference in terms of amount of protein, there are differences in the amount of fat. Therefore, the energy values of the fish vary depending on the amount of fat included in their compositions and the energy values of fatty fish are higher than the energy values of lean fish. Generally fish contain less energy than red and white meat in the same amount.

Fish and seafoods contain high contents of omega–3 (n-3), eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA). n-3 fatty acids play an active role in prevention and treatment of many diseases such as cardiovascular diseases, rheumatoid arthritis, cancer, asthma, Alzheimer; as well as development of retina and brain in infants.

Foods in this group also constitute a good source of thiamine (B_1), riboflavin (B_2), niacin (B_3), pyridoxine (B_6) and B12 among water soluble B group vitamins and fat soluble vitamins A and D. Fish and other seafoods have a particular importance in healthy dietary pat-

tern in terms of their rich mineral contents; because the minerals such as iodine, selenium abundant in fish and other seafoods are found in very small amounts in most of other foods. The amounts required to be consumed daily and the standard portion sizes and amounts are given in Appendix 2.3.1 and Appendix 2.1.4. “Energy and Nutrient Contents of Standard Portion Amounts of Foods According to Food Groups” in Appendix 2.3.1 sets out the content of a portion of some fish species.

4.4. Consumption of Fiber

Dietary fiber is the indigestible part of foods. Fiber plays an influential role in formation of feeling of fullness and a regular functioning of bowel. The best sources of dietary fiber are fresh vegetables and fruits, whole grain products, and legumes.

Dietary fiber, which is a natural composition of foods, is helpful for prevention of cardiovascular diseases, obesity and Type-2 diabetes. Foods with high fiber content should be consumed in adequate amounts in order to ensure normal level of blood lipids and glucose concentration and to ensure healthy regulation of digestive system activities. Positive effects of fiber on health appear especially when consumed with foods. Therefore, foods rich in fiber content are more useful for consumption instead of fiber derivatives sold as food supplements or ready-made products.

Especially whole grain or whole wheat derivatives of foods in cereal group should be preferred in the meals as they provide larger amounts of fiber, vitamins, and minerals. At least half of daily grain consumption should be provided from the products containing whole grain or whole wheat. At least half of the daily consumption of grain products should be provided from the products containing whole grain or whole wheat.

Over-intake of fiber in anemic individuals with iron deficiency, especially children in school age and the adolescents, prevents absorption of iron; therefore, they should be consumed carefully.

Due to its positive effects on health; fish consumption of at least 2-3 portions (300-500 g) a week is recommended. Steaming, baking, grilling methods of cooking should be preferred.

Fiber amounts required to be taken daily are given as contents of a portion of foods in "Adequate intakes of fatty acids, carbohydrates and fiber" in Appendix 1.4.1 and Appendix 2.3.1

4.5. Benefiting From the Sun, Source of Vitamin D

Vitamin D, which has the most important role among vitamins, is necessary for effective use of calcium in bones and teeth tissues. Vitamin D deficiency may cause rickets in children and osteoporosis and osteomalacia in adults. However, a relationship has been recently determined between vitamin D deficiency and risks of many diseases from as diabetes, coronary heart diseases to some cancer types. Vitamin D requirements cannot be adequately met with foods, but they are found in fatty fish and eggs. It is quite important to fortify foods with vitamin D and to promote their consumption.

The best source of vitamin D is ultraviolet rays provided by the sun. Synthesis of vitamin D starts in human skin after exposure to sun rays and active vitamin D forms in the kidneys. 90 % of our requirements can be met this way. At least 25 % of the body (such as hands, arms, legs, face) should be exposed to sunshine for 15-20 minutes during the hours when the sunshine are not in right angles.

The most effective way of preventing vitamin D deficiency at all ages is exposure to sunshine in a regular and conscious way.

People who live in North regions, people who stays indoors for a long time, people over 70 years old, people with dark skin, people who live in societies dressed in traditional clothing style, obese people with body weight above normal, people who are using drugs that affects vitamin D metabolism are under the risk of vitamin D deficiency. The highest serum vitamin D levels are reached in summer months and only a small amount of vitamin D is synthesized in November-March in upper parallels in the northern hemisphere. Air pollution, foggy weather, sunbathing from behind glass, the use of sun protector creams and cosmetic products containing high protection factors, and the use of large/big sunglasses may lead to deficiency of vitamin D by reducing the synthesis of vitamin D.

Especially face, arms and legs should be exposed to sun. Considering vitamin D deficiency in diet and that limitation of direct sunlight exposure due to the risks of skin cancer, vitamin D supplementation can be made upon doctor's advice in order to keep vitamin D level within the adequate limits. See Appendix 1.5.1 for vitamin D amounts required to be taken daily.

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CHAPTER 5

THE FOODS AND NUTRIENTS REQUIRED TO BE CONSUMED LESS

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The Foods and Nutrients Required to be Consumed Less

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5. Introduction

Data obtained from Turkey Nutrition and HealthSurvey (TNHS)-2010 have been examined and food patterns are given in figures in Appendix4.1-4.7, Chapter 10. Foods consumed less than the amount recommended, foods consumed in adequate amounts, and foods consumed in excessive amounts were examined in terms of nutrition and health interaction, based on food consumption data according to age, gender and regions. TNHS-2010 Based analyses: current nutrient intakes from foods and beverages and food consumption patterns of Turkey Population" is given in Appendix 4.1.1-4.1.14, "Nutrient Intakes relative to adequate intakes (AI) and iron intake relative to recommended Dietary Allowance (RDA/PRI)" is given in Appendix 4.2.1-4.2.8,

Evaluation of macronutrient intakes" is given in Appendix 4.3.1.-4.3.8, "Overconsumed nutrients relative to Tolerable Upper Intake Level (UL)" is given in Appendix 4.4.1.

In line with the data obtained, the foods and nutrients required to be consumed less are discussed in this chapter. The foods consumed less than the amount recommended were examined in terms of nutrition and health examined in terms of nutrition and health interaction based on food consumption data according to age, gender, and regions and the foods and nutrients required to be consumed less are examined in this chapter.

Due to the increased incidence of obesity in all age groups, attention should be paid to consumption of total fat, saturated fat, cholesterol, salt and sugar taken by diet.

5.1. Consumption of Saturated Fat and Trans Fat

Totally, 20-35% of the daily energy taken with diet should come from the fats, less than 10% (7-8%) of the energy intake should come from saturated fats, less than 1% of the energy intake should come from trans fats. It is beneficial to keep the cholesterol amount in diet below 300 mg (See Chapter 2.2.5).

Recommendations:

1. Consumption of foods rich in cholesterol (offals such as liver, brain, kidney, head, trotter, tongue, heart, spleen; processed meat and meat products such as salami, fermented sausages, sausages, pastrami, deep fried meat; pastry products containing tail fat, tallow, full fat cream, cream) should be limited.

2. Foods that may constitute a source of any kinds of trans fat consumed in the daily diet should be avoided. The amounts of total fat, saturated fat and cholesterol should be kept low in dishes/

food consumed outside home.

3. It is recommended to request inclusion of information regarding the amount of total fat, saturated fat and cholesterol in menus and menu cards of the out-of-home eating places.
4. Consumption of all kinds of fats (solid and/or oils) should be reduced.
5. Label information on margarines should be read and consumption of margarines containing saturated fatty acids over 70% should be limited. Margarines containing fat below 70% are sold as "soft margarine". Furthermore, consumption of the fats whose label says «hydrogenated» and «partially hydrogenated» should be limited.
6. Poultry (chicken, turkey, duck, goose, etc.) should be consumed after separated from skin.
7. Visible fats of red and white meats should be removed as much as possible during food preparation period and on the plate
8. Consumption of milk and dairy products should be increased especially in adults and children and consumption of low fat or fat free products should be preferred / encouraged in adults.
9. Meat dishes should be cooked without adding fat
10. The label information of the foods sold as packaged should be read and similar foods with less content of total fat, saturated fat, trans fat, and cholesterol should be preferred.
11. Cooking in own fat, boiling, grilling, and baking in oven at low temperatures for short time as much as possible, and steaming should be preferred as the cooking method. Frying process should not be applied.
12. Although eggs as a food rich in cholesterol, healthy individuals can consume 1 egg a day and individuals with cardiovascular diseases can consume 1 egg 2-3 times a week.
13. Some traditional cooking methods (such as cooking in well, in stone oven, on iron plate for a long time) that may cause formation of chemical products that can pave the way for major chronic diseases should not be preferred.

Consumption of total fat, saturated fat, trans fat and cholesterol in large amounts causes many noncommunicable and nutrition-related diseases such as cardiovascular diseases, diabetes, obesity, cancer, etc.

Foods Containing Saturated Fats

- Offals such as liver, brain, kidney, head, lamb's feet, tongue, heart, spleen, tripe
- Processed meat and meat products such as salami, fermented sausages, sausages, bacon, ham, deep fried meat,
- Pastry products such as cookies, donuts, etc. that contain tail fat, tallow, suet, plain butter, whole fat cream,
- Bakery products such as chocolate, bar, waffles, biscuits, ready cakes.

5.2. Salt Consumption

Salt is consumed in excessive amounts in Turkey. Although it differs according to regions, daily consumption amount is generally 2.5-3.5 times higher than the recommended amount. Daily salt consumption should be less than 5 grams. Approximately 40% of common salt is sodium. 5 g of salt contains 2000 mg of sodium. Legal arrangements have been made to reduce the salt contents of bread, cheese, tomato paste, olive, red pepper flakes, processed meat products (such as deep fried meat), and similar foods in the recent years in Turkey.

Excessive consumption of salt (sodium) may lead to cardiovascular diseases, kidney diseases, hypertension, stroke, osteoporosis and some cancer types. Daily consumption of salt should not exceed 5 grams. The salt consumed should be iodized.

Foods Containing Excessive Amount of Salt

- Ready-made sauces (such as soy sauce, ketchup, barbecue sauce, salsa sauce, mustard, pasta sauce etc.)
- Snacks (such as chips, grain based bar, fruit based bar, extruded products, popcorn)
- Salted nuts (hazelnut, peanuts, walnut, almonds, chickpea, roasted wheat, pumpkin and sunflower seeds, all kinds of kernels of seeds, etc.)
- Pickles and pickled products (black and green olives, pickled vegetables) canned fish, salted, smoked, and/or pickled meat and fish products,
- Aromatized/non-aromatized, natural/unnatural, carbonated/non-carbonated mineral drinks.
- Foods such as pickles, tomato paste, tarhana, pickled leaves traditionally prepared at home.

Recommendations:

1. Salt consumption should be reduced. Daily consumption of salt should not exceed 5 grams (1 heaping teaspoon or 1 dessert spoon) and iodized salt should be used (See Chapter 2. Minerals).
2. All sodium compositions such as monosodium glutamate, sodium nitrate, sodium bicarbonate, sodium citrate, sodium ascorbate etc. that are used in the food industry and usually indicated in labels of packaged foods should be consumed carefully since they increase salt/sodium content of foods.
3. The amount of salt added during preparation, cooking and consumption of food should be reduced. It is even better not to add salt during preparation and cooking due to naturally presence of sodium in the composition of foods.
4. Salt should not be added to the dishes at the table and saltshakers should be removed from tables.
5. Ready sauces (such as soy sauce, ketchup sauce, barbecue sauce, salsa sauce, mustard, macaroni sauce), snack (such as chips, grain based bar, fruit based bar, extruded products, popcorn), salted nuts (hazelnut, peanuts, walnut, almonds, chickpea, roasted wheat, pumpkin and sunflower seeds, and all kinds of kernel of seeds), pickles and pickled products (black and green olives, pickled vegetables), canned fish, salted, smoked and/or brined meat and fish products, and aromatized/non-aromatized and natural/unnatural mineral beverages should be consumed in small amounts since they contain large amount of salt/sodium.
6. Foods such as pickles, tomato paste, tarhana soup, dried curd, pickled leaves traditionally prepared at home contain large amount of salt. Therefore, they should be consumed less and consumption of large amounts of salt should be avoided during their preparation.
7. Processes such as washing and soaking may be applied in order to reduce the salt content of pickled products.
8. Label information of the processed products purchased should be read and salt-free or low-salt products should be preferred

9. Content of the foods sold as packaged should be read from their label and similar foods with smaller amounts of salt and agents replacing salt should be preferred.

10. The salt amount in dishes and foods should be learnt when eaten out and dishes should be requested to be prepared with low-salt or salt-free content, if possible.

11. Natural flavor enhancers (onion, garlic, spices, lemon, vinegar, pepper, etc.) should be used instead of salt.

12. It should be remembered that individuals can adapt to low-salt diet after insisting upon some time on reduction of salt intake

5.3. Sugar Consumption

Sugar is a natural composition obtained from sugar beet and sugar cane. It is a pure carbohydrate generally known with the name of sucrose.

Sugar (added sugar) added during the processing of food and sugar naturally found in the structure of foods constitute the total amount of sugar consumed with daily diet (See Chapter 2. Sugar).

Sugar is added to give flavor, to increase durability/shelf life, and to provide structure and consistency to foods and beverages .

The phrases of *"white sugar, semi-white sugar, refined sugar, sugar solution, invert sugar solution, invert sugar syrup, glucose syrup, dried glucose syrup, anhydrous dextrose, dextrose monohydrate, powdered dextrose, powdered sugar, brown sugar, lactose, maltose, fructose, fructose syrup, corn syrup, maltose syrup, and raw cane sugar" indicated in the label of packaged products show that the product contains sugar.*

Recommendations

1. Consumption of sugar and foods and beverages with sugar content should be reduced in all age groups.

2. The label information of the foods sold as packaged should be read and similar products with low sugar content should be preferred.

3. Energy coming from sugar should not exceed 10% and should preferably be less than 5% of the daily energy income (Appendix 3.1.2).

4. Sugar/sugary foods and beverages should not be given to childeren until 2 years old.

5. Sugar containing foods and beverages should be avoided to be consumed especially between meals and before sleeping.Şeker içeren besinlerin ve içeceklerin özellikle öğünler arasında ve yatmadan önce tüketilmesinden kaçınılmalıdır.

6. Consumption of foods with added sugar in externally high amounts (cakes, pastry, cookies, biscuits, chocolate, bars, etc.) and beverages (carbonated/ non-carbonated beverages, readymade fruit juices, energy drinks, sports drinks, etc.) should be restricted due to their negative impact on health.

Consumption of sugar and sugar added foods should be reduced since their over-consumption may lead to mainly obesity, cardiovascular diseases, dental decays, some cancer types, type-2 diabetes, and some metabolic problems.

Foods with sugar content

- Pastries (cake, pastry, cookies, biscuit, and other bakery products) and dairy desserts,
- Jam, marmalade, honey, concentrated grape juice (molasses)
- Carbonated and/or soft drinks, lemonade, sweetened fruit drinks, sports drinks, energy drinks
- Ice cream, dairy/ nondairy ice products
- Toffees (sugar candy, delight, Turkish fairy floss), halva.

Alcohol Consumption

Alcoholic drinks have high energy content. Intake of alcoholic drinks, including alcoholic drinks flavored with sugar, with diet cause increased daily consumption of energy and, as a result, leads to increase in body weight (overweight, obesity).

Alcohol consumption may lead to mainly liver diseases, obesity, cardiovascular diseases and some types of cancer.

CAUTION

- Excessive consumption of any alcoholic drinks may lead to indirect deficiency of nutrients, especially vitamins.
- Excessive consumption of alcoholic drinks in the form of plain or mixed may lead to deterioration of the liquid and electrolyte balance in the body from time to time and severe dehydration condition.
- Children, adolescents, pregnant women, lactating women, drivers, individuals with any health problem, individuals working in the field of operation requiring attention, individuals using drugs showing negative interaction with alcohol should never consume alcohol.

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CHAPTER 6

FOOD SAFETY AND PRINCIPLES

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Food Safety and Principles

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6.1. General Information

The essential approach in food safety requires the careful examination of each step in food chain as from the row material to the consumer and the application of control measures. Millions of people are exposed to foodborne diseases because of consuming contaminated foods despite the execution of various applications and relevant legal regulations in order to make food safer in many countries. It is evident that the foodborne dangers constitute a cause to an important disease worldwide (morbidity) and economiclosses as well as the serious health problems that it causes for risky groups in the population.

In order to prevent physical contaminants;

- Use of glass materials musn't be preferred in preparation and production stages because of its breaking risks unless it is obligatory.
- It is important to prefer packed products in terms to prevent physical contaminants like stone, soil and hay.
- Attention must be paid to make sure that there is no visible soil, dust, hay, animal scat while buying vegetables, fruits and eggs.
- Persons who are engaged in food production must abide obey with rules on personal hygiene.

Foodborne diseases are seen together with diarrhea especially in childhood periods in developing countries. Vulnerability against foodborne diseases increase day by day in societies.

Food safety comprises all measures in production-sale-consumption chain including processing, preparation, storage and provision to consumers, in a manner to prevent physical, chemical and biological factors resulting in foodborne diseases.

Factors hampering food safety result in health problems affecting all sectors of the population including especially risk groups like infants, children, pregnant and lactating women, elderly and patients.

6.2. Hazards Affecting the Food Safety

Each individual has the right to access and consume safe food. However, foods can be contaminated in each stage of production-sale-consumption chain. Foodborne diseases arise as a result of consuming contaminated food. There are three dangers jeopardizing the food safety namely physical, chemical and biological risks.

Danger 1: Physical contaminants: All foreign bodies which get into a food either intentionally or unintentionally cause to physical contaminations. Dust/soil, hair, nail polish scraping, insects, pieces of broken glasses and plates, nails, staples, pins,studs,

metal or plastic particles, bone particles, stone, wood particles and packaging materials etc. are in scope of physical contaminants

Danger 2: Chemical contaminants: Pesticides, food package materials, detergents-disinfectants and all other cleaning materials can be given as examples of chemicals disturbing food safety. These materials can cause in foodborne diseases in short or long term by contaminating to foods.

Metals like aluminum and copper which contact with food are also important contaminants. In order to prevent this:

- Acidic foods like lemonade, tomato sauce or salad sauces must not be prepared and cooked in aluminium and copper vessels.
- Use of vessels of which enamel is worn must be avoided.
- The remaining for canned food after opening and consuming must be preserved in an appropriate container and in refrigerator.
- Containers of bought packaged foods must not be used for other purpose (e.g. yoghurt fermentation, food preservation etc).

Danger 3: Biological contaminants: Bacteria and other microorganisms constitute the most common cause of foodborne diseases. Salmonella, E.coli, L. monocytogenes, S.aureus, C.perfringens are the bacteria which cause foodborne diseases the most frequently. The most prominent sources of contamination of microorganisms are dust, soil, air, pests, rodents and other animals, raw foods, wastes, materials-equipments and peoples.

In order to prevent chemical contaminants:

- Chemical substances must be used and stored in accordance with the instructions.
- All stakeholders and consumers in food chain must be informed concerning appropriate utilization of chemical substances.
- Chemical substances must be stored in their original boxes, with labels on them and away from foods.
- Hands must be washed after use of chemical substances.

Various mushroom strains causing poisoning are not purified from its toxic effects through cooking, freezing, canning or any other method. The only way to avoid mushroom poisoning is to consume cultivated mushroom instead of mushrooms in nature.

In order to prevent biological contaminants;

- The five principles to ensure food safety (hygiene, separation of cooked foods and raw foods, appropriate cooking, preservation of foods in appropriate temperatures, utilization of reliable raw materials and water) must be applied.
- Measures intended to ensure food hygiene, material-equipment hygiene and personal hygiene must be taken.
- The system intended to prevention and control of risks for safe food production (HACCP, ISO22000) must be established and its continuity must be ensured.

5 Principles to ensure food safety:

1. Hygiene	
What?	**Why?**
It is personal hygiene, hygiene and disinfection of used materials-equipments and cleaning and maintenance of all fields where food is produced.	Various microorganisms exist in soil, water, animals and humans. Pathogens are transmitted to foods through clothes, used materials-equipments, hands and it may cause forborne diseases.
2. Separation of Cooked Foods and Raw Foods	
What?	**Why?**
It is separation of raw meat, poultries and sea products from cooked products and other foods consumed raw like salad etc, separation of knives and chopping boards used in preparation of raw foods, and preservation of foods in a manner to separate foods ready for consumption and raw foods.	Raw foods especially meat, poultry meat and sea products contain dangerous microorganisms. These microorganisms may contaminate other foods during preparation and storage of foods
3. Appropriate Cooking	
What?	**Why?**
It is cooking of foods in appropriate temperature and	Etkin bir pişirme işlemi, insan sağlığını etkileyen ve besin zehirlenmelerine sebep olan Campylobacter, *Escherichia coli ve Listeria vb* bakterileri öldürür.
4. Preservation of Foods in Appropriate Temperatures	
What?	**Why?**
It is cooking of foods in appropriate temperature and duration until the safe inner temperature specific to food in order to eliminate biological dan-gers in potentially dangerous foods (meat, milk, eggs etc)	An efficient cooking process kills bacteria like Campylobacter, Escherichia coli and Listeria etc which affect human health and cause food poisoning.
5. Utilization of Reliable Raw Materials and Water	
What?	**Why?**
It is use of fresh water in preparation of foods, selection of fresh and healty food from reliable sources, preferring goods made safe like parorized and sterilized milk.	There a possibility of contamination of raw materials with dangerous microorganisms and chemical substances.

6.3. Encountered Foodborne Factors and Control Measures

Symptoms such as diarrhea, intestinal cramps, nausea and vomiting arise after consuming a food containing pathogen microorganisms. 20 to 40% of foodborne diseases consist of homemade foods.

It is known that the number of species like bacteria, virus and mould causing foodborne diseases in humans is about 50 and that bacteria are the most common of these factors. In the following Table 6.1 the pathogen bacteria resulting commonly in foodborne diseases are mentioned.

The main causes of foodborne diseases are as follows;

- Insufficient cooking,
- Inappropriate duration-temperature applications,
- Contamination of equipments (knife, chopping board, towesl etc.),
- Contamination of food storage and preparation spaces,
- Raw food of animal origin,
- Contact of prepared foodstuffs with raw foods,
- Utilization of unreliable raw material,
- Insufficient hygiene practices of individual engaged in works on food.

Table 6.1. The pathogen bacteria resulting commonly in foodborne diseases

Bacteria	Mediator Food	Symptoms and Effects	Prevention Methods
Campylobacter jejuni	Contaminated water, raw or non-pasteurized milk, raw or uncooked red meat, poultry or sea products	Symptoms arise after 2 to 5 days as from the consumption of contaminated food. Diarrhea (sometimes bloody), stomach cramps, abdominal pain, fever	Cooking the meats and poultry until reaching of inner temperature to a safe level, avoidance of utilization of milk and dairy products which are not pasteurized, respect for personal hygene rules.
Clostridium botulinum	Garlic awaited in oil, canned food which are not made in appropriate conditions, foods with vacuum packages	Symptoms arise after 18 to 36 hours as from the consumption of contaminated food. It affects nervous system because of the production of toxin by the bacteria. Diplopia, blurred vision, muscle weakness, swallowing and respiration difficulty are the symptoms.	Avoiding to produce canned food at home, avoiding to buy and necessarily to utilize canned food which is bending, which is leaked and of which package is damaged, to prevent infants from consuming honey are required.
Clostridium perfringens	Meat, meat products, broth, foods whichare not cooled and stored in appropriate method after cooking	Symptoms arise after6to24hours as from the consumption of contaminated food. Severe abdominal pain, nausea and diarrhea are the most common symptoms. These symptoms may continue for one week in infants and elderly people.	It is necessary to pay attention to cool, to keep waiting in appropriate conditions and service time and temperatures.
Escherichia coli O157:H7	Raw vegetables including especially all foods which are directly or indirectly contaminated by stool, meals which are served without heating after cooking, foods which do not undergo sufficient heat treatment	Symptoms arise after 3 to 4 days as from the consumption of contaminated food. Severe diarrhea (generally bloody), abdominal pain and nausea are the symptoms which continue more severely in elder people, in individuals with weak immune system and children below 5 years old (such as acute renal failure in children)	Especially hamburgers and meat balls must be cooked until their inner temperature reach to a safe level. It is requiredtopreferthepasteurizedmilkanddairyproductsandalljuicesincludingespeciallyapple juice.
Listeria monocytogenes	Foods which are ready to consume and stored in cold for long time as well as raw milk, ice-cream, raw fruits and vegetables, shell fishes, soft cheeses	Fever, muscle pains, disorders of digestive systems like diarrhea and nausea, headache, neck hardness, mental confusion, balance loss, spasm are seen. Severe results like preterm or stillbirths, enceintes and meningitis in new born infants.	Prevention of contact of raw foods and soil, use of pasteurized milk in cheese production.Preservation of food in appropriate temperatures, paying attention to inner temperature and duration of cooking, cooling of cooked food in a appropriate manner are required.
Salmonella	Meat including especially chicken meat, eggs, non-pasteurized milk and dairy products, patisserie products, cream, ice-cream and sauces	Symptoms of diarrhea, fever and abdominal pain arise after 12 to 72 hours as from the consumption of contaminated food. Symptoms may be more severe in persons having weak immune system.	Meat, chicken and foods containing eggs must be cooked until the point that the inner temperature reaches to a safe level. Raw products or products made of raw eggs as well as milk and dairy products which are not pasteurized must not be consumed.
Shigella	Water and food contaminated with human-induced stool	Symptoms arise after1-2 days as from the consumption of contaminated food. Diarrhea (watery or bloody), fever and abdominal pain are general symptoms.	The most appropriate control method is washing the hands in appropriate time and manner.
Staphlococcus aureus	It exists generally in skin and noise mucosa. Meat and dairy products, fish, potato, macaroni, ice-cream, cream and salads with mayonnaise	Symptoms arise after30 minutes to 6 hours as from the consumption of contaminated food. Severe nausea, abdominal pain, vomiting, diarrhea are the general symptoms	Attention must be paid in cooking time and temperature as the toxins are resistant to heat. Appropriate hand wash and personal hygiene rules must be respected.

6.4. The Methods to Ensure Food Safety

There are important points in the process from production to purchase and consumption of foods to pay attention in order to ensure food safety. There are three ways to ensure food safety.

6.4.1.Physical Conditions and Hygiene of Materials-Equipments

Areas where foods are prepared and cooked and all materials-equipments used in this process must be clean and hygienic. Especially in mass food production facilities (mass catering) (MC), all conditions from installation plan of kitchen sections to utilization of appropriate equipments-materials must be arranged in a manner to ensure food safety.

Equipments of mass food production (catering) facilities is produced n must abide with the specified regulations. For example, lightening, ground structure, walls, windows, ceiling, installation related to electric, water, steam, coal gas/natural gas, ventilation and wastage must be controlled with respect to legal regulations. Kitchen spaces must be planned as storage, production spaces (preparation and cooking) and services sections beginning from the section of purchase in accordance with the work flow. All materials-equipments to be used during the production must be hygienic and clean.

Hand washing method

Hygienically appropriate hand washing steps;

- The hands are soaped from wristle to fingertips with water as hot as possible to stand,
- Hands and interdigitals are scrubbed as least for 20 seconds,
- Hands are rinsed completely under running water,
- Hands are dried with a towel or paper towel.

6.4.2.Personal Hygiene

Personal hygiene and sanitation of persons involving in preparation and production of food and beverage is important in ensuring food safety. The persons working in processes of MC must be controlled whether they take training of personal hygiene in framework of relevant legal regulations.

Points to take into consideration in ensuring personal hygiene:

1.Mouth/nose/hairs/clothes

- Mouth, nose and hairs must not be touched in preparation and cooking of foods,
- Paper tissue or mask must necessarily used in coughing and sneezing,
- Taste controls of meals must not be performed by the spoon with which the meal is stirred; it must be done by a separate spoon by putting on a plate,
- Measure must be taken in order to avoid hair fall while working with food (bonnet etc must be used).

2.Hands

Hands must be frequently washed during preparation of food and beverage with methods in accordance with hygienic hand wash principles. Hands must necessarily be washed in a hygienic manner;

- At the beginning of each work,
- After touching raw foods,
- After each exit from toilette,
- Before serving meals,
- After smoking and using hankerchief,
- After touching money,
- After touching dirty materials-equipments,
- After coughing and sneezing,
- After touching garbage

Hand disinfection: Hand disinfection of personnel working in MC places is especially important to ensure food safety. The purpose of this process is removal of bacteria on hand from the environment in the most effective and quickest way. It is required to utilize materials of disinfection having antiseptic feature.

For this purpose, 3 to 5 mL of a rapid-acting alcohol-based disinfectant is taken and both hands are rubbed each other and they are scrubbed for one minute. Hand disinfection is applied to washed and dry hands and it is recommended to apply especially after toilette and following contact with raw meat.

Glove utilization: Disposable gloves are necessarily required in preparation of particularly the foods to which heat treatment will not be applied (cold sandwiches, salads etc) in MC places, in contact with raw meats and during serving the meals. Gloves are used in order to avoid contaminating foods, not in order to not to dirty hands. After contact with raw meats, contact with cooked food by the same gloves must be avoided.

6.5.Food Safety

In order to ensure food safety;

- Labels of food must be read in the purchasing stage
- Foods must be stored in appropriate conditions
- Hygiene rules must be respected during preparation, cooking and service stages.

6.5.1. Reading of labels of foods in the purchasing stage

The principle of "Food Safety from Farm to Table" is systematically applied in Turkey. Production of foods in accordance with technical and hygienic requirements cannot be sufficient. Preservation of foods in compliance with the rules especially in storage, transportation and sale point has a great importance. It is requisite to use appropriate packaging materials which will not affect negatively the food physically, chemically and microbiologically or will not cause deterioration of the food with regards to its nature and to meet the requirements like duration, temperature, humidity, lighting etc. The high-protein foods inducing reproduction of bacteria in favorable conditions are defined as "potentially dangerous foods". Meat, milk and dairy products, sea products are examples for potentially dangerous foods. As the potentially dangerous products of animal origin like meat, meat products, fish, milk, yoghurt, cheese which have also high nutritious value are more sensible to deterioration, it is required to pay more attention while buying these foods.

The principles to pay attention while buying foods are as follows:

1. Foods having package and label on which mandatory information is available must be preferred.
2. It is required to control whether each food is presented for sale in storage conditions (temperature, humidity, lighting etc...) specific to it.
3. It is required to control whether thermometers of refrigerators and deep-freezers where the foods are present, are functioning.
4. Foods without package and foods with ripped or deteriorated package mustn't be purchased.
5. The "identification mark" in oval shape containing enterprise approval number allocated by the Ministry of Food, Agriculture and Livestock must be sought in label of food of animal origin and for other foods, the foods having "Enterprise Registry Number (ERN)" which is granted again by the Ministry of Food, Agriculture and Livestock to the registered food enterprises should be preferred.
6. Expire date for meat and dairy products which are perishable and which should be consumed in short period and recommended consumption date in other products must necessarily verified.
7. In the case that special preservation and/or utilization conditions are not indicated on the product label, these conditions must be met and usage instructions must be respected.
8. Consumers must look to the list of "ingredients" in the label in order to get information on composition of the food, and attent ion must be paid on allergen

substance or ingredients indicated in the list of ingredient in case of sensibility against any allergen substance or ingredient.

9. Food and nutrition indicators should be examined in order to make comparison with other products.

10. Label information (whether it contain allergen substance, expire date, name of food operator etc.) of foods which are sold after taking out of original package must necessarily be demanded.

11. Foods like meat, chicken, fish which may be perished rapidly should be bought at the end of shopping. Their contact with foods to be consumed uncooked should be prevented and they must be placed in refrigerator as soon as possible without breaking cold chain (within two hours at latest, within one hour at latest in hot weather).

Mandatory label Information

- Name of the food
- List of ingredients
- Allergen ingredients or allergen treatment ancillaries,
- Quantity of ingredients or ingredient groups,
- Net quantity,
- Suggested comsumption date or expire date in foods which are easily perishable microbiologically,
- Special storage conditions and/or utilization conditions,
- Name or trade name of food enterprise and its address,
- Enterprise registry number, approval number/ definition mark,
- Country of origine,
- Usage instruction of the food,
- Real alcohol quantity in volume in beverages containing alcohol exceeding 1.2% in volume

12. Frozen foods should be bought at the end of shopping. Attention must be paid to verify that it is not thawed and that there are not any ice crystals in the inner side of package. Such foods must be placed in deep-freezer as soon as possible.

13. Milks which are not controlled and of which the origin is unknown mustn't be bought. Pasteurized and ultra high temperature milks (UHT) must be preferred.

14. Cheese which is produced from raw milk which is not brined and which is not ripened mustn't be bought.

15. Broken, cracked, dirty eggs mustn't be bought and eggs must be washed before use.

16. Attention must be paid to verify that meats are sealed and in specifical odor, color and aspect. Meats must be bought from reliable enterprises.

17. Minced meat ground from pieces of meat should be preferred instead of ready minced meat and whole chicken should be preferred instead of piece of chicken.

18. Attention must be paid in buying fish to observe that it has its specifical odor, its eyes are clear and slightly raised, and its gills are closed and dark red in colour.

19. Fruits which are crushed, perished, and muddy or which have insect bites, fruits which are in their season which are not early grown should be preferred.

20. While buying canned food, the boxes with puffed bottom or top cover, damaged boxes, boxes with loose and damaged cover mustn't be bought.

21. Attention must be paid to make sure those cereals, legumes, nuts/seeds are not moldy, bitted by insect, with broken grains.

Label Reading

The labels of food are identity cards of the foods that we buy and consume.

Consumers are required to pay attention to some points in the course of purchasing while entrepreneurs are required to perform food

production, sale and distribution in accordance with regulations. The following **"mandatory label information"** should be sought in foods labeled in accordance with **"The Labeling Regulations of Turkish Food Codex"** must be sought.

Food ingredients and allergen substances

Ingredients of the food are ranked in the ingredient list with respect to used quantity from high to low. Some of these ingredients may have allergic effect in some consumers. These allergen ingredients or allergen operation ancillaries are indicated on label separately from other ingredients. For example, the persons having lactose intolerance are required to seek the expression of "milk"/"-contains milk" or the individuals having allergy for soya should seek the expression of "soya"/"contains soya" in the ingredient list.

Packaging with respect to nutrition

Labeling information with respect to nutrition indicates energy value of the food and quantity of key nutrients. Although labeling with respect to nutrition is not mandatory except for foods having nutrition and health claims, many food operators give this information voluntarily. However, labeling with respect to nutrition is mandatory in some foods with purpose of special nutrition like infant formulas and sports foods even no declaration is made. When labeling with respect to nutrition is made, it is required that legal rules are absolutely complied with and all necessary informationis given in accordance with the specified form. It is possible to take advantage of information of labeling with respect to nutrition in order to compare the levels of energy and nutrients of different foods and to make convenient selection in shopping.

Guideline Daily Amounts (GDA) in food labels

The information of **"Guideline Daily Amounts (GDA) or Daily Values (DV)"** allowing voluntary practice of producers displays which share as % of reference intake levels given for energy and nutrients is met by one portion of the convenience food.

GDA data indicates how much "energy, sugar, total fat, saturated fat and salt" is contained in one portion as given in Figure 6.1. This information is calculated according to the average reference values determined for "energy, sugar, total fat, saturated fat and salt". All of the GDA data are suggestions which are relevant for an average adult having a healthy body weight and activity level. However, energy and nutrient levels needed in daily basis may vary with regarding to gender, age, physical activity level and other factors. GDA helps consumers to make optimal selections for them in shopping by allowing them to compare energy and nutrient quantities of different foods. These data should be evaluated, if available, when foods are being purchased.

6.5.2. Storing of Foods

Storing foods appropriately after purchase have great importance in terms of both the protection of health and prevention of nutrient losses.

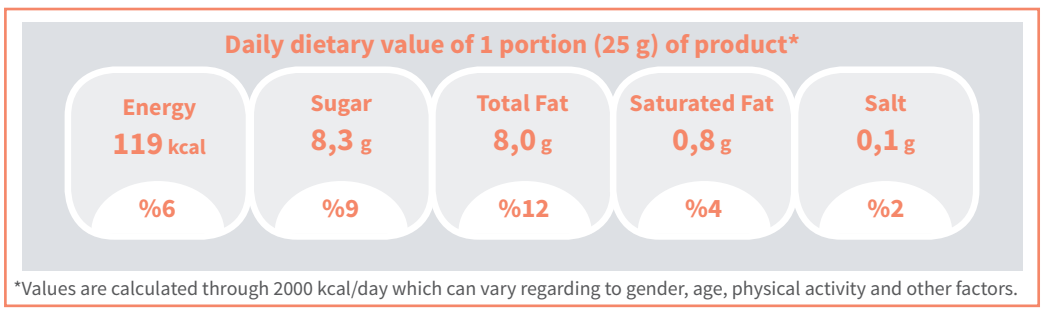

Figure 6.1. (*)The Regulations of Labeling of Turkish Food Codex [Official Gazette dated 29.12.2011 and numbered 28157 (3rd dublicate number)]

Therefore, foods must be stored in spaces allocated with purpose of food preservation like refrigerator, cold rooms, dry stores and deep-freezers with respect to their kinds.

Storing Principles

The purchased foods must be stored in appropriate temperature given in Table 6.2 if they will not be used immediately.

Cold storage

In the course of cold storage;

- Raw foods and cooked foods must be stored in different shelves in order to prevent cross contamination, so that cooked food must be placed in upper shelves as covered.
- Contact of water dropping from raw poultry meats, fishes and other meats with other foods must necessarily be prevented and such foods should be stored in deep-freezer section of refrigerators.
- Cooked meals should be placed in refrigerator in appropriate conditions within 2 hours at most if they will not be served immediately. For example, remaining meat meals must not be kept in refrigerators more than 1-2 days and other meals must not be kept in refrigerators more than 3-4 days.
- Foods which are bought as frozen must be conserved in their own packages, and any thawed food must not be frozen again.
- The foods to be frozen at home should be labeled by writing the kind and freezing date on them.

Dry storage

Durable foods like unopened canned foods, salt, sugar, cereals and cereal products (rice, bulghur etc.), some fruits (apple, banana, avocado etc), some vegetables (onions, potatoes, garlic etc), foods presented for sale in durable packages (UHT milk, juice etc.), legumes (chickpeas, dried beans etc.) should be conserved in dry stores.

- Temperature of dry stores requires being 15 °C to 20 °C and they must not be humid.
- Foods must be conserved in closed boxes for preservation of their freshness.
- The foods which were bought first should be consumed earlier according to the purchasing order.
- There must not be any pest, rodent and domestic animal in these stores.
- Cleaning equipments, detergents and chemical substances must not be in these stores.
- Foods must be stored in a manner to prevent any contact any surface.

6.5.3. Preparation and cooking of foods

In the event that foods are not prepared and cooked with appropriate method, they lose;

- Their sensorial properties like taste, aspect, color, consistency,
- Their nutritional value,
- And more importantly their hygienic quality.

Table 6.2. Storage temperatures of food (°C)

Food / Food Group	Preservation/ Storage Temperatures (°C)
Milk and dairy products	4 - 6
Red meat and meat products	0 - 4
Minced meat	0 - 2
Eggs	5 -12
Poultry meat and products	0 - 4
Fresh fish products (or in melting ice)	0 - 4
Offals	0 - 3
Fruits and vegetables	0 - 12
Frozen products	-18 or lower temperatures

Points to take into consideration in stage of preparing foods

In order to prevent cross contamination in the stage of preparation of foods:

- Clean and potable water must be used in each step,
- Raw and cooked foods must be prepared in separate places and by different equipments-materials and these foods must be kept away from each other,
- Hands must be washed appropriately after touching raw foods,
- All surfaces and materials-equipments contacting especially with raw chicken and meat and fish must be washed by plenty of hot water with detergent or be disinfected.
- Potentially dangerous foods in terms of hygienic risk such as meat, milk and eggs must not be awaited out of refrigerator for more than two hours,
- All fresh fruits and vegetables must be washed in plenty of water,
- Frozen foods must be thawed in refrigerator temperature, in original package or in micro-wave ovens,
- Foods which are once thawed must not be frozen again,
- Marinated meat products must be conserved in refrigerator as covered

Cooking

An efficient cooking treatment neutralizes bacteria like *Campylobacter, Escherichia coli and Listeria* causing food poisoning. Therefore, it is important to pay attention to sufficient cooking of foods.

- Attention must be paid to ensure that temperature is same in any points of the food during cooking and heating,
- Central temperatures of raw poultry and red meats, big pieces of meat, foods like hamburger and sausage made of minced meat must be at least at 72°C and their exposition to this temperature at leat for 15 seconds must be ensured.

In food enterprises and in mass catering services;

- Foods to be conserved as frozen must be taken into appropriate stores without delay,
- Preparation and production spaces must ecxlusively used for product preparation and production and food materials must not be stored in these spaces,
- Distance from walls and elevation of food materials must be at least 15 cm in stores,
- Food materials with opened package must not be left in stores.

Meats should be presented to consumption after cooking in appropriate conditions by considering temperature-time conditions provided in the Table 6.3.

Table 6.3. Cooking temperatures and durations of meats

Temperature (°C)	Duration (minutes)
60	45
65	10
70	2
72	15 seconds
80	6 seconds

Attention must be paid to ensure that the central temperature remains at 80 °C during at least for 3 minutes or at 72 °C at least for 10 minutes during roasting and grill processes.

Especially the potentially risky foods must be cooked in appropriate temperatures.
For this purpose, the inner temperature of meal should be gauged via meal thermometers in MC places.

Attention must be paid to ensure that the central temperature of meat remains at 80o C during at least for 3 minutes or at 72^0 C at least for 10 minutes during roasting and grill processes of poultry meats.

Points to take into consideration in stage of cooking of foods

- Materials-equipments to be used in cooking must be clean,
- Cooking temperature must reach to a level to neutralize harmful bacteria in the course of cooking of foods,
- Cooked meals must not be awaited more than 2 hours at room temperature on counter or cooker.

- Attention must be paid to ensure that the foods to apply the freezing process are fresh and clean, they have to be frozen in quantities to be thawed and consumed easily,
- Foods to be frozen must be stored in appropriate conditions and in covered containers and packages and materials which are suitable for freezing must be used ,
- Storage temperatures must also be indicated on labels of food to be frozen beside the information on production and expire date.

Points to be taken into consideration in stage of cooling/freezing foods

- Quantity of meals cooked with big portions must be decreased and they must be cooled rapidly by placing in shallow trays which don't exceed 10 cm height,
- Hot meals must not be placed directly in refrigerators; the ones which are wanted to be cooled rapidly must be awaited in vessels full of ices by stirring occasionally,
- The cooled meals must be covered and they must be kept in refrigerator until serving.

Preservation by Freezing

The principle of this method is based on the fact that reproduction and activities of microorganism in foods are totally stopped in low temperatures and that their biochemical and chemical reactions are slowed down. Microorganism activities are eliminated to a large extend due to the facts that water activity decreases as a result of transformation of water in structure into ice crystals through freezing of foods and that the temperature is very low (-18 °C). Preservation by freezing is a method through which the natural color, taste, nutritional value of the food can be preserved in closest point to its fresh features.

Thawing

- Thawing process must be performed in a manner to minimize the risk of reproduction of pathogenic microorganism and toxin generation in foods,
- Measures to prevent microbiological, chemical and physical contaminations must be taken in the course of thawing,
- Frozen foods must be thawed in room temperature; especially raw meats must be thawed at 4o C in refrigerators.

Ensuring temperature control and cool chain

- Cooling treatment of cooked meals must be realized rapidly especially from 60°C to

4°C where food temperature must be decreased from 60 °C to 37 °C at most in two hours and from 37 °C to 4 °C at most in four hours.

- If the foods are to be kept hot until consuming, the storage temperature must be above 63°C at most for duration of 3 hours.
- Foods which are consumed cold or conserved cold must be awaited in environments below 4 °C.

6.5.4.Serving of food

- All materials-equipments used for service (plate, fork, and spoon) must be clean and hygienic,
- Scratched, cracked and broken instruments-materials must not be used
- Brims and edges of plates and glasses mustn't be touched; they must be kept from bottom or edges,
- Food or instrument-material which fall in the course of service must not be used again,
- Vessels where foods are put must not be filled much in order to prevent contact of foods with hand,
- Cooked foods must not be kept in room temperature and uncovered,
- Instruments like cruet, salt-celler used in food service must be washed cleanly and hygienically with specific intervals.

Washing Dishes

- In washing dishes by hand, first rough dirts on surfaces of all equipments-materials should be removed by a brush by use of water with detergent
- Equipments-materials must be awaited in warm water if there are dried or cohesive dirts,
- Dishes must be washed by water with detergent in temperature that hand can stand (45-50 ^{0}C),
- No detergent should be added again in dirty dish water.

In emergency cases, thawing must be in cold water and in a convenient package for the food without contact with water, the thawing process must be realized by changing thawing water every 30 minutes, Attention must be paid to ensure that the temperature of water must not exceed 10 °C.

Meals to be served hot must be kept at most 2 hours under 63 °C and cold meals must be kept at most 4 hours above 8 °C.

- Equipments-materials of which washing process is completed must be rinsed in plenty of running water,
- Rinsed equipments-materials must necessarily be dried, a fabric should be used in drying, and drying treatment should be performed by placing as reversed in dish basket with grills.

The instructions of machine use must be respected in washing dishes in machine.

- Cleaning and maintenance of dish washers must be performed in proper intervals,
- Different detergents used in washing processes must not be mixed,
- Scouring sponges used with the purpose of washing dishes must be disinfected at least once per week by awaiting in boiling water with detergent or in bleacher.

Inspection of Garbage and Wastes

Waste: Waste is materials like food, raw-materials, package and cleaning materials which should be disposed of. Wastes must be controlled carefully as they would result in physical contaminations. Besides, damaged and perished food materials may result in microbiologic contaminations in foods when they are not moved away from the environment.

In the fields related to foods and beverages;

- Garbages must be kept away from zones where foods are prepared,
- Trash barrels which are made of metal or appropriate plastic, having handle, being cylindric shape, which does not make leakage, being water prof and having cover which may ve opened and closed by pedal should be preferred.

6.6. Recommendations Intended to Risk Groups on Food Safety

Pregnant and lactating women:Pregnant women are more sensible to foodborne diseases as immune system is suppresses during pregnancy period. Pregnant women are under higher risk for listeriosis disease caused by the bacteria of *Listeria monocytogenes.* This disease may be communicated to infant, it may cause abortion, preterm birth or stillbirth. Furthermore, recommendations should be given to pregnant and lactating women in the direction that they must be careful in terms of foods which potentially contain mercury (fish, shellfish etc.)

Infants: Infants are affected more easily by foodborne disease because their immune system is not completely developed. Attention must be paid in preparation of infant formulas and sterilization of nipples including sterilization of bottles and other equipments used in preparation of infant foods. Prepared foods must not be heated more than once and each food which is served but not eaten must necessarily been thrown to garbage.

Adult patients: Immune functions of adults in case of several diseases (HIV, AIDS, Cancer, Diabetes of type I and type II, renal and liver diseases, individuals having stomach disorder including ones who have undergone gastric surgery and having low gastric acidity). Accordingly, the sensibility to foodborne diseases increase. Additionally, the ones who have undergone bone marrow or stem cell transplantation suppressing the immune system and individuals who have used steroid drug for long time are also under risk. Food safety must be carefully handled in this group.

Elderly individuals: Elderly people, especially ones who are thin and weak are under higher risk to catch foodborne diseases. Immune system, gastric and intestinal activities may be low, taste and odor loss, undernutrition may be observed. Food safety must be carefully handled also in this group.

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CHAPTER 7

PROTECTING, SUPPORTING AND PROMOTING BREASTFEEDING, COMPLEMENTARY FEEDING

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Protecting, Supporting and Promoting Breastfeeding, Complementary Feeding

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7.1. Supporting and Promoting Breastfeeding

7.1.1. Importance of breastfeeding

Breast milk is an ideal, unique and natural food that cannot be replaced in infant nutrition. It contains all the energy and nutrients required for growth and development of infants. It has high bioavailability and is easy to digest. It provides many benefits both to mothers and infants especially on nutrition, immunity, and developmental, psychological, social and economic aspects.

7.1.2.Benefits of breastfeeding

7.1.2.1. Benefits of breastfeeding for infants

- It supports emotional and cognitive development in infants,
- It prevents infants from infectious diseases such as diarrhea, pneumonia, otitis media, urinary tract infections, etc.,
- Feeding on only breast milk reduces infant mortality caused by diarrhea and pneumonia,
- It speeds up time of recovery from illnesses.
- It reduces the risk of sudden infant death syndrome,
- It protects infants from asthma, eczema and allergic diseases,
- It reduces the risk of high blood pressure in childhood,
- It reduces obesity risks in childhood, adolescence and adulthood,
- It reduces the risks of type-II diabetes, cardiovascular diseases and strokes encountered at later ages.

Breast milk is the guarantee of survival of infants for the first 2 years.

7.1.2.2.Benefits of breastfeeding for mothers

- It helps quick recovery of mothers after birth,
- It reduces the risks of ovarian and breast cancer,
- It extends the periods between pregnancies,
- It helps mothers to reach their body weight before pregnancy
- It helps mothers to maintain a healthy and high quality life.

7.1.2.3.Social benefits of breastfeeding

Breastfeeding is the most reliable (natural, ready, hygienic) and the most environment friendly feeding method. It contributes to the economy at familial and national levels by reducing medical costs, loss of labor, and expenses related to infant feeding.

Optimal nutrition for infants is possible by giving them only breast milk for the first 6 months and then continuing feeding with breast milk together with enough and proper complementary foods until 2 years old.

Breast milk meets all the requirements of energy and nutrients in the first 6 months, half of the requirements in 6-12 months and one third of the requirements in 13-24 months.

"Exclusive breastfeeding" is defined as feeding the infant on only breast milk without giving any food and drink including water

7.1.3. Condition of breastfeeding

The frequency of feeding on exclusive breastfeeding for the first 6 months varies between 33-37 % across the world. In a study performed by the World Health Organization to evaluate breastfeeding practices and policies of member countries of European Region (53 countries), it was reported that breastfeeding frequency in the first hour was %4.6-83.8, frequency of feeding only on breast milk in any period until the sixth month was %2.0-54.8, frequency of feeding only on breast milk for sixth months was %0.7-49.0, frequency of continuing breastfeeding in the first year was 1.3-78.3%. Breastfeeding is common in Turkey. In the report of 2013 Turkey Demographic and Health Survey (TDHS), it was reported that 96.4% of all infants were breastfed for a while and the average breastfeeding duration was 16.7 months. Breastfeeding frequency in the first hour was 50%, frequency of feeding only on breast milk in any period until the sixth month was 30.1%, frequency of feeding only on breast milk for sixth months was 2.4%, and frequency of continuing breastfeeding in the first year was 68.2%.

7.1.4. Characteristics and composition of breast milk

The most important feature of breast milk is that it changes according to the infant's gestational week (preterm or term), birth weight (low birth or normal) and birth month. Nutritional composition of breast milk (in terms of nutrients) is different in accordance with the infant's gastrointestinal tract during the period from birth to the first month.

According to its composition and the period in which it is secreted, breast milk is called colostrum, transitional milk or mature milk.

Colostrum: It is the milk secreted during the first 5 days after the birth. Its fat and lactose content is low. It is rich in protein, particularly the proteins that have anti-infective properties. Colostrum covers the infant's gastrointestinal system by forming mucosal layer with immunoglobulins and protects the newborn against pathogenic microorganisms from the external environment. Due to this characteristic, colostrum is considered as the infant's first immunization.

Transitional milk: Doğumdan sonra 7-14 günde salgılanan süttür.

Mature milk: It is the milk secreted after the fifteenth day. Its composition may change depending on nutrition feature of the lactating women and personal metabolic factors and it varies from mother to mother, day by day, throughout day, and during lactation. For example, while colostrum rich in carbohydrate comes at the beginning of lactation, mature milk rich in fat comes at the end of lactation. Although it varies in infants, about 10-30 minutes of heavy breastfeeding is required for the mature milk to come. Otherwise, it is not possible to reach the mature milk rich in fat.

It is known that breast milk is secreted up to 40-50 mL in the first day and this amount reaches 700-800 mL on the fifth day. The energy and some nutrient contents of colostrum and mature milk are given in Table 7.1.

Table 7.1. Nutrient composition of colostrum and mature breast milk (100 mL)

Energy and nutrients	Colostrum	Mature Milk	Energy and nutrients	Colostrum	Mature Milk
Energy (kcal)	58	70	Vitamin K (mcg)	0.2	0.21
Lactose (g)	5.3	7.3	Thiamine (mcg)	15	16
Protein (g)	2.3	0.9	Riboflavin (mcg)	25	35
Casein (mg)	140	187	Niacin (mcg)	25	200
α-Lactalbumin (mg)	218	161	Folic acid (mcg)	-	5.2
Lactoferrin (mg)	330	167	Vitamin B_6 (mcg)	12	28
IgA (mg)	364	142	Vitamin B_{12} (mcg)	200	26
Fat (g)	2.9	4.2	Vitamin C (mg)	4.4	4.0
Cholesterol (mg)	27	16	Calcium (mg)	23	28
Vitamin A (mcg)	89	47	Sodium (mg)	48	15
Beta-carotene(mcg)	112	23	Potassium (mg)	74	58
Vitamin D (mcg)	-	0.04	Iron (mcg)	45	40
Vitamin E (mcg)	1280	315	Zinc (mcg)	540	166

In the event that the mother and the infant remain separated, the infant may be fed on breast milk previously milked. Milked breast milk can be stored up to 3 hours (WHO: 8 hours) at room temperature, 3 days (WHO: 24-48 hours /1-2 days) in refrigerator, and 3 months (WHO: 3 months) in freezer.

Lactose constitutes the majority of carbohydrate in breast milk. In addition to provide energy as its main task, lactose also increases absorption of minerals such as calcium and magnesium and it plays a role in the development of the brain. Besides, lactose protects the infant against infections by stimulating the growth of Lactobacillus bifidus, a beneficial bacterium found in intestines, together with oligosaccharides which constitute another type of carbohydrates found in breast milk.

Breast milk is poor in casein but rich in small molecule proteins (whey protein) such as lactalbumin and lactoglobulin. Therefore it is easy to digest and has a high bioavailability. The protein found in breast milk is the reference protein used in 100% without any loss in the digestive system of the infant.

β-lactoglobulin, an allergen protein, is not found in breast milk. Breast milk protects the infant against food allergies as it contains secretory immunoglobulin A (IgA). Many elements showing anti-infective characteristics such as lactoferrin, bifidus factor, interferon, etc. are found in breast milk.

Approximately half of the energy in breast milk comes from fats. It is rich in essential fatty acids and, therefore, it plays an important role in the development of brain, central nervous system and vision function.

The bioavailability of iron found in breast milk is high. While iron absorption is 10% in a normal nutrition, the iron absorption from breast milk is approximately 50%. Absorption of zinc, an important mineral for growth and development, is also high in breast milk.

7.1.5.Protecting, promoting and supporting breastfeeding

Breastfeeding of infant is the most important factor stimulating production of milk and providing more milk secretion in mother.

- Breastfeeding should begin within the first half an hour or an hour after the birth,
- Mother and infant should stay in the same room after birth,
- Breastfeeding should be adjusted according to the infant's desire during the first months and any program with a timetable should not be applied,
- Infant should also be breastfed at night,
- Pacifiers and feeding bottles should not be used,
- No food or drink should be given to infants other than breast milk unless a medical need is present.

- When mother and infant remain separate, breast milk should be given by milking.
- Lactation should be performed only with breast milk in the first 6 months and should be continued together with complementary foods for 2 years.

For protecting, promoting and supporting breast milk;

- From the beginning of their pregnancy, all expectant mothers should be convinced, encouraged, motivated and informed on feeding their infants on breast milk,
- Lactating mothers should receive support from their families and friends to eat well after birth, to stay away from stress, and to have a regular life style including regular sleep pattern,
- It should be understood that lactation is a natural, the easiest, and the healthiest nutritional method for infants and appropriate environments should be provided for lactating mothers in social places such as shopping centers, restaurants, work places,
- Lactation consultants and health professionals should support the mothers who have any problems arising from breastfeeding technique or breast feeding,
- It is recommended for all health employees, health professionals, non-governmental organizations, employers, families and friends to make every effort to support lactation.

Iron and vitamin D supplementation in infancy

Iron supplementation: Iron deficiency is a common public health problem encountered in infants. Breast milk has low iron content but high bioavailability. Therefore, development of iron deficiency in healthy infants who were born full term and only fed on breast milk is not expected. Iron deficiency is common in infancy period (0-1 age) due to reasons such as iron deficiency in mother, birth of infant with deficient iron storage, inability to feed the infant only on breast milk during the first 6 months, delayed consumption of complementary foods, inappropriate complementary foods in terms of variety and amount, rapid growth of infant, frequent infections.

In Turkey, 10 mg/day of elemental iron supplement have been provided to 4-12 months old infants free, by Turkish Ministry of Health since 2004 within the scope of “Protecting, Promoting, and Supporting Breastfeeding and Program for Prevention and Control of Iron-Deficiency Anemia: Turkey Strong Like Iron”.

Vitamin D supplemenation: Together with calcium, vitamin D is one of the two most important nutrients involved in the development of bone. The main source for formation of vitamin D in body is sunlight. Vitamin D is found in foods in really small amounts. Vitamin D content of breast milk is also low. Therefore, vitamin D supplementation programs starting from infancy period are implemented all over the world. In Turkey, 400 IU/day (10 mcg/day, 3 drops) of vitamin D supplementation have been provided free by the Turkish Ministry of Health since 2005 for 0-12 months old infants within the scope of “Prevention of Vitamin D Deficiency and Supporting of Bone Health Program”.

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7.2. Complementary Feeding

7.2.1.Introduction

The first year after the birth is defined as the period of “infancy” or “babyhood”. The growth in this period is the fastest compared to other stages of life. A newborn infant doubles its birth weight in the 6th month and triples its birth weight at the age of one year. Therefore, the requirements of daily energy and nutrients in this period are also high compared to other periods of life. Nutrition during this period is important not only for ideal growth and development but also for gaining lifelong proper nutrition habits and protection of health in adulthood period.

7.2.2. Complementary feeding and its importance

The infants should only be fed by breast milk during the first 6 months of life. After the sixth month, breast milk becomes unable to meet the requirement of iron, zinc, vitamin A and energy of the infant alone. Therefore, some foods should be given in addition to breast milk. These foods given in addition to breast milk are called “complementary foods”, the period when these foods are given is called “complementary feeding period”.

Breast milk is the essential food in the period of complementary feeding. Additional foods given to infant complement and support breast milk. However, they can never replace breast milk. Implementation of an effective complemen tary feeding is only possible with supporting sustainability of breast feeding.

Complementary foods should be given timely, in proper variety, and in high quality and they should be nutritious, clean, safe and adequate.

Complementary food consumption should be initiated ideally on the 6th month in each healthy child with normal development. The infant’s digestive and excretory systems should be developed and neurological development should be completed to start complementary foods.

While the infants get used to foods in different flavors, tastes and consistencies during complementary feeding process, their skills associated with eating functions also develops. While infants are fed on breast milk, a food in liquid form, they also get used to the consistency of mashed food prepared specially for them and they become accustomed to family dishes by the end of complementary feeding.

Reference values of energy and nutrients for children in the 0-2 age group are demonstrated in Table 7.2-7.5.

Table 7.2. Average energy requirement (AR) in 6-24 months old children

Age	Energy (kcal)
Boys	
7 months	636
8 months	661
9 months	688
10 months	725
11 months	742
1 year	777[1]
Girls	
7 months	573
8 months	599
9 months	625
10 months	656
11 months	673
1 year	712[1]

1 Physical activity level (PAL) has been determined with the value of 1.4.

Table 7.3. Recommended adequate intake (RDA/AI) of vitamins and tolerable upper intake levels in 7-24 months old children

Age		Vitamin A_1 (mcg)	Vitamin B_6 (mg)	Vitamin B_{12} (mcg)	Vitamin C (mg)	Vitamin D (mcg)	Vitamin E_2 (mg)	Vitamin K (mcg)	Folate[3] (mcg)	Niacin[4] (mg /1000 kcal)	Thiamin (mg)	Riboflavin (mg)
7-11 months	RDA/AI*	250	0.3	1.5	20	10	5	2.5	80	6.6	0.3	0.4
	UL**	-	-	-	-	25	-	-	-	-	-	-
1 year	RDA/AI*	250	0.5	1.5	20	15	6	30	120	6.6	0.5	0.5
	UL**	800	5	-	400	50	100	-	200	2-150[5]	-	-

**RDA/AI: Recommended daily intake/Adequate intake*

***UL (Upper limit): Tolerable upper level intake amount*

[1] Retinol equivalent

[2] α- tocopherol value

[3] Dietary folate equivalent

[4] Niacin equivalent (NE); 1 mg niacin = 1 NE = 60 mg dietary tryptophan

[5] First value nicotinic acid (mg/day), second value is nicotinamide (mg/day)

Table 7.4. Recommended adequate intake (RDA/AI) of minerals and tolerable upper intake levels in 7-24 months old children

Age		Calcium (mg)	Iron (mg)	Copper (mg)	Magnesium[1] (mg)	Phosphorus (mg)	Sodium (g)	Potassium (g)	Selenium (mcg)	Zinc (mg)	Iodine[2] (mcg)	Fluoride[3] (mg)
7-11 months	RDA/AI*	280	11	0.4	80	160	0.37	0.7	15	2.9	70	-
	UL**	-	40	-	-	-	-	-	-	-	-	-
1 year	RDA/AI*	450	7	0.7	170	250	1	3	15	4.3	90	0.5
	UL**	-	40	1	65	3000	1.5	-	60	7	200	1.5

**RDA/AI Recommended daily intake/Adequate intake*

***UL (Upper limit): Tolerable upper level intake amount*

[1] Tolerable upper level intake for magnesium covers only intakes from pharmacologic agents. It does not cover intakes from foods and water.

[2] Tolerable upper limit values do not cover individuals with iodine deficiency as they are more sensitive to iodine intake.

[3] Adequate intake amount of Fluoride was determined by basing on the reference value of 0.05 mg/kg and by using WHO MGRS 2006 – 2007 Growth Standards 50th percentile body weight (kg) for children.

Table 7.5. Estimated average requirement (EAR) amounts of some of the micro nutrients in 7-24 months old children

Age	Vitamin A (mcg)	Vitamin B_6 (mg)	Vitamin C (mg)	Vitamin D (mcg)	Folatee[2] (mcg)	Thiamin (mg)	Riboflavin (mg)	Calcium (mg)	Demir (mg)	Zinc (mg)	Iuoride[3] (mg)
7-11 months	190	0.4	-	-	-	0.4	0.4	-	8	2.43	-
1 year	205	0.4	15	10	90	0.4	0.4	390	5	3.63	0.5

** RDA/AI Recommended daily intake/Adequate intake*

*** UL (Upper limit): Tolerable upper level intake amount*

[1] Tolerable upper level intake for magnesium covers only intakes from pharmacologic agents. It does not cover intakes from foods and water.

[2] Tolerable upper limit values do not cover individuals with iodine deficiency as they are more sensitive to iodine intake.

[3] Adequate intake amount of Fluoride was determined by basing on the reference value of 0.05 mg/kg and by using WHO MGRS 2006 – 2007 Growth Standards 50th percentile body weight (kg) for children.

Table 7.6. Frequency, amount and consistency of complementary food given to 6-23 months children

Age (month)	Energy of the complementary food (kcal/day)	Consistency of the complementary food	Number of meals (times)	Amount of meal (g)
6-8	200	Soup, thick and well mashed puree	2-3	150-200
9-11	300	Semi-solid, rough, thinly chopped, finger sized foods	3-4	210-280
12-23	500	Homemade meals	3-4	300-350

7.2.3.Recommendations

- Infants should be breastfed day and night whenever they desire for the first 6 months without any limitation.
- Infants should be breastfed for minimum 8 times in total per day.
- Breastfeeding should be continued up to 2 years.
- At the six month and later when the infants are introduced to complementary foods, they should be breastfed frequently whenever they desire.

As complementary foods for the infants after six months;

- Foods which are rich in energy and nutrient, clean and safe, found at home, found locally, easy to be purchased and prepared should be given to infants.
- Complementary foods should be started with a teaspoon (for Turkey dessert spoon) in the 6th month, the amount should be increased gradually, and they should be diversified as long as the infant tolerates.
- Infants should be continued to be breastfed whenever they desire in the first 6-12 months, complementary foods should be given 3 times a day if infants are receiving breast milk, and complementary foods should be given 6 times a day if infants are not receiving breast milk.
- Infants should be continued to be breastfed whenever they desire during the period between 12 months-2 years, homemade meals should be given 5 times a day. The amount of meal or food is a glass of water or a normal size bowl.
- It should be ensured infants eat their food actively in each meal.
- While giving complementary foods to infants, the method feeding by spoon or cup should be used and feeding bottles should never be used.
- The complementary foods prepared should be kept in refrigerator; otherwise they should be consumed within 2 hours.
- When infants get sick, they should be breastfed more both during and after the disease; fluid intake and the number of meals should be increased. Feeding of infants should be supported as much as possible until they gain the weight they lost after the disease and until sufficient growth is ensured.
- The best indicator of adequate and balanced nutrition is increase in body weight and body height. Weight gain of infants should be monitored with growth curves.
- Frequency, amount, and consistency of complementary food given to children according to their age are given in Table 7.6.

Disadvantages of starting complementary foods early (before 6th month)

- Production and protective effect of breast milk against disease decrease.
- It provides no positive effect in terms of growth and development of infants.
- Tongue thrust reflex is strong in the first months; chewing skills develop in the 5th-6th months.
- Head control is not fully developed; infants are reluctant.

- Renal functions of infants are not developed enough.
- Enzymes in the digestive system of infants are not sufficiently developed.
- It leads to increase in allergic diseases.
- Solid foods may cause choking and lead to increases in diseases such as pneumonia, diarrhea, etc.

Disadvantages of starting complementary foods late (after 6th month)

- Increasing requirements of infants cannot be met.
- Growth and development of infants slow down.
- Inadequate intake of nutrients may increase the risks of incidence of diseases such as malnutrition, anemia.
- A large number of foods with animal origin such as milk, yoghurt, cheese, eggs, meat, chicken, fish, and with plant origin such as cereals, roots, vegetables, fruits, and legumes should be included in the complementary feeding. Complementary foods should be freshly prepared in home conditions.

Cows milk: It is an important source of food for growing children. However, it is rich in protein-casein and sodium content but poor in iron content and bioavailability. Therefore, it may be included in complementary foods in small amounts. It should not be used as the main source of food or drink.

Yoghurt: It can be given to infants as the first food to complement breast milk starting from the 6th month. Giving yoghurt as the first complementary food to infants is of vital importance for regulation of intestinal flora.

Fruit juices-fruit purees: Fruits should be given to infants as fruit juices as of the 6th month and then as fruit purees by the end of the 6th month. Freshly squeezed juices are good sources of vitamin C. The first fruit juice or fruit puree to be started to be given to infants should be from apple or peach. Citrus should be given after 8-9 months since they may cause gas complaints or allergen effects on infants.

Vegetable juices-purees: Just like fruits, vegetables containing large amounts of vitamins, minerals, antioxidants and fiber should be given to infants before the 6th month in the form of vegetable juice and in the form of vegetable soup and puree thereafter. Vegetable juice, puree and soup should be prepared freshly and given to infants without delay.

Eggs: Eggs is a cheap food with high nutritional value due to its content of high quality protein and iron. Therefore, it is an important nutrient for nutrition of infants. As of the sixth month, egg yolk should be started to be given in small amounts (1/4) every day for a week. Then this amount should be gradually increased to a whole egg yolk in the fourth week. Rich content of egg yolk especially in iron is important for supporting iron storage of infants that starts emptying around the 6th month. Egg white may demonstrate allergen effects in some sensitive infants. Therefore, it is safer to start its consumption in the 9th-12th months.

Meats: The fibrous structure of meat makes it difficult to be consumed by infants. Therefore, meat can be used after 6th month in the form of minced meat or as divided into small pieces in other complementary foods (soups, vegetable purees, vb.). Poultry meat can be used instead of red meat when their leg parts richer in iron are preferred. Fish should be given once a week after the 6th month as a complementary food in other complementary foods such as soup, vegetable puree, etc. after boiled or cooked thoroughly in the oven and de-boned thoroughly.

Legumes: After 7th-8th month, legumes are started to be given to infants as lentil soups; and the legumes that can be given in the 9th-12th months such chickpeas, beans are added in the form of vegetable puree after boiled and outher skin separated when first started and, later, they may be given in their natural state.

Grain soups-cereals: Tarhana (dried yoghurt and flour) soup, yoghurt soup and rice-wheat added vegetable soups are given to infants as of the 6th month. After infants get used to such soups, the soups enriched with different mixtures with lentil and minced meat can be given to infants in the 7th-8th months in more consistent forms. After infants get used to homemade meals and grained foods, cereals are given to infants as rice and macaroni in small amounts.

Cheese: Provided that it is made of pasteurized milk and is salt-free, cheese is given to infants in small amounts in the 6th month.

Sugar: Sugar is not recommended for infant nutrition as it is a source of energy and it is not desirable for infants to learn the sweat taste.

Molasses (Grape juice molasses, pekmez): Grape molasses rich in iron and calcium (20 g of grape molasses contains 2 mg of iron and 80 mg of calcium) can be used as sweeteners in infant nutrition.

Honey: It carries the risk of botulism as it may contain *Clostridium botulinum* spores. Since the stomach acid level of infants is low, *Clostridium botulinum* spores cannot be killed. Therefore, honey is not recommended for infants younger than one year old.

Water: Water requirements of infants receiving breast milk for the first 6 months are only met with the breast milk which is composed of 87% of water. Infant need additional liquid when additional foods are started to be given. Therefore, clean water can be given up to 1-2 glasses of water to infants during the period between 6th-12th months

Points to be Considered In Complementary Feeding

- While continuing breastfeeding, complementary feeding should be started in small amounts in the sixth month and the amount of foods should be increased as the infant grows. Infants who are breastfed and maintain normal development should not be started on complementary foods before the 6th month.
- The number and amounts of meals in complementary feeding should be adjusted in accordance with the age of the infant and the amount of benefit provided from breast milk. Food should be prepared in accordance with the age and digestive system characteristics of the infant.
- More than one complementary food should not be started at the same time; new food should be tried a few days later. If the infant does not like the taste of the newly tested food or if the food caused diarrhea or vomiting; it should be tried again after a short break.
- New food should be given when the infant is hungry.
- Foods which are likely to be allergens such as eggs, fish, tomato, strawberry, should be given according to the family history for the children who have a family with history of allergy.
- •Daily meal numbers to be taken as complementary foods as required by infants fed on breast milk should be 2-3 times between the 6th-8th months, 3-4 times between the 9th-11th months and 3-4 times between the 12th-24th months.

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CHAPTER 8

THE IMPORTANCE OF NUTRITION DURING THE LIFE COURSE AND ENERGY BALANCE

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The Importance of Nutrition During the Life Course and Energy Balance

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8.1. Nutrition During Pregnancy and Lactation

8.1.1. Introduction

Pregnancy is that fetal growth is added onto the normal metabolism scheme and lactation is an important physiological state for the infant's healthy growth and development. Sufficient energy and nutrient intake during pregnancy and lactation are important for the growth and development of newborn, and prevent the chronic diseases of the infant that may occur in adulthood period. Premature birth or restricted intrauterine fetal growth, late delivery, risk of preeclampsia and gestational diabetes can be reduced with adequate and balanced nutrition.

Energy and nutrient requirements during lactation are more than pregnancy. Milk that mother secretes in lactation is a product of the foods that mother consumes. The amount of energy and nutrients required for the production of milk should be considered additional to mother's her own requirement. Energy and nutrients of milk that mother secretes have been provided from mother's eating and stores during the pregnancy period.

8.1.2. General recommendations

Woman's daily energy and nutrient requirements during pregnancy and lactation

depends on many factors such as age, prepregnancy body weight, sufficiency level of nutrient stores and physical activity. level Accordingly, some vitamin and mineral requirements have increased during this period. Nutrient requirements of pregnant and lactating women are given in Appendix 1.1.4, Appendix 1.2.2, Appendix 1.4.1 and Appendix 1.5.1-1.5.2.

Folic acid: Since intake of sufficient folic acid before pregnancy is protective against fetal neural tube defects, low birth weight and placental abruption early separation of placenta), it is recommended to be given 400 mcg/day folic acid supplementation addition to diet starting before the pregnancy period, to the women who are planning pregnancy and to be continued such supplementation during the first 3 months of pregnancy. Therefore, planned pregnancies are important. In addition, adequate vegetable and fruit consumption should also be ensured.

Vitamin D: Although vitamin D requirement is met by sunlight exposure, vitamin D supplementation program is started for all pregnant by the Ministry of Health of Republic of Turkey due to requirement for vitamin D increases in pregnancy period. It is recommended to be started 1200 IU (30 mcg)/day (9 drops) single dose vitamin D since the 12th week of pregnancy, and to be continued during pregnancy and to be used during lactation minimum 6 months after the birth.

Calcium: Osteomalacia (bone softening) and tooth decays can be seen in the women

in the event of frequent births, not benefiting from the sun light, lack of physical activity and prolonged duration of breastfeeding and failure to replace the lost calcium. Total consumption amount of milk and its alternatives group is under the recommended levels for pregnant-lactating women in Turkey. Therefore, the increased consumption of milk and its alternatives are necessary. The infant's skeletal structure develops, mother's bone mass is maintained and it protects mother from osteoporosis in later life with adequate intake.

Iodine: Iodine requirements of pregnant and lactating women are high. *"Elimination of Iodine Deficiency Disorders and Salt Iodization Program"* has been carried out since 1995 in Turkey. Iodization of table salt has been made mandatory by legal regulations on salt iodization in 1998 within the scope of program. Iodine is not added to the food industry salt. Iodine requirements of women especially planning to become pregnant and pregnant and lactating women for various reasons have to restrict the intake of salt, (200- 250 mcg/daily) should be mett.

Restriction of sodium intake that is valid for the population is also valid for pregnant and lactating women. (See section 5, foods and nutrients that should be reduced).

Fish consumption: Fish consumption during pregnancy is important. Fish is rich in omega 3 fatty acids that is necessary for the brain development of the infant.Some types of fish may contain mercury and should be consumed with care. Per week 180-360 g fatty fish (such as salmon, trout, catfish) consumption is recommended. Canned tuna consumption should be less than 180 gram per week.

Nuts and seeds consumption: Pregnant and lactating women sometimes restrict their nuts and seeds consumption considering that their infants may have allergy. Consumption of some foods (such as nuts, seeds) that they may cause allergy in their infants. If mother and infant have no allergy limitation of these foods is not necessary. Lactating women should avoid to consume too spicy foods, onions, garlic or flatulent foods.

Fluid intake: Fluid requirements of pregnant and lactating women has been increasing with the reasons such as increasing extracellular fluid volume, requirement of fetus, amniotic fluid and secretion of mother's milk. Therefore, it is important to ensure daily sufficient fluid intake. As the fluid source, water, milk, diluted yoghurt (ayran), freshly squeezed fruit juices should be preferred. It is recommended to drink 750-1000 mL (3-4 glasses) extra fluid. Daily caffeine intake should be maximum 200 mg/daily (approximately 2 cups of instant coffee or 4-5 tea glasses of tea. 1 tea glass is approximately 80 mL).

Food poisoning: Pregnant and lactating women are at greater risk of food poisoning. Women should be informed about the risk of Listeria that may occur originating from freezing and thawing processes by cooking of raw or undercooked meat and meat products. Due to salmonella, the pregnant and lactating women should not consume the foods containing raw eggs (Chapter 6: Food Safety and Principles).

Smoking and alcohol consumption: Smoking and alcohol should not be used during pregnancy

Obesity: Obesity in pregnancy leads to adverse outcomes of pregnancy. It has been seen one of the potential modifiable risk factors for mothers and infants in the long term. When it is considered to be approximately 25 kg/m2 of the average of body mass index (BMI) in pre-pregnancy in Turkey, it is important to refrain from excessive body weight gain during pregnancy. Gaining proper body weight during pregnancy is important for the infant's health according to pre-pregnancy body mass index (Table 8.1).

Table 8.1. Gaining proper body weight during pregnancy in according to pre-pregnancy Body Mass Index (kg)

Pre-pregnancy BMI	Gaining of body weight (kg)
Underweight (BMI=<18.5 kg/m²)	12.5-18
Normal weight (BMI= 18.5-24.9 kg/m²)	11.5-16
Overweight (BMI= 25.0-29.9 kg/m²)	7-11.5
Obese (BMI= ≥30 kg/m²)	5-9
Multiple pregnancies	
Twin pregnancy	15.9-20.4
Triplet pregnancy	22.7
Other	
Short women (<157 cm)	Recommended lower limit according to a normal woman (11.5 kg)

Gaining body weight under the recommended level during pregnancy increases the risk of low birth weight infant.

Excessive body weight gain during pregnancy may lead to macrosomia in the short term in infants (birth weight: >4500 gr infant) and obesity in adulthood period and related diseases. For mothers, it is related with gestational diabetes in short term, metabolic syndrome and the risk of obesity in long term. Slimming diets are never recommended during pregnancy. The gaining extra body weight of pregnant women should be prevented.

The risk of overweight and obesity have been increasing in the period of adolescence and adulthood in the infants of mothers who smoke during pregnancy.

Daily extra energy requirements of pregnant and lactating mothers should be met from foods to be chosen from healthy food groups (milk and alternatives group, meat and meat products, eggs-legumes group, bread and cereals, vegetable and fruit groups) instead of high energy junk foods.

Anemia: Anemia that is resulting from iron deficiency in the early period of is related with premature (<37th week), low birth weight (<2500 g), infant mortality, inadequate maternal body weight gain, tachycardia, fatigue, dizziness, maternal mortality. It is recommended by the Ministry of Health of Republic of Turkey for all pregnant to be started to 40-60 mg/day elemental iron supplementation since the 16th pregnancy week and to be given 9 months period including 3 months after the birth. Foods containing heme iron (red meat) that are both absorbed easily by the body and containing iron should be preferred during pregnancy. Both non-heme iron sources (poultry, eggs, dried fruits, legumes, grape molasses (pekmez), whole grain and fortified cereals) and foods rich in vitamin C (fresh fruits and vegetables) should be consumed together in order to increase iron absorption. The consumption of tea and coffee should also be avoided together with meals so that it reduces iron absorption. Due to iron intake is under the recommended limit both in pregnant and in lactating women, healthy nutrition recommendations should be considered.

Constipation: Constipation is common in pregnant women depending on reduction of small intestine motility and increasing the fluid absorption in the large intestine and reduction of physical activity. Constipation should be prevented by high fiber and adequate fluid intake.

Nausea-Vomiting: Nausea and vomiting begin in the 4-6th weeks, and reaches the highest level in the 8-12th week and then decreases. Nausea is more when stomach is empty. Generally frequent feeding, reduction of fluid intake together with meals, intake of fluid between meals are recommended.

Edema: Edema which could occur is the last trimester of the pregnancy is a natural phenomenon. The amount and extent of edema is significant. The untreated preeclampsia endanger both the life of mother and the infant and this may be more dangerous towards the end of pregnancy. Daily salt intake should be restricted in order to prevent the danger.

Gestational Diabetes: Gestational diabetes is glucose intolerance in the varying degrees arisen during pregnancy for the first time. Gestational diabetes are common in individuals with diabetes in the family, in obese individuals before pregnancy, in those who gain more weight during the pregnancy, pregnant women who are over 35 years, gestational diabetes individuals with their previous pregnancy, those who gave macrosomia infant before. Both for the maintenance of the health of the mother and the infant early intervention test could be conducted between 24-28th weeks of the pregnancy.

Gestational diabetes is usually recovered after the birth. Blood sugar levels of women with gestational diabetes should be monitored, nutrition program toward blood glucose level should be implemented, gaining of excess weight should be avoided (Table 8.1), carbohydrate should not be restricted in the diet, slimming diet should not be applied.

Pregnancy Poisoning (Toxemia): Due to many reasons including inadequate and unbalanced nutrition, blood pressure in the last period of pregnancy may increase, as a result of protein loss with urinary, severe edema may be seen in the hands and feet. It occurs frequently in pregnant with chronic diseases (kidney, heart, diabetes), in old age pregnant women (over 35 years old) and those who gave birth in very frequent intervals. Restricted intake of dietary sodium and protein and increased intake of vitamin B group are recommended.

Heartburn: Digestive system problems occur during pregnancy. Reflux and heartburn are common in pregnancy. They return to normal in 1-7th week after the birth. The meal breaks should be consumed, foods such as milk and yoghurt should be preferred, and should not be slept after dinner. Very spicy and fatty foods, carbonated beverages , lemon and fruit juices may increase the complaints, they should not be consumed.

Food Craving, Disgusting: Food craving emerging with the hormonal changes during pregnancy is defined as a state severe desire or extreme reluctance (disgusting) against some foods. The state of food craving is also harmless unless there is reluctance in food intake and inadequate consumption of certain food groups.

Consumption of Breast Milk Boosters During Lactation: The first week of lactation is important for the initiation of adequate milk production. Increasing the amount of breast milk is related to discharging the milk in the breast. Starting to the breastfeeding late, not breastfeeding frequently, not breastfeeding at night, the short duration of breastfeeding, bad placing the infant to the breast, bottle-feeding and giving false pacifier, starting early the complementary foods cause reduction in milk production. The use of some herbal teas are common to boost the amount of the breast milk. Herbal teas to booster the breast milk should not be considered a miracle treatment. The women should be informed on the usage of herbal teas, as the effectiveness, safety, side effects and duration of use, interactions with diseases and drugs. Their long term effects for mother and infant are not known. Before using these teas, the breastmilk and breastfeeding should be fully evaluated, mother should be fully supported for lactation, emptying breast should be completely provided, the infant should be breastfed more and sucking the breast effectively, togetherness of mother and infant and grasping the breast by the infant should be ensured.

Food groups for pregnancy and lactation period and recommendations on energy and nutrient intakes are given in Appendix 1.1.4, Appendix 1.2.2, Appendix 1.4.1 and Appendix 1.5.1-1.5.2.

8.2. Nutrition in Preschool Period

8.2.1. Introduction

Being healthy adult individuals of our children depends on starting from the mother's womb to the growing in a healthy environment. Early childhood covering one to five years old children is divided into two period as 1 to 3 years old game age and 3 to 6 years old preschool period.

This period is the most important period that the basic nutritional habits are gained and the the nutrition of the child depends on foods offered.

One to six years old children require the foods that are less in terms of volume, that the content of nutrients are high, for the growth and development of bone, teeth, muscle, brain and nervous system, circulatory and other organs. As the growth rate is low in this period, child's appetite decreases generally. Chewing movements in children start in the first year, chewing of hard and fiber containg foods develops thoroughly into the school age. In three to four years old, they began pushing the foods on the spoon by his/her fingers, eating food with a fork and drinking water with a glass. Children can eat their own meals since three years old. Foods that have the appropriate texture and easy eating should be preferred considering oral motor development and manual dexterity of this age group of children. Children could drink from a glass in 12 months and could eat by themselves in 12-18 months.

8.2.3. Growth Monitoring and Promotion

Every child shows peculiar growth and development velocity depending on his/her genetic structure. Growth standards or reference values (curves) are used in growth monitoring. Growth values is a reliable method understanding whether the child's diet meets the needs of the child. The growth should be monitored by taking the measurement of the body weight and length/height every month for the first year of the child's life, every two months in the second year, and every three months between three to five years old. In Turkey, measurements are done every month during first 2 months, then once every two months, every three months during 12-18 months, then every six months and once a year after 3 years of age. Also a child should be monitored each time the child has recruited to a health center.

Monitoring the growth should be also made by parents next to health personnel. Ensuring the support and participation of the family has an important role for the promotion of growth. Body height/length for age, body weight for age, body weight for body height/length and body mass index for age should be evaluated in the monitoring of the growth.

BMI is used as a screening tool at two years and over children in determining nutrition and general health status. BMI values according to age and gender are given in Table 8.2 and Table 8.3. The standard growth values of body weight for age, height/length for age, body weight for height /length are also included in Appendix 6. It is recommended to use them in evaluation of growth.

Calculation and Evaluation of Body Mass Index (BMI)

Child's body height (in meters) and body weight (in kilograms) are measured.

Child's age is calculated.

BMI = It is calculated by the Body Weight (kg) / [Body Height (m)^2] equation.

For example: For a girl at 4 years old, 1,03 meters tall and at the weight of 15 kg:

Table 8.2. BMI for age percentile values for boys (kg/m^2) (WHO MGRS, 2006)

Age (year)	Age (month)	Under-weight (<3rd p.)	Risk of underweight (3-15th p.)	Normal (15-85.p)	Overweight (85-97.p)	Obese (>97.p)
2	24	<13.9	13.9-14.7	14.8-17.4	17.5-18.7	>18.7
2.5	30	<13.7	13.7-14.5	14.6-17.2	17.3-18.4	>18.4
3	36	<13.5	13.5 -14.3	14.4-17.0	17.1-18.2	>18.2
3.5	42	<13.3	13.3-14.1	14.2-16.8	16.9-18.0	>18.0
4	48	<13.2	13.2-14.0	14.1-16.7	16.8-18.0	>18.0
4.5	54	<13.1	13.1-13.9	14.0-16.7	16.8-18.0	>18.0
5	60	<13.0	13.0-13.8	13.9-16.7	16.8-18.1	>18.1
5.5	66	<13.1	13.1-13.9	14.0-16.6	16.7-18.1	>18.1
6	72	<13.2	13.2-13.9	14.0-16.7	16.8-18.3	>18.3

Tablo 8.3. BMI for age percentile values for girls (kg/m²) (WHO MGRS, 2006)

Age (year)	Age (year)	Under-weight (<3rd p.)	Risk of underweight (3-15th p.)	Normal (15-85.p)	Overweight (85-97.p)	Obese (>97.p)
2	24	<13.5	13.5-14.3	14.4-17.1	17.2-18.5	>18.5
2.5	30	<13.3	13.3-14.2	14.3-16.9	17.0-18.3	>18.3
3	36	<13.2	13.2-14.0	14.1-16.8	16.9-18.2	>18.2
3.5	42	<13.1	13.1-13.9	14.0-16.7	16.8-18.2	>18.2
4	48	<12.9	12.9-13.8	13.9-16.7	16.8-18.3	>18.3
4.5	54	<12.9	12.9-13.8	13.9-16.8	16.9-18.4	>18.4
5	60	<12.8	12.8-13.7	13.8-16.9	17.0-18.6	>18.6
5.5	66	<12.8	12.8-13.7	13.8-17.0	17.0-18.7	>18.7
6	72	<12.8	12.8-13.7	13.8-17.0	17.1-18.9	>18.9

BMI = is found as 15/1.03×1.03 = 14.2 kg/m².

Since the values found in Table 8.3 for the girl 4 years old are between BMI: 13.9-16.7 kg/m² child's status takes place in "Normal" range.

Frequency and Amount of Feeding: : Many preschool children's daily diet in the game age is irregular. This irregularity is in the form of eating less a meal and closing this later meal. Due to small child's stomach capacity is small, they require to eat five or six meals per day. Being regular of meals and not skipping meals should be eating habit acquired in childhood.

Foods should be consumed in three main meals a day for regular operation of the metabolism. The foods are eaten by children in the morning, in the lunch and main meals should be monitored and foods should be ensured to consume by children such as fruit, milk, diluted yoghurt or cheese and bread in the mid-morning, afternoon and while sleeping by looking at the amount of food consumed in the meals.

Considering children are selective in their meals, it has been recommended that 2 main meals (breakfast, lunch meal) in kindergartens and day care centers and minimum 1 refreshment (preferably afternoon meal) addition should be made.

Small children are not ready to eat at the adult's portion size. Adult's portions exceed the capacity of children. Portions of preschool children should be between ¼ and ⅓ portions. The size of portion can be defined as 1 table spoon for all ages.

8.2.4. Nutritional problems

There is very little data about the nutritional problems related to food and nutrients intake in the long term period for preschool children. During these periods that growth and development occur quickly, lack of energy and nutrient intake or over intake state may be result in programming of health problems such as obesity, diabetes and hypertension during childhood or later life of the children. Furthermore, micronutrient deficiencies encountered early periods of life may lead to irreversible damage in mental and motor system. The most common nutritional problems in this age group are obesity, underweight and stunting and loss of appetite and dental caries. If the child needs a special diet, the child's family, care taker and school administrators should be informed about it.

Obesity: Obesity is a health problem and its basis depends on the unhealthy diet. It is known that approximately 1/3rd of individuals who are obese in adulthood were obese in childhood. The increased incidence of obesity leads to be seen more frequently and early ages of complications related to obesity and also affects adversely the child's social life. TNHS 2010 data showed that 16% of children between 2 to 5 years ol were overweight, 10% of children between 2 to 5 years old were obese.

As nutrition for preschool children depend on entirely others, overeating, in other words obesity, which is seen in this group is the fault of parents and caregivers. Sugar, biscuits, chocolate, potato chips, cola drinks, sweets are the foods giving high energy and offering these foods which are consumed lovingly by children to the child is a wrong behavior.

The first step on the weight control of all children who are two years old and over is to protect the current body weight. Children are able to achieve this target with regulation of their nutrition and with slight changes in their physical activities. Continuation of body weight for many children is sufficient target. If there is no complications of obesity for children who are at the age of seven years and under, maintaining the protection of the current weight is a suitable target.

Absence of appetite: Inappetency is a condition seen with the child's reluctance to take food or food selection behavior and is the problem that families complain most in a way "one does not eat anything". In such a case, it should be examined firstly for the presence of the physical disturbance in children.

The children in this age group may result in food rejection and loss of appetite in such cases reactions to family any reasons, preventing the child's own food choices, excessive insistence and discipline of the mother, families not satisfying with the food consumed in the child's daily diet, comparing the child with others, feeding forcedly in the event of illness, food consumption of which energy content is high between meals.

Dental health: Children should be fed by spoon, cup or glass after 6 month. Tooth decay at the first teeth may affect the development of permanent teeth. Tooth decay is related with the amount and frequency of food intake containing sugar. These foods are table sugar, candy, honey, cakes, chocolate, biscuits, wafer, sugary and fruit beverages and beverages. Many snack foods contain sugar and may lead to tooth decay. Therefore, foods should be carefully selected.

Children should be encouraged to use their teeth to chew and foods should be given to encourage children chewing apple, carrot, and fried bread. Children should be ensured to brush their teeth under the supervision of their family on a regular basis every day in order to reduce these negative effects.

8.2.5. General recommendations

- Mothers should be fed adequately and balanced starting from pregnancy and should be passed to appropriate complementary foods as well as feeding the infant with breast milk for the first 6 months in the infancy. Breast milk should be given until two years old. When the infant feels full, infant stops eating and in such case family should not insist on the infant to eat more, when the infant feels full, eating should be ended.
- The desired behavior to be done toward the infant's nutrition should be performed by the family or performed together with the infant to be an example.
- Regular family meals and appropriate table manners should be placed, situations to distract the child should be reduced (TV, tablet, computer).
- By encouraging the consumption of nutritious refreshments stays the child from snacks and prevents gaining excess weight. Foods such bagel (simit) cheese, ayran (diluted yoghurt), sandwiches with little cheese, fruit, vegetable or freshly squeezed juices should be preferred instead of chips, chocolate, readymade cakes, biscuits in meals.
- Foods such as sweets, chocolates, chips given to the children before the meals or waiting the hungry children for meal time affect adversely a child's appetite. If child's meal has not been ready yet, a sum of food requiring to be taken may be given the children helping not escaping child's appetite.
- The amount of food of child with poor appetite is determined with the age and it should be aimed to consume food as much as child's age.

- Children should be prevented to consume large amounts of only one food continuously, and large amounts of consuming one food should be limited. Milk consumption musn't exceed 500 mL per day in child who consume much milk.
- Children should not be awarded with sweets, chocolate and wafer..
- No food should be banned for children. However, their consuming too much fatty and sugary foods should be limited.
- Many food advertising target children. Children are affected from commercial advertising and package that they see, more than adults.
- Children should get adopted a physical activity habit at an early age. Children in this age group should be in active as physically every day during minimum 3 hours spreading throughout the day.
- Children should be ensured to get enough vitamin D for healthy bone and tooth development by spending time and playing in the open air.
- Putting less food on the plate of child, sometimes appreciating the child at the end of each meal by putting food gradually may helpful to stiffen the child's eating behavior.
- Physical activity and spending time in the open air in low appetite child may helpful to increase in child's appetite.
- The nature of food service and content of the offered menu in nursing homes and in schools providing full day services to meet a large part of children's daily nutritional needs are of great importance. Nutrition services that will be available for children are crucial in terms of both promoting adequate and balanced diet and getting the correct eating habits adopted starting from early ages.
- Considering children are selective about meals, addition of 2 main meals (breakfast, lunch meal) in kindergartens and day care centers and minimum 1 snack (preferably afternoon meal) are required.

The food groups and consumption recommendations of energy and food for the preschool period have been given in Chapter 10 Appendix 1.1.1-1.1.2 Appendix 1.2.1, Appendix 1.3.1, Appendix 1.4.1 and Appendix 1.5.1-1.5.4.

8.3. Nutrition for School-Age and Adolescence

8.3.1. Introduction

School-age can be defined as the transitional period that a child gets involved in the population life consciously for the first time. Adolescence, on the other hand, can be defined as the transitional period from childhood to adulthood. School age encompasses 6-12 age group while adolescence encompasses 12-18 age group. Getting this group adopt a healthy nutrition and a healthy life style and raising their awareness about this subject is extremely important to prevent adulthood illnesses.

In this period, children's psysiological, psychological and social developments grow fast and their behaviors which are going to last for a lifetime are mostly formed. Also in this period they are most suitable for expanding their knowledge and adopting new habits. But this is the most risky period in terms of the development of adulthood illnesses. The physical growth and development accelerate in this age group. The fastest growth starts in 10-12 ages in girls and 11-14 in boys. To provide this fast growth and development, children need to meet the adequate and balanced energy and nutrient requirement.

8.3.2. General recommendations

One of the most common unfavorable dietary habits seen in this period is skipping meals. According to many studies that analyze the dietary habits of the Turkey and the world, children mostly skip the breakfast which is the most important meal of the day.

Children need to eat from different food groups in each meal for adequate and balanced nutrition and for increasing the food variety. They especially need to eat fruits, vegetables and foods that contain protein every day and they need to limit the consumption of foods and beverages which are low in nutritional value and high in energy density. Out of these groups, milk and milk products are important calcium and protein sources for growing children and adolescents. Decrease in the milk and milk products intake among adolescent girls is an important problem. In this age group, milk and milk products intake is found as 165 g/day and this amount is insufficient.

Water needs to be consumed for a healthy life. Making sure that the water is safe and clean is important. Every child needs to have a water pan of his/her own and they need to use non-returnable glasses.

Children need to gain the habit of washing their hands appropriately especially before and after eating, after going to the bathroom, after playing outside and after coming home from outside.

In feeding practice of the schools, supporting the development of children and making them gain the habit of healthy nutrition must be aimed. For this aim, the feeding practice of the schools must be handled as a whole and the development of children must be provided with healthy eating habits in canteens, cafeterias and during feeding times. Especially among the low income families, nutrition quality, food variety, notably milk and milk products, and also vegetable and fruit consumption must be enhanced.

8.3.3. Nutritional problems

Calcium and vitamin D deficiency: Especially in these days, common nutritional problems seen in Turkey and the world are vitamin D, calcium and iodine deficiency, iron deficiency anemia, obesity, eating disorders and tooth decay.

In childhood, in which growing is fast, bone development is extremely fast and calcium requirement increases. During this period meeting the calcium requirement and sufficient calcium intake is very important.

Vitamin D is synthesized in skin and get active in kidneys with the help of sunlight. This vitamin, along with calcium and phosphorus metabolism, plays an important role in childhood for bone health. It is impossible to meet this requirement with only foods. It is suggested to sunbath for 15-20 minutes daily for the formation of vitamin D in the skin.

Anemia: One of the risk groups that iron deficiency anemia is seen are children and adolescence. The most important factors of this deficiency are insufficient intake, decreased gastrointestinal iron absorption, formation of muscular tissue in men, increased blood volume, and menstrual blood loss among girls. Anemia can damage the cognitive enhancement of children, affect their neuropsychology, decrease the capacity in different tissues and can make the children more prone to infection, which decelerates the development of children. Foods that contain heme iron (red meat) must be preferred in child development. Foods that contain heme iron can be absorbed by the body easily. To increase the iron absorption, non-heme iron sources (poultry, eggs, dried fruits, legumes, grape molasse, whole grains and fortified grain products) must be consumed with foods that are rich in vitamin C (fresh fruits and vegetables). With an early, effective diagnosis of anemia and with a proper treatment, many complications of anemia are preventable.

Iodine Deficiency: Iodine deficiency is an endemic problem in every region of Turkey. Iodine deficiency develops out of insufficient intake from diet. Due to deficiency, goiter, juvenile hypothyroidism, impaired mental and cognitive functions, decrease in physical development and cretinism are widely seen among children. Iodine deficiency is also associated with IQ score and it can cause a 13.5 points decrease in the IQ score. Families need to be educated to decrease their salt consumption and to use iodized salt.

Obesity: Obesity which develops out of unbalanced diet leads to growth retardation, decreased physical development, and at later ages leads to increase in chronic illnesses associated with nutrition.

BMI reference values which are unique to age and gender are used to determine the obesity among children and adolescents (Table 8.4 and 8.5). (See Chapter "Pre-school period child nutrition"). To prevent obesity in children and adolescents, their physical activity as well as adequate and balanced nutrition must be supported. During this period, at least 60 minutes of physical activity, which goes from moderate-intensity activity to vigorous-intensity activity, is preferred daily. The time spent in front of TV, tablet and computer must be limited to 2 hours daily. The reference growth values of body height for age, body weight for age, body weight for body height are also included in Appendix 6. It is recommended to use them in the determination of growth.

Table 8.4. BMI for age percentile values for boys (kg/m²). (WHO MGRS, 2007)

Age (year)	Age (month)	Underweight (<3rd p.)	Risk of underweight (3-15th p.)	Normal (15-85.p)	Overweight (85-97.p)	Obese (>97.p)
7	84	<13.3	13.3-14.1	14.2-17.0	17.1-18.8	>18.8
8	96	<13.4	13.4-14.3	14.4-17.4	17.5-19.4	>19.4
9	108	<13.6	13.6 -14.5	14.6-17.9	18.0-20.1	>20.1
10	120	<13.9	13.9-14.8	14.9-18.5	18.6-21.0	>21.0
11	132	<14.2	14.2-15.2	15.3-19.2	19.3-22.0	>22.0
12	144	<14.6	14.6-15.6	15.7-20.0	20.1-23.1	>23.1
13	156	<15.1	15.1-16.2	16.3-20.8	20.9-24.2	>24.2
14	168	<15.6	15.6-16.8	16.9-21.8	21.9-25.3	>25.3
15	180	<16.2	16.2-17.5	17.6-22.7	22.8-26.4	>26.4
16	192	<16.7	16.7-18.1	18.2-23.6	23.7-27.3	>27.3
17	204	<17.1	17.1-18.6	18.7-24.3	24.4-28.0	>28.0
18	216	<17.5	17.5-19.1	19.2-21.6	21.7-28.6	>28.6

Table 8.5. BMI for age percentile values for girls (kg/m²) (WHO MGRS, 2007)

Age (year)	Age (month)	Underweight (<3rd p.)	Risk of underweight (3-15th p.)	Normal (15-85.p)	Overweight (85-97.p)	Obese (>97.p)
7	84	<12.9	12.9-13.8	13.9-17.3	17.4-19.4	>19.4
8	96	<13.0	13.0-14.0	14.1-17.7	17.8-20.2	>20.2
9	108	<13.3	13.3-14.3	14.4-18.3	18.4-21.1	>21.1
10	120	<13.6	13.6-14.7	14.8-19.0	19.1-22.1	>22.1
11	132	<14.0	14.0-15.2	15.3-19.9	20.0-23.2	>23.2
12	144	<14.6	14.6-15.8	15.9-20.8	20.9-24.4	>24.4
13	156	<15.1	15.1-16.4	16.5-21.8	21.9-25.6	>25.6
14	168	<15.6	15.6-17.1	17.2-22.8	22.9-26.7	>26.7
15	180	<16.1	16.1-17.6	17.7-23.6	23.7-27.6	>27.6
16	192	<16.4	16.4-18.0	18.1-24.1	24.2-28.2	>28.2
17	204	<16.6	16.6-18.2	18.3-24.6	24.7-28.6	>28.6
18	216	<16.7	16.7-18.4	18.5-24.8	24.9-28.9	>28.9

Eating disorders: While ideal body weight in children and adolescents must be supported with optimum nutrition and physical activity, distorted body image, irregular eating habits and irregular exercise habits must be avoided. Irregular eating behaviors such as abnormal eating habits, binge eating, vomiting, distorted body image*, obesity phobia are commonly seen among adolescents while eating disorders are seen in all ages.

To prevent the eating disorder risks, it is recommended that children

- Be supported for their adequate and balanced eating habits,
- Avoid various distorted body image* and persistence of body weight,
- Beware of restricted diet and harmful weight control behaviors (for example vomiting, using overdose laxatives),
- Are encouraged positively as to their psychological health.

Tooth Decay: One of the most common oral health problems among children is tooth decay. Tooth decay is accepted as mouth infection disease and is encountered more than (7 times more than hay fever, 5 times more than asthma) some other infection types.

Tooth decay is especially associated with the amount and frequency of intake of sugary foods and is associated with oral health care. Sugary foods are; table sugar, confectioneries, honey, cakes, chocolate, biscuit, waffle, sugary and fruity beverages. Parents need to make sure that these foods are consumed with main meal, not with snack. They also need to make sure that their children consume foods such as whole apple and carrot biting. Also children must brush their teeth regularly every day to prevent tooth decay.

Food groups and energy and nutrient intake recommendations for school-age children and adolescents are given in Chapter 10 Appendix 1.1.1-1.1.2 Appendix 1.2.1, Appendix 1.3.1,Appendix 1.4.1 and Appendix 1.5.1-1.5.4.

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8.4. Nutrition in Adulthood

Nutrition is the adequate intake and use of necessary nutrients for growth, development and for longevity of healthy and for a productive life. It is scientifically proven that if any of these nutrients is not taken or is taken insufficiently or excessively, it hinders the growth and development and causes to impairment of health. Adopting an unbalanced nutrition habit and a sedentary lifestyle forms a basis for many diseases such as obesity, cardiovascular diseases, diabetes, hypertension and osteoporosis.

Healthy lifestyle plays a crucial role in maintaining a healthy life in other words in increasing the quality of life. Adequate and balanced nutrition and regular physical activity ensure the amelioration of mental health as well as physical health.

8.4.1. Recommendations for a healthy nutrition in adulthood

To prevent the development of nutrition-related chronic diseases among adults;

- At young ages, children should adopt the habit of healthy nutrition which will affect their body weight, blood lipid profile, blood pressure, blood glucose level and bone health positively.
- Food variety must be increased. Every day, foods from different food groups must be consumed sufficiently in every meal.
- It must be made sure that the BMİ is between 20-24.9 kg/m^2, that underweight, overweight and obese individuals take private nutrition therapy. Ensuring that they control their bodyweight with the help of behavior therapy is also important.
- Total fat, saturated fat, cholesterol and sugar intake must be decreased.
- In meals; instead of saturated fats such as margarine, butter, tail fat, tallow; vegetable oils(olive oil, sunflower oil, soybean oil, corn oil and canola oil) must be preferred. If margarine is to be used, soft margarine (bowl) must be preferred.
- Vegetables, fruits, whole grain, legumes consumption, hence fiber intake must be increased.
- 2-3 glasses of milk and yoghurt must be consumed daily for bone health. Low-fat milk and diary products must be preferred.
- Fish must be consumed at least 2 days a week.
- Overconsumption of protein (more than recommended amount of meat and meat products) must be avoided. High amount of protein in nutrition increases the urinary calcium excretion and triggers bone loss (osteoporosis).
- Product label information on the food packages must be evaluated and the ones that are low in fat and sugar content must be preferred.
- Added fat amount must be reduced with appropriate cooking technique. For example, instead of frying the foods, roasting, boiling, grilling, steaming and cooking in the microwave techniques must be preferred.
- The frequency of eating outside the home must be reduced and if one is to eat outside the home; he/she must prefer fat free or low fat foods or menus.
- Consumption of salt and salted foods (pickle, pickled foods, olive, and foods high in salt content) must be reduced, and one must cease to add salt to food without tasting it and he/she must beware that the salt he/she is using is iodized.
- Fluid consumption must be increased; 8-10 glasses of water must be drunk.
- Beverages that contain sugar must be avoided. Fruit itself must be consumed instead of juice.
- Consumption of coffee drinks that contain caffeine and fizzy/fizzless beverages and energy drinks must be limited.

- Food intake with 3 main meals, 2 or 3 snacks daily must be provided. Breakfast should never be skipped.
- Physical activity must be increased; exercise habit 2-3 hours after meal must be gained.
- 30 minutes (5000 steps) of walk must be taken every day, and over time the step count must be increased to 10.000.
- Tobacco and alcohol use must be avoided.
- Adults must check their blood glucose, blood lipids and blood pressure values at regular intervals.

Food groups and energy and nutrient intake recommendations for adult individuals are given in the given in Section 10: Appendix 1.1.3-1.1.4 Appendix 1.2.1, Appendix 1.3.1,Appendix 1.4.1 and Appendix 1.5.1-1.5.4. Also recommended dietary pattern (portion/day or portion/week) according to different energy intake levels (1000-3200 kcal) is given in the Appendix 3.1.1, nutrient content of the suggested dietary pattern according to energy levels is given in Appendix 3.2.1 and suggested portion amount to consume for an adult is given in the Appendix 3.1.1.

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8.5. Nutrition in Elderly

Old age is a phase of life. Adequate and balanced diet in old age period is extremely important in terms of intake of the required nutrients, prevention of chronic diseases (cardiovascular diseases, diabetes, osteoporosis, some cancer types etc.) and protection, improvement and promotion of health. Old age-related factors such as decrease in sense of taste and smell, loss of teeth, anorexia, and decrease in the digestion and absorption of the nutrients can affect the nutrition negatively.

8.5.1. Recommendations for healthy nutrition in elderly

A healthy diet in accordance with these recommendations will contribute to the intake of the energy and nutrients at recommended level. These recommendations will also contribute to the prevention of acute and chronic health problems related to undernutrition. These recommendations are:

1. Food variety must be provided.
2. One must feed at least 3 meals a day.
3. One must protect his/her ideal body weight and muscle strength.
4. Foods must be prepared, cooked and preserved appropriately.
5. Vegetables and fruits must be frequently and abundantly consumed.
6. Bread and other grains must be consumed sufficiently.
7. Saturated fat consumption must be reduced.
8. Water and other beverages must be consumed sufficiently.
9. Fiber consumption must be increased.
10. Foods rich in calcium must be consumed.
11. Salt and sodium consumption must be reduced.
12. Sugar consumption must be reduced.
13. Alcohol and cigarette must be avoided.

1. Food variety must be provided.

Food variety is the consumption of biologically different foods or foods that are different in terms of nutritive value. For food variety, milk and milk products, meat and meat products (meat, eggs, legumes, and seeds), fresh vegetables and fruits, bread and grains (rice, bulghur, macaroni…) must be consumed in every meal in accordance with the needs of the old person (Appendix 2.1.1-2.1.10). With food variety, along with the intake of the essential nutrients (carbohydrate, protein, fats, vitamins, minerals, fiber and water), excessive consumption of fat and salt is reduced.

2. One must feed at least three meals a day.

One must feed at least three meals a day with food variety. Skipping a meal is a sign of undernutrition in elderly. For a healthy nutrition, being careful as to what to eat in meals is as important as not skipping a meal. Foods rich in protein, vitamin and mineral must be consumed instead of foods that are rich in energy content. For elderly, it is essential to eat less but often, and to chew the foods thoroughly.

Eating is an activity that has physiological and social aspects. For this reason, elderly people must be prevented from eating alone to provide adequate nutrition. The dining table must be designed savoringly to increase the food consumption. Listening to music or watching TV increases the pleasure of the food

3. One must protect his/her ideal body weight and muscle strength.

Decrease in the skeletal muscle mass and strength is common among elder population. Decrease in the muscle mass leads to the decrease in physical activity. As a result, metabolic rate and bone mineral density decrease. Old age-related decrease in energy expenditure must be balanced with energy expenditure and body weight must be maintained. Also, obesity and increase in body must be prevented. Elderly must consume sufficient and good quality protein in every meal. Low fat milk and milk products, meat-poultry-fish, eggs and legumes are good protein sources.

Caution is warranted against undesired weight loss and gain among elderly. Body weight must be monitored at regular intervals. About 4.5-5 kg of undesired weight loss or gain over the last six months is a sign of malnutrition. Elderly who have problems of overweight or undesired weight loss should definitely consult a health organization.

To increase physical activity, 30 minutes of moderate activity every day or at least few days a week is recommended. Regular physical activity not only helps to preserve ideal body weight, but it also helps to maintain cardiovascular health. Regular physical activity affects the regulation of blood pressure, cholesterol and blood glucose. It regulates sleep, increases digestion and appetite. Being active makes elderly feel better in every respect.

4. Foods must be prepared, cooked and preserved appropriately.

With aging, the resistance of the body against micro organisms that are transmitted via foods weakens. Food poisoning is frequently encountered among elderly. Therefore, being careful as to the safety of food is crucial (Chapter 6). Unbaked and raw foods are potential of microorganisms which cause food poisoning. Personal hygiene rules must be followed (especially hand washing) and attention must be paid to the cleanness of food and cleanness of equipments that are used in cooking.

5. Vegetable and fruit consumption must be increased.

Vegetables and fruits are rich vitamin and mineral sources. It is known that abundant consumption of vegetables and fruits is effective in protection from cardiovascular diseases, some cancer types, non-insulin dependent diabetes, and prevention and

of hypertension, protecting from cataract and some other eye diseases. Elderly who have difficulty in eating and chewing can generally prefer consuming all vegetables and fruits by cooking. To not to lose their sustenance, vegetables must be poached in their own water and the cooking water must be saved. Different vegetables and fruits must be consumed in every meal and snack. (Chapter 4).

6. Bread and other grains must be consumed sufficiently.

Foods that are prepared with bread, rice, macaroni, bulghur and flour are rich sources of carbohydrate. Grains are usually low in fat and they don't contain cholesterol. Whole grain products contain vitamins B group, vitamin E, and many minerals including especially iron, zinc, magnesium and phosphorus. These products also provide fiber. Therefore, whole grain and whole wheat products play role in preventing obesity, diabetes, cardiovascular diseases, some cancer types and constipation. (Chapter 4).

7. Saturated fat consumption must be reduced.

Among elderly individuals, at least 30% of the daily energy must be provided from fat. Among elderly, consumption of saturated and trans-fats must be reduced. Cholesterol content of the diet must be under 300 mg daily. Increase in the consumption of the animal fats such as butter and tail fat leads to the increase in blood cholesterol level. High blood cholesterol is a risk factor for cardiovascular diseases. Apart from visible fats (vegetable oils such as margarine, butter, sunflower oil, olive oil), fats also exist in natural composition of foods. When meat, chicken, milk and cheese are excessively consumed, fat intake increases. As most of these are saturated fat, vegetable oils (olive, sunflower and corn oil, etc.) must be preferred in foods and salads. Elderly must consume fish at least two times a week as it contains omega-3 fatty acids. These fatty acids are known to have positive effects on vision, cognitive functions, bone and joint diseases blood lipids (Chapter 5).

8. Water and other beverages must be consumed sufficiently.

Due to the decrease in sense of thirst in the elderly, beverages are not consumed sufficiently, and this causes to dehydration. As a result of thamuria and less fluid retention in the body, the total body water decreases. Elderly must drink at least 2000 mL fluid daily. To meet this need, they need to consume 8-10 glasses of water daily. It must be made sure that elderly consume water at regular intervals even if they are not thirsty. Consumption of sufficient water or fluid is important in terms of maintaining the normal functions of kidneys, prevention of urinary tract infections, kidney stones and constipation. Fresh squeezed fruit juices, milk, ayran (diluted yoghurt) and soups are favorable fluid sources for elderly and these beverages also contain other nutrients. Milk is a favorable drink as to meet the fluid intake and calcium requirement of elderly. Caffeinated drinks such as coffee, tea and coke must be moderately consumed, herbal teas must be preferred. Since consumption of tea with foods decreases the iron absorption, teas must be drunk one hour before or after the meals and they must be weak or with lemon.

9. Fiber consumption must be increased.

The consumption of foods which are high in fiber must be increased. Foods that are highest in fiber are; legumes, cereals, vegetables-fruits, respectively. Fiber has a protective and curative effect on elderly. Fruits (apple, pear, strawberry etc.), vegetables, haricot, oily seeds, nuts (like walnut, hazelnut, almond, etc.), rice, oat, water-soluble fiber in barley bran decrease cholesterol and regulate blood glucose. These foods decrease the risk of diabetes, cancer, coronary heart disease and have a curative effect on elderly who have these diseases. Wheat bran, corn bran, cereals in breads that are made from whole wheat flour, and "water insoluble fiber" in vegetables prevent constipation and they are important in terms of regulating intestine motility in elderly. They also decrease the risk of colon cancer.

Legumes are needed to be consumed at least 2-3 times a week in order to take sufficient amount of fiber. Also vegetable and fruit consumption must be increased, and consumed above 400 g daily. Bread and grain groups that are made from whole wheat flour must be preferred. (Chapter 4).

10. Foods rich in calcium must be consumed.

Calcium plays an important role in protection of bone health not only in childhood and adulthood but also in old age. Calcium absorption decreases with aging as a result of change in the metabolism of vitamin D. Adequate intake of calcium decreases bone mineral loss and ensures the protection of bone health. That is why, foods high in calcium (milk, yoghurt, ayran, cheese, skim-milk cheese etc.) must be consumed in the old age. Vitamin D is necessary for the use of calcium in the body. As vitamin D requirement cannot be met with foods, elderly need to benefit from sunlight sufficiently. But as vitamin D formation in skin decreases in elderly, vitamin D supplementation is recommended where necessary. (Chapter 4).

11. Salt and sodium consumption must be reduced.

Over consumption of salt may lead to osteoporosis due to the increase in hypertension, cardiovascular diseases and urinary calcium excretion. Sodium in the composition of salt also exists in the composition of foods. Sodium in the foods of animal origin is more than that of vegetal ones. Salt is also used in some food handling. Elderly must reduce their salt consumption and must prefer low sodium foods. Salt mustn't be added to the foods in table. Addition of different spices to the low sodium foods and salty foods enhances the flavor and therefore facilitates the consumption. (Chapter 5).

12. Sugar consumption must be reduced.

Carbohydrates exist in the food as simple sugar or complex carbohydrates. Among elderly, carbohydrates amount of a balanced diet must be between 55-60% of the daily energy intake. Added sugar (simple sugar) consumption must be reduced in elderly nutrition. Foods rich in complex carbohydrates (cereals, legumes, potatoes etc.) must be preferred instead of simple sugars (table sugar, jam, honey etc.). Over consumption of simple sugars can lead to increase in serum triglycerides and low density lipoprotein (LDL) cholesterol level. Simple sugars only provide energy whereas foods containing complex carbohydrates provide not only energy but also protein, vitamin, mineral and fiber which are necessary for body. (Chapter 5).

13. Alcohol and smoking should be avoided.

Alcohol has negative effects on health. Excessive alcohol consumption has been known to lead to liver, brain, heart muscle injury; ulcus, pancreatitis, digestive system cancers, hypertension and depression. Cigarette causes to osteoporosis, some cancer types, and undernutrition due to the nutrient losses in the body. That the elderly doesn't consume alcohol and cigarette is important for an adequate and balanced nutrition. (Chapter 5).

Food groups and energy and nutrient intake recommendations for elderly individuals are given in Chapter 10, Appendix 1.1.3-1.1.4 Appendix 1.2.1, Appendix 1.3.1, Appendix 1.4.1 and Appendix 1.5.1-1.5.4. Also recommended dietary pattern (portion/day or portion/week) according to different energy intake levels (1000-3200 kcal), nutrient content of the suggested dietary pattern according to energy levels and suggested portion amount to consume for a adults is given in the Appendix 3.1.1.

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CHAPTER 9

NUTRITION IN SPECIAL CASES

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Nutrition in Special Cases

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9.1. Obesity and Control of Body Weight

9.1.1. Obesity and control of body weight

Obesity is the imbalance between the energy intake and expenditure. It is a chronic but preventable disease that occurs as a result of fat storage of the excess calorie in the body and as a result of increase in the fat mass of the body. This disease is generally seen in those who have the habit of malnutrition, limited physical activity, and who have a sedentary life style. Increase in the amount of fat mass of subcutaneous and internal organs (visceral) increases the health risks among obese people.

To maintain and protect the healthy body weight, a lifestyle that encompasses both adequate and balanced nutrition and regular physical activity. Being overweight or obese increase the risk of many health problems such as high blood pressure, high blood cholesterol, cardiovascular diseases, stroke, diabetes, some cancer types, arthritis and respiratory syndrome. Health risks caused by the increase in the fatty tissue of the body affect not only adults but also children and adolescents.

Providing acceptable weight based on height in balance is a key of maintaining longevity.

Being thin also impairs the quality of life, increases the risk of diseases and is an is an unexplained situation. Weakness decreases the body resistance, increases the risk of catching an illness, decreases the school performance and work productivity, causes menstruation disorders (menstrual bleeding), decreases fertility, and increases the risk of osteoporosis. When sudden and unexplained weight loss is the case, one must consult a doctor immediately.

9.1.2. How is the body weight evaluated?

Calculation of body mass index, waist circumference and waist/hip ratio for adults: It is given in Chapter 3. Obesity and regional distribution of body fat should be evaluated according to this method.

9.1.3. Obesity and nutrition theraphy

Obesity is defined as a BMI that is above 30 kg/m2. It is an important risk factor for the occurence of chronic diseases and increase in degree of the disease. These individuals must consult a doctor and dietitian and must lose weight. Weight that is lost rapidly is also gained rapidly. In order for weight that is lost to be permanent, the process of losing weight must be slow. Therefore a treatment program composed of nutrition therapy, exercise therapy and behavior therapy must be used.

Control of the body weight starts with children. Children need to intake energy and nutrients adequately and in a balanced way in order to grow and develop.

Excessive energy intake and lack of physical activity lead to obesity. Getting children adopt the habit of healthy nutrition at early ages is important to prevent obesity. Consumption of foods that are high in sugar and fat must be limited. It must be ensured that children select healthy foods from canteens. Also in schools that serve lunch, it must be ensured that the menus support healthy nutrition.

If the BMI of adults is above the recommended healthy levels it is possible to control the body weight by balancing the daily energy intake and increasing the physical activity. The recommendations below must be taken into consideration in controlling the body weight.

- Energy and nutrients intake must be provided to meet the individual daily take is given in the Appendix 1.1.3-1.1.4. Food groups and energy and nutrieint intake recommendations for adults are given in Appendix 3.1.1. Also recommended dietary pattern (portion/day or portion/week) according to different energy intake levels (1000-3200 kcal) is given in the Appendix 3.2.1, nutrient content of the suggested dietary pattern according to energy levels is given in Appendix 3.1.1 and suggested portion amount to consume in five food groups for a adults is given in the Appendix 3.4.1-3.5.7.
- Fresh vegetables and fruits, legumes, cereals (especially whole grain products), low-fat milk and milk products, low-fatty meats, fish, poultry and eggs consumption are healthy food options.
- onsumption of foods that are high in fat and sugar must be limited.
- Fiber consumption must be increased. Legumes, whole grains, vegetables and fruits must be in the diet
- Water must be consumed instead of beverages
- that are high in energy such as sugary drinks, instant fruit juices, liquors and energy drinks.
- Foods must be consumed with portion control based on the daily needs, excessive consumption must be avoided.
- Breakfast must be eaten. Snacks mustn't be skipped and the number of snacks must be increased.
- Consumption of fresh vegetables and fruits, whole grain foods or low-fat milk or yoghurt consumption is a good choice.
- Foods must be chewed thoroughly and slowly.
- The habit of reading the food labels of the products must be adopted. Fat, sugar and salt info of the packaged foods must be known and healthy choice of foods must be ensured.
- Foods whose fat amount is decreased mustn't be thought to contain low energy. Sometimes low-fat foods provide excessive energy due to their excessive amount of sugar content.
- To decrease the fat consumption, attention should be paid to food preparation and cooking techniques. Boiling, grilling or roasting techniques must be preferred instead of frying.
- Eating out may increase the daily energy intake. Attention must be paid to the portion size to control the energy intake of outside foods. Also the consumption of fast foods must be limited.
- Grocery shopping when hungry must be avoided and shopping list must be prepared before leaving the house.

- Being active the whole day is necessary. Adults are recommended to do 30 minutes of moderate activity (walking, riding, dance, tennis, etc.) at least 5 times a week. Being active at all ages increases the muscle and bone strength of the body.
- Rapid body weight loss must be avoided. At least half, at most 1 kg weight loss a week must be aimed. Weight that is lost slowly is more permanent while weight that is lost rapidly is gained rapidly.
- The support of family members and immediate vicinity is needed to gain and preserve the habit of healthy nutrition and regular physical activity. Also these persons should set as an model to children.
- It mustn't be forgotten that behaviors are important in terms of protecting the body weight. The support of behavior modification therapy must be taken when necessary.

9.2. Nutrition of Workers

The health of workers is the protection, promotion, and maximum maintenance of the workers' health. The job security of the workers, who play an important role both on production and national economy, depends on their intake of the necessary quality nutrients sufficiently and in accordance with their job. The health of the undernourished workers impairs, the job accident risk increases, their productivity and performance decrease considerably. Generally workers who are undernourished at their home are undernourished at work as well.

The most important reason of this situation is lack of nutrition training and lack of dietary consciousness of workers and employers. In addition to this, inadequacy and insufficiency in food production, food distribution, food technology, inadequacy in purchasing power, rapid population growth and unfavorable ambient conditions are other factors of poor nutrition among workers. When the nutrition (especially of those who work in heavy and dangerous works) of workers examined, it is seen that there is a relationship between the required energy, nutrients, bioactive compounds and health, productivity and performance.

9.2.1. Energy and nutritient requirements of workers;

The biggest problem of the feeding of workers is that their energy expenditure doesn't meet the energy that they are supposed to get through diet. In some line of works, some nutrients must be supplemented to normal requirement.

Energy: There is a provision in Turkish Labor Legislation regarding the feeding of workers. The labor agreement that was published in the official gazette, number 29454 dated 23.08.2015, encompasses the years 2016 and 2017. It regards the financial and social rights of public officials in general and general service lines. In some business agreements it is envisaged to give foods with certain energy levels, in some it is envisaged to pay certain money in exchange for a meal, and in some of them it is envisaged to give one meal.

Workers menu of Turkey stand out with their high energy content. The meals that are given in workplaces must meet at least half of the daily energy needs of workers. The important thing here is the characteristic of the work. A plan must be made based on the working conditions and the quality of their work (Table 9.1).

Important remarks for meeting the energy need;

- A meal given in the workplace must meet at least half of the daily energy need of the workers. It is hard to meet this need by giving three plates of food in a meal. Also intense energy intake is undesirable as it causes to a state of sleep.
- Energy intake value of the workers who work in a very cold or hot work environment increases. When below 10-14 C degree the heat of environment decreases by every 10 degree, energy requirement increases by 5-10%. On the other hand, if above 30 C degree the heat of the environment goes up by every 1 degree, energy requirement increases by 5%.

Table 9.1. Energy expenditure standards of male and female workers based on the type of work

Activity Type	Males		Females	
	Energy spent	Work type	Energy spent	Work type
Sedentary/ Light Activity	2500 kcal /day 1.99 kcal /mn)	Office jobs, lawyer, doctor, architect, accountant, officer, teacher , sales clerk	2100 kcal /day (1.5 kcal /mn)	Office jobs,housework that can bedone with an appliance
Moderate Activity	3000 kcal /day (3.16 kcal /mn)	Light industrial worker, unskilled worker, student, fisher, private soldiers serving routinely, agricultural worker that can use vehicles	2300 kcal /day (2.03 kcal/mn)	Light industrial worker, women that clean the house without an appliance, student, warehouse worker, agricultural worker that can use vehicles
Vigorous Activity	3750 kcal /day (4.45 kcal /mn)	AHeavy agricultural wor er, heavy construction, worker, hodman, forest worker, heavy military servicemen, mineworker and heavy industrial worker, peformer of tiring athleticism and sports activity	2600 kcal /day (2.54 kcal /mn	Heavy agricultural worker, worker of tiring industry, (2.54 kcal/mn) ballerina, peformer of tiring athleticism and sports activity
Very Vigorous Activity	4000 kcal /day (6.22 kcal /mn)	Sapper, woodcutter, ironmonger, blacksmith,porter, carter	3000 kcal /day (3.21 kcal/mn)	Heavy construction worker, a very heavy agricultural worker

Menu pattern shouldn't be considered only in terms of energy. For heavy workers, it is unfavorable to consume foods that have a high content of sugar and fat to complete the extra energy. Therefore workers must increase their meal frequency with at least a snack addition

Protein: Attention must be paid to the amount and quality of the dietary protein of adolescents, pregnant and lactating mothers, workers of night shift or manual labor. Protein loss is more than normal among heavy workers due to perspiration. When dietary energy is enough, muscles don't use protein as a source of energy. But increase in muscle mass increases the protein need of the physically active workers. Protein value of the diet of old workers and growing young workers must be increased. Workers must meet 12-15% of their daily energy intake from proteins.

Carbohydrate: A significant amount of the dietary energy must be provided through carbohydrates. Productivity increases with the increase in amount of carbohydrate (glycogen) storage in tissues. The intensity of the activity must be correlated with the amount that diet energy provides from carbohydrates. Also attention must be paid to the type of carbohydrate of the diet. 55-70% of the daily energy requirement must be provided from carbohydrates. And 85% of this must be provided from complex carbohydrates (whole grains) and 15% through simple carbohydrates (sugar). A meal that is rich in carbohydrate which is also high in simple sugar content is unfavorable.

Fats: Fats affect the labor productivity as they contain high energy and they carry the oil soluble vitamins. Amount and type is important in fat consumption. 25-30% of the daily energy need must be provided from fats. Fried foods mustn't frequently be in meals and fats added to the food must be without oil frying.

Table 9.2. Essential food groups for a diet of 1750 kcal

Food Groups	Amount (g)
Meat, poultry, fish, eggs, legumes;	125
Rice, cake, bulghur, flour	75
Fresh vegetables and fruits	250
Milk and yoghurt	250
Fat (half saturated, half unsaturated)	50
Sweets such as sugar, honey, grape molasse	50
Bread	225

Workers who do heavy physical activity must have the other nutrients sufficient enough to meet their increased energy need.

Vitamins and Minerals: Sufficient amount of vitamins A, E and C must be given place in the workers' menus, especially of those who work with toxic/poisonous substances. Sufficient amount of iron, calcium, vitamin E and vitamin C must be in the diets of workers who work in the branches of industry which use heavy metals such as lead and cadmium. The aim of this is to decrease the toxic effect. Vitamins E and C need of the workers, who are in touch with radiation and toxic chemicals increases. B vitamins need of these workers also increases.

Minerals are related to labor productivity. For example, minerals have strong impacts on the performance of workers as they have a role in oxygen-carrying and blood formation of iron. Insufficient intake of zinc causes to decrease in physical activity and body resistance. Potassium has impact on systematic circuit of cardiac muscle.

Fluid: : Particularly those workers who work in heavy and dangerous works must meet their fluid intake regardless of their sense of thirst. Especially workers who work in hot environment must be careful as to take sufficient amount of safe water. Therefore, based on the type of work (working under the sun, working in a hot environment etc.), workers must consume at least 10-12 glasses of water or a liter of fluid per 1000 calories.If the environment is hot, beverages and foods such as ayran, lemonade, tea, biscuit, and fruit must be consumed as snack. If the environment is cold grape molasse, syrup, sherbet, tea, biscuit and fruit must be consumed as snack.

A sample meal (750 kcal) and menu of foods given to a worker whose daily energy requirement is 3500 kcal and who sleeps 8 hours on average;

The amount of energy that must be given from each food group must be provided with at least one type of food and 3 or 4 plates of meals and bread. In Table 9.2, 1750 kcal from essential food groups which are necessary for balanced nutrition is given.

When these nutrients are planned as foods in a meal, this meal can be composed of a portion meat-vegetable or a dish that is a mixture of legumes, a portion of rice of macaroni, a portion of vegetable dish or salad-fruit and yoghurt.

9.2.2. Recommendations for workers' nutrition provided by either themselves or their workplace

- Workers who work in heavy and dangerous works mustn't put their extra energy load on a single meal.
- Workers must consume at least one snack in addition to their existent snacks. This way overload of the lunch can be prevented. Also problems occurring out of this overload are prevented for workers who come to the work without having breakfast or who have a poor breakfast. Having breakfast or who have a poor break fast.

- A qualitative snack pattern in tea breaks enhances the performance and labor productivity of the workers, this way work accidents are prevented.
- Vegetable and fruit consumption of the heavy workers working in dangerous/toxic conditions should be more than that of workers working in light/moderate activity situations. Attention must be paid to this in feeding of workers considering antioxidant intakes.
- Workers, notably heavy workers, must be careful as to consume fluid.
- As an addition to their fluid intake, workers must consume aqueous foods such as fresh squeezed fruit juices, ayran, milk, weak tea, herbal teas, lemonade and soup.
- Workers who are exposed to sunlight or who are exposed to x-rays must consume fruits and vegetables which are rich in carotene which is the precursor of vitamin A. In this sense, carrot, lettuce, garden rocket, tomato, apricot, orange, etc. must be consumed sufficiently.
- Workers must organize their meals as 3 main meals and 1-3 snacks.
- Workers must take their lunch box with them if their workplace doesn't serve food. In their snack time, workers may consume milk, ayran, lemonade, herbal teas, fruit juices as beverage and various sandwiches, cake, biscuit, pastry, pie, fruit, walnut, hazelnut and dried fruits as food.
- Workers must provide fruit and vegetable variety so that they can consume antioxidant vitamin, mineral and herbal chemicals sufficiently during the day.
- Breakfast menus must be balanced in terms of fluid, energy and protein. The list below can be considered as food options

Eggs: Fried eggs, soft-boiled eggs, and hard-boiled eggs

Meat group: Red meats, poultry, fishes, legumes, nuts such as walnut and almond etc.

Cheeses: White cheese, kashar cheese, bryndza, string cheese, roquefort, curd cheese, skim-milk cheese

Types of sugary foods: Honey, grape molasse, jam

Besides sugary foods: Butter, margarine, tahini (sesame)

Olives: Black olives, green olives

Types of breads: Refined bread, whole wheat bread, rolls, sliced bread

Breakfast cereals: Corn cereal, rolled oats

Types of vegetables: Tomato, paprika, cucumber, lettuce, garden rocket, pepper weed, parsley, etc.

Types of fruits: Apple, orange, mandarin, banana, melon, water melon, etc.

- Distribution of the meals in workplaces must be balanced for a good nutrition.
- The catering firm must prepare and serve hygienic, appetizing and quality foods.
- If the workplace is serving food, half of the total energy need must be provided from this meal. Also food variety must be provided in each meal (Table 9.2).
- Main meal and snack menus must be planned for heavy workers to meet half of the daily energy and nutrient requirements.
- Firms must put at least four plates of food when planning the lunch and dinner menus (Table 9.3 and Table 9.4).

Table 9.3. Lunch box examples that workers can bring from their home

Food Groups
Meatball sandwich, ayran (diluted yoghurt), season salad, grape molasses with tahini
Sandwich with kashar, cold vegetable, lemonade, carrot cake with nuts
Tuna fish sandwich, fruit juice, dried apricot-walnut
Chicken sandwich, boiled potato, ayran (diluted yoghurt), fruit
Saute sandwich, stuffed grape leaves with olive oil, yoghurt, season salad
Meatballs with rice dipped in eggs batter and fried, ayran (diluted yoghurt), season salad, fruit
Pide with mince, ayran (diluted yoghurt), sliced vegetables, dessert

Table 9.4 Ineligible (4 plates) menu samples for refinery workers

Days	Lunch
Monday	Vegetable soup Big portion of meat dish Rice/ bulghur pilaf Fruit
Tuesday	Vegetable with meat Pie Salad Compote
Wednesday	Ezogelin soup Small pieces of meat dish Rice/ bulghur pilaf Dessert (Light dessert)
Thursday	Chicken/Turkey Macaroni Olive oil dish Fruit
Friday	Lentil soup Meatball Rice/bulghur pilaf Salad
Saturday	Egg with minced meat Macaroni Yoghurt with cucumber (cacık) Fruit
Sunday	Vegetable soup Legume dish with meat Rice/bulghur pilaf Dessert

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9.3. Nutrition of Athletes

9.3.1. Introduction

Nutrition of an athlete affects his/her health, body weight, body composition, and recovery time and exercise performance. Exercise performance defines the effort made by the athlete to achieve a goal in a given time. Natural ability and condition of the athlete determine the performance level. There is no such a thing as foods and beverages that guarantee an excellent nutrition or miraculous nutritional support products (supplements). The best approach for athletes is a well balanced nutrition program and sufficient amount of fluid consumption.

9.3.2. Fluid consumption of athletes

Athletes who want to increase their exercise performance to a maximum level must focus on eutrophy and sufficient amount of fluid consumption plan. In order for an athlete to deliver a high level performance, his/her body systems are supposed to work ideally. And this is achieved through sufficient consumption of various nutrients such as carbohydrate, fat, vitamin and minerals. In addition to this, without sufficient fluid consumption, an athlete cannot perform his/her best.

When sufficient amount of fluid is drunk and a balanced diet is consumed, the body can produce energy effectively and it fuels for the maximum level of performance

Water loss: : Hydration, namely sufficient fluid support is an important component of the success of an athlete. Dehydration (excessive loss of fluid of body) affects the performance of an athlete negatively. For a good hydration, personal fluid requirement needs to be known. Fluid requirements of people differ based on their sweat rate. To know the sweat rate, one needs to be weighted before and after exercise. The difference between these two weights is the loss of water from body during the exercise. Sweat rate, on the other hand, is calculated by dividing the amount of lost water into time of exercise (in minutes) and multiplying it with 60.

Sample:

Body weight before the exercise= 70 kg

Body weight after the exercise= 68 kg

Time of exercise= 90 minutes

Rate of sweat= 2(= 70 – 68 kg) ÷90 x 60 = 1.3 L/hour

Calculation of sweat rate

Replacing the body water lost by perspiration during exercise is important for maintaining the performance as well as preventing dehydration, recovering rapidly, and avoiding from injuries. Even a small amount of dehydration (2% loss of body weight) results in muscle and body exhaustion that will affect the exercise performance negatively.

To determine sweat loss and dehydration;

- Body weight must be measured before and after the exercise. The difference shows the water or sweat loss of the body during exercise.
- The easiest way to determine dehydration is monitoring the color (it must be a very light yellow) of the urine.

An improving sense of thirst is not a reliable technique to tell whether the athlete has dehydration or not. Because an athlete doesn't feel thirsty till water loss reaches the 2% of the body weight. This level impairs the performance of the athlete. When the sense of thirst is satisfied, drinking comes to an end and almost half of the need is exhausted. Athletes must avoid from drinking too much beverages that contain caffeine or alcohol as these beverages causes dehydration. Sports drinks may be necessary for long duration activities (more than 1 hour). During these activities, consuming sports drinks that contain carbohydrate at the rate of 6-8% is the best choice.

Even slight dehydration (2% loss of the body weight) affects the performance negatively.

Recommendations for fluid consumption:

- Before exercise, athletes must consume sufficient fluid little by little but with frequent intervals instead of consuming a great quantity but at long intervals. 24 hours before the exercise is crucial for over consuming of fluid. It is suggested to drink 500 mL of water 4 hours before the exercise. This way, the time needed for excreting the consumed fluid out of the body before doing exercise is ensured.
- Sufficient fluid consumption is also important during exercise to maintain the fluid balance of the body. Optimal fluid consumption is provided with 15-20 minutes of intervals and with 150-350 mL water and/or sports drinks (especially for endurance sports). Most of the athletes don't consume sufficient amount of fluid to make up the water lost during exercise. But fluid loss must definitely be supplied after the exercise.
- Fluid consumption that will reach 150% of the body weight lost during exercise is necessary to make up the perspiration losses. 450-465 mL (about 2-3 glasses of water) fluid must be consumed for per half kilogram of weight lost after the exercise. Drinking water makes an athlete maintain hydration, but the body also needs an energy source. During recovery period after the exercise, consuming milk and sports drinks is a wise choice.

9.3.3. Energy and nutrient needs of atletes

Energy requirement: The necessary energy for exercise depends on factors such as age, gender, body weight, muscle mass and body fat (Appendix 1.1.1-1.1.4). Low energy intake results in risk of muscle loss, decrease in bone density, irregular menstrual cycle, fatigue, injury and disease.

In weight sports which are done based on body weight classification such as wrestle and boxing, control of the body weight is important. Daily energy need of the athletes varies between 2000 kcal and 5000 kcal. Endurance sports, which require intense training and which are generally for competitions (4-5 hours of training), this need can reach to 6000-12000 kcal daily.

Carbohydrate requirement: Carbohydrates are the main energy source of the body. Focusing on cereals (macaroni, rice, various breads etc.) and carbohydrates of fruits and vegetables (potato, carrot, corn, green peas etc.) in a athlete's diet is important for the intake of vitamin, fibre and other essential nutrients (Chapter 2).

Carbohydrates are stored as glycogen in liver and muscle tissues, and this stored glycogen affects endurance. When the glycogen in the muscle cells exhausted, a sense of exhaustion on starts which affects performance negatively. The glycogen spent during the first half hour generally comes from the carbohydrates consumed as solid or fluid. For example, bagel and fruit juice, sports drinks high in carbohydrates, sports nutrition products, crackers, vegetable and fruit juices, fruit purees, cornflakes, banana, milk, ice cream, soda in ayran (diluted yoghurt), etc. are good food choices. There is 300-400 g glycogen storage in muscles and 75-100 g in livers. With high carbohydrate nutrition, glycogen storage can be increased by 1.5-2 times.

When the glycogen storage of the athletes decreases considerably or exhausts (after the training or as a result of inadequate carbohydrate intake), it causes to chronic tiredness, exhaustion, and to overtraining. Carbohydrate requirement of the athletes increases to 60-65%, and it increases to %70 in intense trainings and resistance sports. It is more appropriate to evaluate the carbohydrate requirement of the athletes based on their body weight. Especially for athletes that take high energy, providing the 50% of the energy from carbohydrates meets the carbohydrate amount recommended for per weight (7-8 g/kg). However, as long as the daily energy intake is below 2000 kcal, even if the 60% of the energy is provided from carbohydrates, it is not enough to meet the carbohydrate need per weight (4-5 g/kg).

Especially for athletes who take high or low energy, when carbohydrate requirement is calculated, both percentage and values per body weight are considered together.

Based on the energy exercise intense and duration, 5-10 g/kg carbohydrate intake is recommended daily. For example, when a 70 kg athlete does 1 hour training a day, his/her carbohydrate need is calculated from 5-6 g/kg (350-420 g). However, when a person does 3-4 hours of intense training, this number increases to 8-10 g/kg (560-700 g) daily on average.

Protein requirement: Another nutrient that constitutes the balanced diet of the athlete is protein. Protein is necessary for the reparation and development of muscle tissue and it supports growth and development. Protein helps muscles in gaining strength and muscle. But this process is provided not only with a high protein diet but also with endurance training.

12-15% of the daily energy need of the athlete must be provided from protein. The required protein amount of the athlete depends on condition, type of exercise, body weight, total daily energy need and consumption of carbohydrates.

- The daily amount recommended to endurance athletes is 1.2-1.4 g/kg.
- The daily amount recommended to force athletes doing strength training is 1.6-1.7 g/kg.

The recommended amount can be met without protein or without amino acid supplements with diet (Appendix 1.2.1).

Fat requirement: Fats provide energy, fat soluble vitamins and essential fatty acids for athletes. When body uses more and more fat during exercise, limited storage of muscle and liver glycogen are used in lower level, fatigue time delays and activity duration grows longer. Fat consumption must be 20-35% of the total daily energy intake. Long distance runners, bicyclers and paddlers need to consume more fat with their diet to balance the energy loss. Intensity and duration of the energy determine percentage of the fat for use of energy.

The higher the glycogen storage of the athletes is, the higher their performance is.

Fats are the primary energy source when resting or doing low-intensity activity. But as the intensity of the activity increases, body takes more carbohydrates for energy. If the glycogen storages exhaust and exercise continues, the intensity of the activity decreases and fat starts to be used for the energy.

Vitamin and mineral requirement: The most important two minerals of an athlete are iron and calcium.

Inadequate calcium consumption with diet causes to low bone mineral density and stress fractures.

Calcium: Calcium requirement of the young men and women is 1200 mg daily. This amount is met by consuming 4 portions of milk and milk products (a glass of milk, a glass of yoghurt, 2 matchbox sized cheese is a portion). (Appendix 2.1.1-2.1.10).

Iron: Iron plays a key role in sports performance. It exists in oxygen carrier compositions, hemoglobin (in blood), myoglobin (in muscle), and also some other compositions which are necessary to be constituted and which play role in muscle function. It is important for athletes, especially women athletes, to monitor their iron storages. Because these storages are related to of oxygen carrying capacity and to oxidative enzyme functions and they play a crucial role in physical performance.

Iron level in blood of all athletes, especially that of women athletes must be monitored at regular intervals.

Caffeine: Caffeine is a central nervous system stimulant and myorelaxant. Caffeine consumption increases the free fatty acid level in blood plasma. As the plasma fatty acids increase, the ability of cells to use fats as a fuel in low-intensity endurance exercise increases. As a result of over consumption to provide this ergogenic effect, some problems show up. Over consumption of caffeine leads to dehydration and/or leads to diuresis which makes this problem worse. Caffeine which is consumed 250 mg or 3-9 mg/kg daily is known to support the performance in long endurance exercises and increase the performance in high intensity, short-time exercises. Caffeine maintains its ergogenic effect by stimulating the sympathetic nervous system, by increasing the use of fatty acids and protecting the limited glycogen storages.

Sodium: It helps both maintenance of blood volume and stimulation of the desire to consume fluid. Protection of blood intensity is important for sport performance. This situation is related to the ability to carry the nutrients to cells, removal of the metabolic waste from cells and maintenance of the perspiration level. Because of their salt lost, athletes need to consume 1.5 times more of the recommended amount.

9.3.4. Nutrition before and after the training

Athletes are also recommended to consume 3 main meals and 3 snacks and meet the extra energy and nutrients. As a general principle, consumption of snack 3-4 hours before the training or competition is important for nervous system to provide necessary time.

- In meals and snacks before the training and competition; a diet which is composed of fluid to provide hydration, low-fat and fiber to prevent gastrointestinal problems is consumed. Also foods which are high in carbohydrate to maintain the glucose level and which contain moderate amount of protein take place in this diet. Another characteristic of this diet is that the athlete should have a diet used to and liked to have.
- During the training or competition, especially during the exercises which last more than an hour and which are done in hot and humid air, beverages which contain 30-60 g carbohydrate are consumed per hour to prevent fluid loss and to maintain the blood glucose level.
- For a rapid recovery after the training or competition, sufficient amount of water/fluid and electrolyte must be consumed to make up for lost water and electrolyte (sodium, potassium and chlorine) due to perspiration. Carbohydrate consumption must start right away for glycogen storage of muscles to regenerate. After the first 30 minutes- within 2 hours 1-1.5 g/kg carbohydrates must be taken, then for 4-6 hours this intake must be repeated every 2 hours.
- During the recovery period after the training and competition, carbohydrates consumed together wirh proteins develops the body composition and results in increase of endurance during force trainings. 3-6 g of essential amino acids are recommended to be consumed right after the exercise or within 3 hours (for this 10-12 g quality protein must be consumed) for the repairment of muscle tissue and for the extra protein synthesis (consumption ratio of the carbohydrate and protein must be 3-4:1).

Vegetarian athletes take energy, protein, fat and some important micronutrient (iron, calcium, riboflavin, zinc, vitamin D and B_{12}) insufficiently. For these athletes a well-programmed diet must be prepared under the sports dietitian control (See Chapter 9.4).

9.3.5. Ergogenic supplements

When not needed, the use of ergogenic supplements (sports nutrition products, vitamins, creatine, sodium bicarbonate etc.) may cause to unnecessary expense for athletes and it may create a risk for their health. Attention must be paid to age, gender, sport branch, whether the athlete is amateur or professional and other health problems when selecting these products. Also consumption of some foods must be avoided as they are in the list of stimulators and list of doping of ergogenic supplements.

These supplements increase the performance when necessary. The right product, right time and right use of the product must be decided with a professional help. Below the nutritional support products that can be used after the evaluation of their reliability, beneficence, activeness, and legality are summarized;

- **Alkalizing agents (sodium bicarbonate and sodium citrate),** increases the anaerobic performance.
- **L-argigine,** support the aerobic performance (little data exist about this).
- **Beta-alanine,** develops the anaerobic and aerobic exercise performance.
- **Caffeine,** develops the endurance and reaction duration.
- **Creatine,** increases the force and power.
- **Nitrate,** develops the aerobic breathing in endurance exercises.

Conclusion

In order for an athlete to perform his/her best, all systems of his/her body need to be working at a maximum level. In order to achieve this, the best way is to provide the adequate and balanced nutrition and make a good fluid consumption plan based on age, gender, the type of sport and environmental conditions. For athletes, success is completely balancing the right nutrition and right training level. Athletes must focus on maintaining their energy balance with regard to their energy expenditure, by adhering to Mediterranean Diet, which contains various foods and beverages and based on feeding 5-6 meals a day. The use of fluid meal supports, multivitamin, mineral, protein and amino acids supplements with low risks is recommended only if necessary.

By following the recommendations, it is possible to reach a maximum sport potential with the aid of sports dietitians.

Carbohydrates, proteins, water and electrolytes, amino acids, have ergogenic characteristics.

Athletes are recommended to use nutritional supplements in appropriate times. These products must be used after the evaluation of reliability, beneficence, effectiveness and legality.

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9.4. Vegetarian Nutrition

9.4.1. Introduction

Vegetarianism is a manner of nutrition comprising predominantly consumption of plant based foods. While vegetarian individuals consume plant foods they consume in small quantity of or do not consume foods of animal origin like meat, poultry, fishes, eggs, milk, cheese and yoghurt.

Vegetarian nutritional habit is preferred for various reasons. The basic reason is the fact that the population is fed on the basis of cereals. In addition, the facts that milk and eggs are accessed easily, that meat of animal is rapidly consumed after slaughter and that meat is an expensive food. Recent years, vegetarian nutrition habit has been adopted with the purpose to be protected from chronic diseases like cardiovascular diseases, hypertension, diabetes, cancer etc.

Vegetarian diet varies with respect to restrictions in food types. These are;

1. **Vegan diet:** No food of animal origin is consumed. The diet consists of cereals, vegetables, fruits and legumes. Number of people practicing vegan diet is very low. Vegans have also sub-groups.
2. **Lacto vegetarian diet:** Milk and dairy products are consumed beside plant foods.
3. **Ova vegetarian diet:** Eggs take place in the diet beside plant foods. Meat and milk are not consumed.
4. **Lacto-ova vegetarian diet:** Milk and eggs are consumed. The most commonly practiced vegetarian nutrition form nowadays.
5. **Polo-vegetarian diet:** Red meat is not consumed in this diet. Only poultry animals like chicken and turkey among foods of animal origin are consumed beside plant foods.
6. **Pesco-vegetarian diet:** Red meat is not consumed in this diet as well. Only fish types, mussels and marine products among foods of animal origin are consumed beside plant foods.
7. **Semi-vegetarian diet:** Red meat is not consumed in this diet as well. Limited quantity of fish types and chicken are consumed. Semi-vegetarians consume eggs, milk and milk products as much as they want.

9.4.2. Evaluation of of vegetarian diets in terms of nutrition and nutrient content

Nutritional value of vegetarian diet varies according to diversity of nutrients in foods. Badly planned vegetarian nutrition results in several nutritional deficiencies. An individual who is fed as vegetarian may option a manner of nutrition including foods with high fat and low fiber in day. For this reason, it is required to select accurately the foods in food groups in order to ensure diversity in nutrient during day (Table 9.4.). The easiest way for this is increasing diversity of food of the diet during the day. The easiest and the most accurate way to ensure food diversity are to benefit from food groups. At least one of the foods taking place in each of different food groups in each meal.

Vegetarian diets contain high complex carbohydrates, low saturated fat, cholesterol and high unsaturated fat, fiber types and phytochemicals as they comprises plant foods. Vegetarian individuals consume predominantly unrefined cereal products or foods being source of fiber so that whole grain products, unrefined cereals, vegetables and fruits among the foods with carbohydrate should be preferred. While complex carbohydrates existing in structure of these foods ensure more regular rise of blood sugar, the risk of occurrence of chronic diseases like obesity, diabetes, cardiovascular diseases, intestinal cancer decreases through consumption of fiber types (Chapter 2).

Vegetarian individuals have to pay attention while selecting the foods in the cereal group to ensure that they are in the minimum quantity suggested to be consumed per day (Chapter 10). Whole grain bread, bulghur, breakfast cereals, macaroni, brown rice and other whole-wheat products should be preferred among the wholegrain products. Vegetarian individuals also should meet 50-60% of their daily energy intake from carbohydrates (Table 2).

Carbohydrate type is also important as well as the consumed quantity of carbohydrate.

The biggest problem in nutrition of many vegetarians is the failure of their diet to contain adequate quantity of protein in good quality. Lacto-ova, lacto, polo and pesco vegetarians do not encounter big problems in terms of protein when they consume sufficient quantity of milk and dairy products and eggs. But there may be problem for vegans who do not consume any food of animal origin and vegans may consume soya instead of meat. The food which are equivalent of meat (poultry, fish, milk and dairy products, eggs) are rich sources of protein, fat, cholesterol, iron, zinc and vitamins of B group. Vegetarians consuming lean meat and chicken without skin consume products with low fat and cholesterol. Pesco-vegetarians should prefer fishes like salmon, mackerel, haddock, catfish containing less quantity of saturated fat and cholesterol and more unsaturated fatty acid (omega-3) instead of shellfishes.

Vegetarian diets are predominantly based on herbal proteins. Vegetarian individuals may synthesize their body proteins when they consume sufficient quantity of legumes, oil seeds, kernels, cereals, vegetables and fruits among plant foods as well as adequate energy intake during day. Legumes and nuts/seeds which are good sources of protein, contains low total fat and saturated fat and they do not contain cholesterol. Vegetarian who don't consume any food of animal origin, especially vegans, may meet their need for nutrient in this group by consuming legumes and nuts/seeds as alternative to meat. What is important is to ensure diversity of foods containing indispensable amino acids in the vegetarian diets. While indispensable amino acids are existent in amounts to meet needs in foods of animal origin, they are limited in some plant sources. Therefore, especially vegans must meet indispensable amino acids by ensuring diversity of plant foods in their meals.

Vegetarian individuals can fill this gap and ensure protein balance of their diet if they eat some plant foods by mixing them.For example; they take indispensable amino acids to their bodies when they eat bulghur together with dried beans cooked without meat. (Chapter 2: Nutrients).

The daily protein need of vegetarian individuals is 1 g per 1 kg of body weight as same as healthy adults. For example, the daily need of protein of a vegetarian individual whose ideal body weight is 58 kg is 58×1=58 g. In other words, 15-20% of daily energy intake must be met by proteins (Table 9.5).

Omega-3 fatty acids exist in diets of vegetarian individuals, especially vegans less than diets of individuals who are not vegetarian. Only pesco-vegetarians or semi-vegetarians consume sufficient quantity of omega-3 fatty acids. Diets of vegan are insufficient in terms of fishes containing omega-3 but rich in terms of vegetable oils containing omega-6. Loss of balance between these fats may cause some problems in brain development, vision and central nervous system in adolescence. It increases the risk of cardiovascular and inflammatory diseases in adults. Thus, attention must be paid in ratio of n-6/n-3.

At most 25 to 30 % of daily energy must be obtained from fats in vegetarian individuals if no restriction is made because of health problem (Table 9.5). 1/3 of the daily total fat content of the diet should be obtained from saturated fatty acids (like butter), 1/3 from polyunsaturad fatty acids (sunflower seed, maize, linseed oils, soft cup margarine etc.) and 1/3 from monounsaturated fatty acids (olive oil, hazelnut oil etc). Daily intake of cholesterol taken by the diet must not exceed 300 mg.

There is insufficient intake of several vitamins and minerals depending on type of vegetarianism. Different minerals and vitamins exist in content of each food. They have important functions although they are found in very small amounts in foods (Chapter 2: Nutrients; vitamins and minerals).

Individuals having vegetarian nutrition habits must be exposed regularly to sun light as well as individuals having normal nutrition habits. Infants and children with dark skin, elderly, vegetarian individuals being dependant to home and having traditional dressing style and especially vegans must pay attention to take sufficient quantity of vitamin D.

The most serious problem encountered in vegans is insufficiency of riboflavin (vitamin B_2) and vitamin B_{12}. Health problems related to insufficiency of vitamin B_{12} (anaemia, irreversible nervous damage) can arise in individuals practicing vegan diet for longtime. For this reason, diet of vegans must be controlled by a nutritionist in terms of vitamin B_{12}. Vitamin B_{12} is particularly important for elderly having vegan diets, pregnant and lactating mothers and infants and children). For intake and use of fat soluble vitamins A, D, E, K, and synthesis of several hormones ensuring body functions; adequate quantity of fat in appropriate type must be consumed.

Vegetarian individuals must make their food selections carefully. Vegetarians consuming milk and dairy products meet their calcium needs through consumption of daily milk, cheese and yoghurt. Vegan individuals are required to consume foods of other food groups containing calcium sources if they do not consume milk and dairy products sufficiently. Vegetarian individuals are exposed to low risk of fragile bone disease and osteoporosis if they consume sufficient quantity of calcium. Vegans are required to consume plenty amount of green leafy vegetables, fruits with hard nuts and kernels, legumes, whole grain products for important minerals like iron, zinc and calcium.

The most practical way of selecting calcium rich foods other than milk and dairy products is inclusion of about 100 to 150 mg of calcium by each portion of food. A diet may be required to intake foods containing in suggested quantity of calcium in daily basis (Appendix 3.1.1-3.2.1).

Lacto-ova vegetarian diet and semi-vegetarian diet where meat is limited but eggs as well as milk and dairy products take place are generally adequate and balanced. This diet may be inadequate in terms of iron only for women in childbearing age with tendency of anemia as well as children and young individuals. Iron deficiency may occur in vegetarian individuals in the event that they are not fed in balance. Use of iron taken from vegetables and cereals is less than iron in meat. Vegetarian individuals are required to consume legumes, green-leafy vegetables, dried fruits, grape molasses (pekmez), eggs and nuts as iron is absorbed better when it is consumed together with foods containing vitamin C. However, a food rich in vitamin C should be consumed in each meal. Foods which are rich in terms of vitamin C are citrus fruits or their juice, broccoli, tomato and green pepper. Tea or coffee consumed together with meals decrease the absorption of iron and zinc. It will be beneficial to drink beverages like tea and coffee either one hour before or two hours after meals to avoid decreasing iron absorption.

Lacto-ova vegetarians take zinc adequately as they consume milk, cheese, yoghurt and eggs Zinc may be insufficient in vegetarian whose diet doesn't comprise meat, poultry, and sea products. Utility rates of some minerals like iron, zinc and calcium which are necessary for growth and health are also low because vegan diet contains high quantity of fiber.

Fluid needs of vegetarian individuals are not different from those of individuals who are not vegetarian.

9.4.3. Feature of nutrition in vegetarian individual having special condition

There may be various individuals preferring vegetarian diet being elderly, pregnant, lactating, sportive or in growth age (babyhood, childhood and adolescence). There are important points to pay attention in nutrition of each of these individuals having vegetarian nutritional habit.

Nutrition of infants of vegetarian mothers; vegetarian mothers should take care of feeding their infants with their own breast milk. Composition of breast milk of vegetarian mothers are similar with breast milk of mothers who are not vegetarian and they are not equivalent with any other food in terms of nutritional value. If infants cannot fed by breast milk up to 6 month or the mother goes dry, then commercial baby foods can be choosen. Infant formulas, animal milks and soya milk cannot substitute human milk. Because the nutritional values of these foods are not in appropriate rates and are not similar to those of breast milk. Assistance should be taken, in this period, from a dietitian or physician in order to meet the increasing needs of the baby and to ensure sufficient and balanced nutrition of the baby.

Nutrition of vegetarian children; growth and development of children who are fed in lacto-vegetarian type is similar to growth and development of children who are not vegetarian. Growth retardation can occur in children having very strict vegetarian nutritional habit if their daily nutrient intake is not planned well. Protein needs of vegan children are slightly more than that of children who are not vegetarian. No problem arises if these children can ensure adequate energy and diversity of plant foods in their daily diets. Daily protein intakes of vegetarian children out of vegans are relatively less than children who are not vegetarian. But the quantity of protein that they consume can meet daily intake quantity suggested for children when they keep balanced diet. While especially vitamin B_{12} deficiency is observed in children feeding in vegetarian type, calcium deficiency is also added to this in vegan children.

Furthermore, attention must be paid to the intake of nutrients of iron and zinc. Attention must be paid to ensure children to consume milk and dairy products, eggs, vegetables and fruits, nuts/ seeds, and soya and other legumes as well as whole wheat products in order to meet these nutrients. Attention should also be paid in terms of vitamin D deficiency if these children cannot benefit from sunlight adequately.

Vegetarian nutrition of adolescents; Vegetarian children and young individuals need adequate food diversity and energy to grow and develop like one who are not vegetarian. Attention must be paid to ensure growth and to meet the high needs for nutrient of adolescents feeding as vegetarian. Lacto-ova vegetarians can generally sufficient nutrient through the foods that they choose. However, adolescents who has a vegan type nutrition must take care of consuming especially, iron, calcium and vitamins B_{12} and D.

Nutrition of vegetarian pregnant and lactating women; the needs of vegetarian mothers in periods of pregnancy and lactation for energy and nutrients are same with mothers who are not vegetarian. However, vegetarian type nutrition has positive and negative effects on pregnancy. The high quantity of fiber consumed in vegetarian diet prevents the constipation which is frequently observed during pregnancy. Plant foods that vegetarians consume are beneficial for nervous system of infant as they contain folic acid. Vegetarians may consult with a specialist in the matter of taking folate supplement even though they consume more folic acid than individuals who are not vegetarian. It is easy for lacto-vegetarians to take sufficient calcium during pregnancy and lactation period. It is convenient to make further addition of one or two portions from milk group. It is convenient to consume sufficient quantity of sources of vitamin B_{12} of which deficiency affect the health and mother and baby negatively.

Nutrition of vegetarian elderly; Food consumption of vegetarian elderly is not much different from that of elderly who are not vegetarian. While energy needs decrease in vegetarian elderly, their needs for calcium, vitamin D, B_6 and B_{12} increase. Attention must be paid to consume foods containing these nutrients and to benefit sufficiently from sun light. Furthermore; use of linseed, canola oil and soya products ensure obtention of omega-3 fats when fishes and sea products are not existing in elderly individuals' vegetarian diets.

Nutrition of vegetarian athletes; The needs of vegetarian athletes for energy and nutrient must be arranged in consideration of their preferred vegetarianism type and their exercise status. Energy needs of vegetarian athletes are even different with individuals in same age, gender and sports branch. Athletes who fed in vegetarian type consume foods according to a diet containing high fiber and low energy as they consume predominantly plant foods. While the consumption of food with high fiber increase satiety condition of athletes, foods like legumes give discomfort sensation because of their high flatogenic nature. Besides, they increase glycogen storage of muscles better than other foods. For this reason, foods of which starch content increased by refining and composition is later fortified by vitamins and minerals (enriched breads, macaroni etc.), juices sweetened by grape molasses (pekmez) or sugar, pealed fruits and vegetables should be consumed and consumption of foods with intensive energy and nutrients and low fiber should be preferred.

Child, adolescent or adult athletes who adopted vegetarian nutrition may be under risk in terms of several vitamines (riboflavin, vitamins D, B_{12}, B_6) and several minerals (calcium, iron, zinc).

9.4.4. Recommendations

- Vegetarian individuals should ensure food diversity from which they will be able to obtain all nutrients.
- Eggs, legumes, nuts/seeds substituting meat should be consumed in appropriate quantity.
- Foods of two portions containing omega-3 fats should be consumed when fish is not consumed. 1 portion values of them are as follows: 1 tablespoon (10 mL) linseed oil; 1 tablespoon (10 mL) crashed linseed; two handful (60 g) walnut; 1 tablespoon (10 mL) canola or soybean oil.
- A food containing legumes or eggs should be consumed in main dished of main meals.
- At least two types of foods increasing body protein synthesis such as whole grains, legumes, nuts and kernels should be consumed in daily basis.
- Sugar and foods and beverages sweetened by sugar which has high value of energy but has not nutritious value and refined cerealproducts should not be consumed more than need.
- Nuts /seeds should not be consumed more than suggestions because they contain high quantity of fat.
- At least 3 portions of foods being the best source of vitamin B_{12} should be consumed per day.
- Vegetarians with high body weights should consume minimum quantity of sweet food and beverages with high energy but low nutritious value and foods like crisps and mayonnaise with high amount of fat.

- As many foods in Turkish cuisine culture like ezogelin (lentil, bulghur, rice containg) soup, bulghur pilaf with lentils, pancake with spinach (borek), stuffed green pepper with olive oil, rice pudding are prepared by mixing more than one food, they provide vegetarians with appropriate nutrients.
- Assistance should be taken from physician or dietitian in order to ensure intake of vitamin B_{12}, calcium and iron in cases that no food of animal origin is consumed at all.
- Vegetarians in special circumstances like infants, children, adolescents, elderly, athletes and individuals depending to home must necessarily take assistance from a dietitian to be fed sufficiently and healthily.

Table 9.5. Food groups and portion amounts which required to be consumed daily

Food Groups	Portion	Foods
Cereal Group (bread, rice…)	3-6	Bread... 1 medium slice of bread, 50 g Breakfast cereals.....30 g Cookedcereals.....120 g Cooked rice, macaroni.....120 g
Vegetable Group	3-5	Cooked-chopped vegetable...120 g Raw leafy vegetable.....240 g
Fruit Group	2-4	Fruit juice.....180 mL Dried fruits.....60 g Raw-chopped fruit.....120 g Canned fruit.....120 g 1 medium size fruit
Milk and Dairy products Group	0-3	Milk.....240 mL Yoghurt.....240 mL Cheese.....45 g
Eggs, Legumes	2-3	Cooked legumes.....120 g 1 egg..... 50 g Seeds and kernels.....30 g Hazelnut spread.....20 g
Fats- oils, Sugars	Up to the preference	

Table 9.6. Calculation of amounts of nutrients according to dietary energy

Daily energy (kcal/ day)	Carbohydrate		Protein		Fat	
	kcal/day (55%E)	g	kcal/day (15%E)	g	kcal/day (30%E)	g
1500	825	206	225	56	450	50
1800	990	248	270	68	540	60
2000	1100	275	300	75	600	67
2200	1210	303	330	83	660	73
2500	1375	344	375	94	750	83
2800	1540	385	420	105	840	93

Table 9.7 Amont of several essential nutrients existing in one portions of several foods

Nutrient/Food	Amount	Nutrient/Food	Amount
Vitamin	**IU**	**Calcium**	**mg**
Egg: 1 piece -50 g	25	Fat free milk :240 mL	300
Margarine:1 dessert spoon-5g	20	Whole fat milk:240 mL	290
Oily fish, boned: 90 g	10	Yoghurt, with fruit: 240g	315
		Fat free yoghurt:240 g	450
		White cheese: 60 g	210
		Ice-cream:120 g	85
		Milky chocolate:30 g	70
		Green leafy vegetables, cooked: 120 g	40-60
		Legumes, cooked: 120 g	40-65
		Orange : 1 whole	50
		Dried fig: 8 pieces	140
		Tahini: 20 g	85
		Almond: 60 g	140
Vitamin B_2	**mg**		
Fat-free yoghurt: 240 g	1.6		
Fat-free milk: 240 g	0.4		
Egg:1 whole	0.1		
Whole grain flour bread:1 slice	0.1		
Almond: 60 g	0.3		
Vitamin B_{12}	**mcg**	**Omega-3**	**g**
Fish, grilled salmon: 90 g	2.6	Linseed: 1 tablespoon 10 g	2.3
Veal, grilled: 90 g	2.2	Wallnut: 30 g	2.7
Yoghurt, skimmed: 240 g	1.4	Salmon: 150 g	1.6-2.8
Milk: 240 g	0.5	Soybean oil: 3 dessert spoon: 10 mL	0.7
Chicken meat, skinless,baked: 90 g	0.3	Canola oil:1 tablespoon: 10 mL	0.9
Egg: 1 whole -50 g	0.1	Portulaca: 150 g	0.6
Zinc	**mg**	**Iron**	**mg**
Meat, veal, lean: 90 g	4.5	Whole wheat bread: 50 g	1.8
Wheat germ: 60 g	3.5	Wheat germ: 2 tablespoons	0.9
Wheat flour: 120 g	2.0	White bread: 50 g	1.4
Sunflower seed:30 g	1.5	Egg: 1 whole	1.4
Whole milk:240 mL	1.0	Fish, cooked:90 g	1.1
Yoghurt: 240 g	1.8	Chicken, cooked: 90 g	1.4
Tuna fish: 90 g	0.7	Green leafy vegetables, cooked: 120 g	1.1
Egg: 1 whole	0.5	Other vegetables, cooked: 120 g	0.6
Whole grain bread: 1 slice	0.4	Dried fruits: 60 g	1.1-1.5
Legumes, cooked: 120 g	1.0-2.0	Grape molasse: 2 tablespoons	2.5
Soya, cooked: 240 g	1.0	Tahini: 2 tablespoons	2.2
Green leafy vegetables,cooked:120 g	75-125	Legumes, cooked: 120 g	1.7-3.3
Dried fig: 8 pieces	140	Soybean: 120 g	4.4
		Milk,yoghurt: 240 mL	0.3
		Soy milk: 240 ml	1.8
Selenium	**mcg**	**Iodine**	**mcg**
Chicken meat, skinless: 90 g	26	Table salt, iodized, 1/4 tablespoon	100
Brown rice: 120 g	13	Fish, cooked: 90 g	87
Egg: 1 whole	12	Patato, cooked, 1 medium	7
Whole grain flour bread:1 slice	11	Spinach, cooked; 120g	5
Peanut:60 g	3	Almond, 1 handfull, 30 g	4

IU: International Unit; mL: millimeter; g:gram, mcg:microgram; mg:miligram

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CHAPTER 10

APPENDIXES

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TUBER 2015 consist of six Appendixes; Reference Values for Energy and Nutrients for Turkey (Appendix 1), Standard Portion Sizes and Amounts of Foods According to Food Groups (Appendix 2), Recommended Dietary Patterns for Turkey (Appendix 3), Current Nutrient Intakes, Food Consumption Patterns and Physical Activity Levels of Turkey Population based on "Turkey Nutrition and Health Survey (TNHS)" 2010 national representative database (www.sagem.gov[1], Appendix 4) Sample Menu Plans For Different Age Groups(Appendix 5), and WHO Growth Standards (Appendix 6) .

10.1 Determination of Reference Values for Energy and Nutrients for Turkey

Reference values for energy and nutrient intakes constitute the scientific basis of nutritional recommendations. Reference values are determined by considering physiological needs and metabolic demands related to age, gender and special conditions. Nutrients and composition of the diet affect also the risk of disease. Therefore, the epidemiological data had been taken also into consideration beside physiological needs in determination of reference values in recent years (1,2).

Recommended Energy and Nutrient Intakes for Turkey (Appendix 1.1-1.6) were determined by using the scientific opinion reports prepared by EFSA (European Food Safety Authority) for Member Countries of European Union (1,3-28) and the reports (29-34) prepared by Institute of Medicine; Food and Nutrition Board of National Academy of Science for United States of America. Reference values for energy and protein was adapted by considering of measured height and calculated or measured body weight of Turkey population,WHO Growth Standards and food consumption data from TNHS 2010 database. Recommendations were prepared for individuals for two years of age and above.

The dietary reference values are divided under six groups with different titles in the application reports of EFSA and IOM (1,2). These terms used in TUBER 2015 with original abbreviations in Table 10.1

Reference values for energy intake are indicated as "Average Energy Requirement (AR)" in direction of EFSA Panel on Dietetic Products, Nutrition, and Allergies (NDA) opinions and displayed in Appendix 1.1.1-1.1.4. The contribution of macronutrients to energy are indicated as "Recommended intake ranges for macronutrients" (Appendix 1.3)., For other nutrients; reference values determined by authorized institutions (RDA/PRI or AI values) are considered as "Adequate Intakes for Turkey" (Appendix 1.2.1, Appendix 1.4.1., Appendix 1.5.1-1.5.2) "Tolerable Upper Intake Levels (UL)" (Appendix 1.5.3 and 1.5.4) and "Average Requirements"(Appendix 1.5.5).

[1] *Ministry of Health General Directorate of Health Research, HacettepeUniversity, Faculty of Health Sciences, Department of Nutrition and Dietetics, Ankara Numune Training and Research Hospital. Turkey Nutrition and Health Survey 2010: The Final Report of Evaluation of Nutrition Status and Habits. Ministry of Health Publication No: 931, Ankara 2014.*

Tablo 10.1. Dietary reference values

IOM (Institute of Medicine)	EFSA (European Food Safety Authority)	Explanation
DRI Dietary Reference İntakes	**DRV** Dietary Reference Values	***General Name;*** ***"Dietary Reference Values" or "Reference Values of Energy and Nutrients"***
RDA Recommended Dietary Allowances	**PRI** Population Reference Intakes	***Recommended Dietary Allowance:*** It refers to the amount of nutrient meeting requirement of nearly all (97.5%) of the individuals in the population. • Recommended Dietary Allowances (RDA/PRI) are used to plan the nutritional patterns to meet the requirements of the individuals in the population. The prepared nutritional patterns/plans are patterns which ensure reference values in adequate levels (with very low risk of inadequacy) and which keep the excess risk potential in minimum. [1,6] • RDA/PRI amounts are not recommended to be used in determination of inadequate intake frequency of nutrients.
EAR Estimated Average Requirement	**AR** Average Requirement	***Estimated Average Requirement:*** It refers to the amount of nutrient meeting the requirement of half of the individuals (50%) of the population. • Estimated Average Requirement (EAR/AR): It is used to provide with opinion on adequacy of intake condition of nutrients in the population, in other words to estimate the inadequate intake frequency under the names of EAR cut-off point method or AR cut-point method.[2,6]
AI Adequate Intake	**AI** Adequate Intake	***Adequate Intake:*** Adequate Intakes are established for the cases that Recommended Dietary Allowances and Estimated Average Requirement can not be determined. This amount is established by examining the "amounts of daily average intake" of healthy individuals of the population. • Quantity of adequate intake is used to reveal the situation of the individuals of the population who take nutrients in adequate level.[3,6]
RI Reference Intakes Ranges for Macronutrients	**AMDR** Acceptable Macronutrient Distribution Ranges	***Reference Intakes Ranges for Macronutrients:*** It is expressed as % rate of energy intake. It is the intake range which is deemed to be related with sustaining health and low risk of for several chronic diseases. • It can be used to evaluate the status of fields on, below or above the reference intake range of macronutrients of population. [4]
UL Tolerable Upper Intake Levels	**UL** Tolerable Upper Intake Levels	***Tolerable Upper Intake Level:*** It show the upper limit of nutrient amount which is established not to make adverse effect on human health when it is taken continuously with foods and food supplements.[5] • Tolerable Upper Intake Level is used in evaluation of nutrients of dietary patterns established for the population and the quantity taken with diet+supplement in individuals using dietary/foof supplement. Shortly, it is the amounts of nutrients stemming from food+enriched food + food supplement. Minerals stemming from water content are also added for minerals.

[1] See Appendix 3.4.3, Appendix 4.2.8, Appendix 1.1.1-1.1.4

[2] See Appendix 4.1.1 – 4.1.14

[3] See Appendix 4.2.1- 4.2.7

[4] See Appendix 4.3.1-4.3.2

[5] See Appendix 4.4.

[6] See Appendix 1.2.1, Appendix 1.4.1, Appendix 1.5.1-1.5.2

Reference No: 1-6

10.1.1. Determination of reference values for energy intake

Reference Reference values for energy intake are displayed in Appendixes 1.1.1-1.1.4 for children, adolescents and adults regarding to age groups, gender and physical activity levels.

Average Energy Requirement is determined with reference to total energy expenditure by use of factorial method (3). As geographic, economic and cultural differences in population are effective on height, body composition and habitual physical activity level, WHO/FAO/ UNU-2004 Expert Committee suggests the use of factorial method in the estimation of total energy expenditure (Table 10.2) (35, 36).

Resting metabolic rate were calculated with Henry-2005 equations according to age and gender (37 36), median, 5th, 25th, 75th, 95th percentiles of measured heights and calculated body weights according to the body mass index of 22 kg/m^2 , as the midpoint of healthy range of BMI between 18.5 and 24.9 kg/m^2 for adults and median and 85th percentile of heights and weights in WHO-MGRS 2006- 2007 Growth Standards of World Health Organization for children aged 2 - 18 years (38).

36. WHO (World Health Organization), 2000. Obesity: preventing and managing the global epidemic. Report of a WHO consultation. WHO Technical Report Series No. 894, 253 pp.

EFSA-NDA Panel 2013 (3) suggests that habitual physical activity level of the population should be considered in the calculation of energy expenditure as multipliers of resting metabolic rate and the less active or sedentary individuals should be promoted to reach the recommended physical activity level. Therefore, the data from the TNHS 2010 database concerning energy expenditure of adults were analyzed, it was observed that the PAL value of 50th percentile of men and women between 18 and 59 years old were on the range of 1.45-1.5 (sedentary lifestyle with low activity) and that physical activity further decrease (PAL: 1.32-1.44) at above ages (Appendix 4.8.1-4.8.2). In this context, it is possible to argue that the average energy requirement of adult males and females in Turkey correspond the values taking place in the low activity in Appendix 1.1.3 and Appendix 1.1.4 (PAL=1.4)

It was noted in the report of WHO/FAO/UNU Expert Committee-2004(35, 36) that habitual physical activity level of 1.70 or higher is associated with the lower risk of obesity, cardiovascular disease, diabetes and some

Table 10.2. Calculation of total energy expenditure by using factorial method [1]

Children and Adolescents						
Total Energy Expenditure (kcal/day)	=	*Resting Energy Expenditure (kcal/day)*	x	*PAL (Physical Activity Level)*	x	*0.01 (Growth Coefficient)*
Adults						
Total Energy Expenditure (kcal/day)	=	*Resting Energy Expenditure (kcal/day)*	x	*PAL (Physical Activity Level)*		

Factorial Method, has been taken from EFSA NDA Panel 2013. Scientific Opinion on Dietary Reference Values for Energy. EFSA Journal 2013;11(1):3005 [112 pp.].

Table 10.3. Henry 2005 equations used in calculation of resting energy expenditure[2]

Children and Adolescents Resting Energy Expenditure (kcal/day)		Adults Resting Energy Expenditure (kcal/day)	
Gender and Age Groups (year)[4]	**Equation**	**Gender and Age Groups (year)[4]**	**Equation**
Boys		**Men**	
0-3	28.2 x body weight (kg) + 859 x height (m) - 371	**18-30**	14.4 x body weight (kg) + 313 x height (m) + 113
3-10	15.1 x body weight (kg) + 74.2 x height (m) + 306	**30-60**	11.4 x body weight (kg) + 541 x height (m) - 137
10-18	15.6 x body weight (kg) + 266 x height (m) + 299	**>60**	11.4 x body weight (kg) + 541 x height (m) - 256
Girls		**Women**	
0-3	30.4 x body weight (kg) + 703 x height (m) – 287	**18-30**	10.4 x body weight (kg) + 615 x height (m) - 282
3-10	15.9 x body weight (kg) + 210 x height (m) + 349	**30-60**	8.18 x body weight (kg) + 502 x height (m) - 11.6
10-18	9.40 x body weight (kg) + 249 x height (m) + 462	**>60**	8.52 x body weight (kg) + 421 x height (m) + 10.7

[1] The term of Resting Energ Consumption has been used in substitution for Basal Energy Consumption. EFSA NDA Panel 2013. Scientific Opinion on Dietary Reference Values for Energy. EFSA Journal 2013;11(1):3005 [112 pp.]

[2] Henry CJ. Basal Metabolic Rate Studies in Humans: Measurement and Development of New Equations. Public Health Nutr. 2005 Oct;8(7A):1133-52.

[3] Age limits (0-3 years, 3-10 years, 10-18 years) in Henry 2005 equations coincide. Resting metabolic rates were calculated in 0-<3 years old children with the equation recommended for ages 0-3 years, in 3-<10 years old children with the equation recommended for ages 3-10 years, and in 10-18 years old individuals with the equation recommended for ages 10-18 years, in 18-29 years old adults with the equation recommended for the ages of 18-30 years, in 30-39, 40-49, and 50-59 years old adults with the equation recommended for ages 30-60, and in 60-69 and 70-79 years old individuals with the equation recommended for ages ≥60. EFSA NDA Panel 2013. Scientific Opinion on Dietary Reference Values for Energy. EFSA Journal 2013;11(1):3005 [112 pp.]

cancer types. The "Lifestyle Classification" where PAL values are defined to emphasize the importance of Physical Activity Level Protect Appendix 4.8.3. Activities to be performed to raise the low active PAL to a desirable level and the contributions of regular exercise to PAL of sedentary adults are given in Appendix 4.8.4 - 4.8.6 8(39, 40)

EFSA-NDA Panel 2013 (3) suggestions are referred for determination of average energy requirement in children and adolescents. In Appendix 1.1.1 and Appendix 1.1.2,the average energy requirement is shown; in low activity (PAL=1.4) category for children aged 2 - 3 years; in low active (PAL=1.4) and moderately active (PAL=1.6) categories for children 4 years of age ; in low active (PAL=1.4), moderately active (PAL=1.6) and active (PAL=1.8) categories for children aged 5 - 9 years; in at least moderately active (PAL=1.6), active (PAL=1.8) and very active (PAL=2.0) categories for children 10 to 18 years of age.

10.1.2. Determination of reference values for protein

Determination of protein requirements per body weight

"Population reference intakes (PRI) (g/kg)" by EFSA NDA Panel 2012 (4) is considered as protein requirement per body weight for individuals who consumed high quality protein (Digestible Indispensable Amino Acid Score; DIAAS=100).

Calculation of total protein requirement

Recommendations for protein intake according to age, gender and body weight calculated through measured median body weights from the database of TNHS 2010 for adults and median body weights of children aged 2-18 years from Growth Reference Standards of WHO-MGRS 2006-2007 (38)

Protein quality estimation of dietary pattern of poputaion

It is reported that the protein quality is related with short- term health outcomes,such as growth, tissue repairment, immune function, physical and mental performance, detoxification of chemicals, antioxidant system and long-term health outcomes; such as, lineer growth, menarche, age related functional losses related with muscle and bone mass, immune system , decline in cognitive functions and nutrition related chronic disease(41, 42).

Protein quality is affected by digestibility , quantity and the pattern of indispensable amino acids (IAA). Digestibility of indispensable amino acids in foods of animal origin is high.The quantity and the patterns of indispensable amino acids in these foods completely meet the requirement for indispensable amino acids needed with respect to age and gender (DIAAS= 100) (42).

Digestibility of indispensable amino acids in plant foods is low and some of the indispensable amino acids (for example;lysine in cereals and sulphur containing amino acids in legumes) exist limited amount DIAAS may remain under 100 in diets where plant protein intake is high and animal protein intake is low. (42).

The protein sources of average diet of Turkey were examined in TUBER 2015 by using daily food consumption data of TNHS 2010 and DIAAS (Digestible Indispensable Amino Acid Score) of the diet as specific to population was calculated. It was seen that 58% of total protein intake is provided by plant foods in the diet. The share of 40% of this rate provided from cereals including especially refined cereals which are poor in terms of lysine. Consumption amount of legumes which might meet the deficit is low; its contribution to protein intake was observed as 3.7%.

Foods of animal origin being rich in terms of indispensable amino acids are consumed rarely and/or in small amounts by the majority of the population. DIAAS value of the diet as specific to the population is calculated.

Digestible indispensable amino acid scoring method and digestibility rates of raw protein were used while calculation was made (42,43). DIAAS value of average diet of Turkey was found as 83 for lysine. It was observed

that average DIAAS of women was lower than men. The frequency of individuals of whom DIAAS values of diets were 100 or above was 24% across the country, 20% in women and 27% in men.

The protein quality of the diet is an important factor in the determination of protein requirement. It was noted in the report of Expert Committee of FAO (42) that recommended amounts for protein intake can be arranged when the digestible amino acid score is below 100. As DIAAS was found as 83 in average diet, the “Adequate Amounts of Intake for Turkey” were calculated by performing arrangement in the values of EFSA NDA Panel 2012 (4) PRI with reference to this value (Appendix 1.2.1).

Determination of “Reference Lower Limit of Protein/Energy Ratio”

Average protein requirement according to age and gender by EFSA, energy intake values (kcal/day) from food consumption data of TNHS 2010, median body weights of adult women and men with respect to age from TNHS 2010 , median body weights of children and adolescents from Growth References and Standards of WHO-MGRS 2006-2007 were used for determination of “reference lower limit of Protein/Energy Ratio”. (44)

Determination of “reference value of upper limit” of Protein/Energy Ratio

EFSA NDA Panel 2012 (4) opinions were taken as basis for this and the protein/energy ratio of 97.5 percentile calculated through the food consumption data of TNHS 2010 were considered as higher limit (Appendix 1.2.1).

10.1.3. Determination of reference values for micronutrients and other macronutrients

The Adequate Intakes for Macronutrients and Micronutrients and Recommended

Intake Ranges for Macronutrients were compiled from scientific opinion reports of EFSA and IOM (5-27, 29-34). They are displayed in Appendix 1.3.1, 1.4.1., 1.5.1 and 1.5.2 . The upper tolerable intake level for micronutrients compiled from IOM and EFSA reports (28-34) are displayed in Appendix 1.5.3 and Appendix 1.5.4. Estimated average requirements for nutrients are taken from reports of scientific opinion prepared by EFSA-NDA Panel (4,9-11, 14, 20, 23) and from reports prepared by IOM-Food and Nutrition Board (30,31)and they are given in Appendix 1.6.

10.2. Determination of Standard Portion Sizes and Amounts of Food Groups

10.2.1. Definition of standard measurement tools

Definition of the standard measurement tools is requared for the determination of standard portion size of foods. However, in Turkey standard measurement tools and weighing instruments are not used

generally in food preparation and service Portions amounts of foods or meals are expressed through service equipments which exist in everybody's home such as glass, bowl spoon, and ladle.

Expansion of portion sizes of food and beverages in market and restaurant chains in developed and developing countries especially in America for the last 30-35 years (45,46) have reflected on sizes and diversity of home type service equipments and materials in Turkey, examples from Turkey related to sizes of tools used in food preparation, may be listed as follows.

- **Glass and bowl sizes in Turkey:** When the catalog of a firm manufacturing kitchen devices was examined it was observed that volumes of tea glasses,water glasses, beverage glasses used as water glasses in homes and bowls as specific to Turkey varied respectively between 85-165 mL, 200-560 mL, 160-490 mL ve 130-600 mL (47).
- **Plate types and sizes in Turkey:** There are different sizes of plates for sale in the markets, it was observed that their diameter measures varies between 18-23 cm in soup plates and between 20-22 cm in dinner plates. It was seen that a very large new plate size up to 35 cm under the name of service plate had been added to the group of dinner plates.
- **Tablespoon sizes in Turkey:** The tablespoons manufactured in Turkey are not standardized. It was determined that as there are differences between firms, there are also differences from imported similars. It was observed that the volumes of tablespoons had gradually decreased with respect to the similars manufactured 35-40 years before (volume of 1 tablespoon had decreased from 15 mL to 10-12 mL).
- **Ladle sizes in Turkey:** Ladle sizes used at home are not standardized in Turkey. Ladles are generally manufactured or imported by several firms as sauce ladles or meal ladles (numerated according to diameters and depths) for organizations providing mass catering service. Numbering form of ladles manufactured in Turkey is similar to that of imported ladles,however it was observed that their volumes corresponding same numbers were lower than the imported ones. It was established in the comparison of products of two manufacturers that ladles manufactured in Turkey are similar.It is not possible that food and beverage portions are explained accurately to our people in this diversity through nonstandardized tools and that our people apply them properly. For this reason, it was found convenient to define several "portion

control tools" in their standard size for TUBER 2015. These measuring tools are displayed in

Appendix 2.2 in their original sizes (Appendix 2.2.1-2.2.11).

These measuring tools are displayed in Appendix 2.2 in their original sizes (Appendix 2.2.1-2.2.11).

TUBER 2015 Measuring Tools

Size of soup bowl and service plate: It is in a dimension to allow an healthy portion in service (Appendix 2.2.5-2.2.6). Use of larger service plate should be avoided.

Larger portions of food and beverages contributes to the increasing prevelance of overweight and obesity problem in the population by increasing energy intake. The Ministry of Health of Republic of Turkey and international authorities give the message "Reduce your portion sizes" to people to be protected from obesity. (48-50). In this context, portion estimates may be enabled by comparing the sizes of bowl, plate, glass defined in TUBER 2015 in their original sizes with their alternatives used in every home and the messages to reduce portions may be applied for efficiently.

Cup size: 240 mL being one of the international standard serving tools was considered and selected and the dimensions

of a glass with handle in similar volume sold in Turkey are defined in Appendix 2.2.1. It would be helpful to keep a glass defining the size of 1 cup in kitchen of each consumer who prepare and serve food.

Cup is the main measuring tool used to define the standard portion/ serving in all food groups (Appendix 2.2.1

Examples

In the milk-yoghurt-cheese group (Appendix 2.1.1);

- 1 standard portion size of milk and yoghurt = 1 cup

In the meat-poultry-fish-legumes-eggs-seeds-nuts group (Appendix 2.1.3);

- 1 standard portion size of cooked legume = ¾ cup

In the bread-cereals group (Appendix 2.1.5);

- 1 standard portion size of rice and macaroni, cooked = ½ cup
- One standard portion size of soup = ¾ cup (180 mL)

In the vegetables group (Appendix 2.1.7);

- 1 standard portion size of cooked vegetables = 1 cup
- 1 standard portion size of raw leafy vegetables =2 cups
- 1 standard portion size of other raw vegetables = 1 cup

In the fruits Group (Appendix 2.1.9);

- 1 standard portion size of chopped or small ones = 1 cup

Cup volume was used also to identify sizes of other measuring tools.
Examples:

- 1 fist (Appendix 2.2.8.) = 1 cup
- 1 small bowl; diameter:14-16 cm, volume: 240 mL (Appendix 2.2.3) = 1 cup
- 1 large bowl; diameter: 18-22 cm, volume: 480 mL (Appendix 2.2.4) = 2 cups
- 1 large glass; volume:360 mL (Appendix 2.2.2) = 1.5 cup

Size of small bowl: Bowls (diameter range; 14-16 cm)which intake the foods in the same volume of cup has been considered as alternative of 1 cup by considering serving mode and scaling of measuring tool for fruits, yoghurt and soup.

- a small bowl of 14 cm diameter is convenient for soup service,
- a small bowl of 16 cm diameter is convenient for fruit and yoghurt service

For estimation of the quantity of 150 g (1 standard portion) of small or chopped fruits, to make measuring in a small bowl instead of cup will give better results.

180, 200 and 240 mL are marked on the figure in Appendix 2.2.3.

Size of large bowl: A bowl size which can intake the volume of 2 cups (480 mL) is defined as large bowl by considering serving mode and measuring facility of leafy vegetables like lettuce, purslane or spinach. Volume of 480 mL in the bowl is marked on the bowl figure(Appendix 2.2.4). It is possible to encounter in the market to bowl forms of which diameter can vary with respect to depth or shape. Consumers are recommended to compare the bowl types at their home with the pictures and to test and recognize their sizes measuring by 2 cups of water for large bowl, and 1 cup of water for small bowl.

Sizes of ladles: Very small, small and medium sized ladles in diameters of 7, 8, 9 cm respectively were used in defining standard portions sizes by indicating numbers, diameters and depths in Appendix 2.2.7. These ladles are manufactured for mass catering institutions in Turkey and they may be procured from related sale points to be used at homes.

Very small ladle = Sauce ladle, number 3 , 7 cm in diameter and 2.5 cm in depth = 60 mL= ¼ cup

- It is convenient for breakfast cereals.
- 1 standard portion of oatmeal = 1 level very small ladle = 30 g
- 1 standard portion of wheat/rice flakes = 2 level very small ladles = 30 g
- 1 standard portion of cornflakes = 4 level very small ladles = 30 g

Small ladle = Meal ladle, number 1 ; 8 cm in diameter and 3.2 cm in depth = 90 mL = Volume of 2 small laddles = ¾ cup

- It is convenient for meals of legumes.
- 1 standard portion of legume meal = 2 small ladles = 130 g

Medium ladle = Meal ladle number 2; 9 cm in diameter and 3.2 cm in depth = 120 mL = ½ cup

- It is convenient for rice, bulghur, pasta and cooked vegetables.
- 1 standard portion of rice or bulghur = 1 level medium size ladle = 90-110 g (garniture portion)
- 1 standard portion of pasta = 1 level medium size ladle = 75 g (garniture portion)
- 1 standard portion of cooked vegetables = 2 level medium size ladles = 150 g

10.2.2. Using of hand method in portion estimation

Another method in defining of portion sizes is using of terms like medium size, small size and large size; for example; 1 medium size apple, 1 small size potato.However, it was established that these terms are not explicative enough and they might be perceived in different size even by persons who are educated in the matter of nutrition (51). For this reason, it is noted that use of comprehensible hand sizes like fist,finger and handful might increase accuracy in estimation (52).Despite hand sizes vary between individuals,it will be easier to ensure standardization as the own sizes of the person will remain unchanged. Standard portion sizes and amounts of foods regarding to food groups are expressed in Appendix 2.1.1, 2.1.3, 2.1.5, 2.1.7, 2.1.9, 2.2.8 -2.2.11).

10.2.3. Portion sizes and amounts of foods in the group of milk,yoghurt and cheese

1 standard cup of milk and 1 standard bowl of yoghurt are equivalent to 60 g white cheese and 40 g of kashar cheese. Equivalent amounts of milk, yoghurt and cheese are the amounts containing in similar level of energy . Standard portion sizes and amounts of cheese are displayed through finger sizes and dimensions in Appendix 2.1.1.

- While finger sizes are used, dimension of cheeses in a standard portion may be considered as similar for white and kashar cheese.
- ½ standard portion white cheese may be defined as 1 matchbox size.

10.2.4. Portion sizes and amounts of meat, poultry, fish, legumes, and nuts or seeds

Meat, poultry and fish: Standard portion amounts are as cooked and/or raw weight size. Standard portion of cooked meat and chicken is defined by the palm size of hand while standard portion of fish is defined by size of hand (Appendix 2.1.3).

- For meat, chicken and fish ; 30% loss related to bone and 30% loss related to cooking was accepted. Standard portion amount of meat and chicken is deemed as equivalent to 100 g of raw meat as an whole piece, 115 g of raw minced meat or meatball mixture, 165 g of raw boned meat.

1 standard portion of boneless meat; 75-80 g cooked meat in 1 palm size of hand, with diameter of 9-10 cm and 1 cm in thickness = 100 g raw meat, 11-12 cm in diameter and in 1 cm of thickness

1 standard portion of minced meat or one of big meat ball ; 1 palm size (9-10 cm in diameter and 1 cm in thickness) 75-80 g cooked hamburger meatball = 115 g of raw minced meat or meatball mixture with diameter of 11-12 cm and 1cm in thickness.

1 standard portion of smaller meat balls ; 4 meat balls; each of cooked ones, 5 cm in diameter or total 80g cooked = each of raw ones; 6.5 cm in diameter or total 115 g of raw meatball mixture

- 1 standard portion of cooked fish is considered as equivalent to 250-300 g of non-cleaned for small or medium size fishes.

1 standard portion of cooked fish; A thin slice in one hand size (16-17 cm length x 8 cm width x 1 cm thickness) or a thick slice in one palm size (10 cm length x 8 cm width x 2-2.5 cm thickness) = 150 g (Appendix 2.2.9.)

- 1 standard portion of cooked legume is 130 g and it corresponds to 50 g of raw legumes. It is equal to 1 portion of main legume dish of standard recipies in traditional cousine or in mass catering (53,54).

1 standard portion of cooked legume; ¾ cup = 130 g = 8-10 tablespoons = 2 ladles ; ladle “number 1” or 1 small ladle with diameter of 8 cm, made in Turkey (Appendix 2.2.7) It is recommended to measure legume dishes for serving by ladle instead of tablespoon to ensure easiness and accuracy in measuring.

- 1 standard portion of egg= 100 g = 2 eggs

Eggs are classified according to their weight in the Turkish Food Codex Egg Legislation (55). XL: extra large eggs >73g; L: large eggs >63 – <73 g; M: medium eggs> 53 – <63 g and S: small eggs <53 g.1 standard portion is equal to two small eggs according to this classification (55)**.**

The serving amount of eggs is generally is "one whole egg" in Turkey. Standard portion quantity is identified as 2 pieces. The reason of this is to ensure similarity with other group members in terms of energy and protein. It is suggested to children and adolescents to consume ½ portion per day and to adults to consume 4-5 eggs per week.

Energy equivalence of 1 standard portions of foods in the group of meat, poultry, fish, legumes, nuts or seeds

Although the energy values of 1 standard portion of the foods included in this group vary between 150 and 200 calories in average, it is at the level of 90 kcal/portion in breast meat of poultry and 125 kcal/portion in low fat red meat. (Appendix 2.3.1).

- Red meat and chicken in this group may substitute each other according to preference .
- Despite energy value of 1 standard portion of fatty fish (150 g),it is consumed in substitution for 80 g of meat or chicken corresponding 1 standard portion.
- It is not recommended to prefer chicken or read meat in substitution for fish. Weekly fish allowance is tried to be met.
- Eggs may be used in alternation of red meat or chicken. (Appendix.2.1.4).
- Daily recommendations of consumption are also given for legumes and seeds.
- It is not recommended to fill the allowance of legumes with meat or chicken to meet the total portion number of the group. Legumes should be consumed every day as stated in Appendix 3.1.1 or in a manner to fill 3-3.5 standard portions in a week.
- It convenient to consume legumes in substitution for bread-cereals when it is required to consume them more than weekly total portion number. In this case, 1 standard portion of legume meal = 1 standard portion of bread and cereal).
- It is not recommended to fill the allowance of nuts or seeds with meat or chicken to meet the total portion number of the group. In other words, seeds or nuts should be consumed every day as stated in Appendix 3.1.1 or in a manner to fill 3.5 standard portions in a week.

Equivalence of protein content of foods in the group of meat, poultry, fish, eggs,legumes, nuts-seeds (Appendix 2.3.1)

- It should not be forgotten that protein amount in 1 standard portion of legumes or nuts-seeds will remain lower than meat types or fish equivalents in this group is maintained on the basis of energy content.
- 1 standard portion of cooked legume is similar with 1 standard portion of egg in terms of protein content; half of the protein amount in 1 standard portion of red meat and chicken or it contains ⅓ of protein amount of one standard portion of fish.
- 1 standard portion of nuts or seeds contains protein as ¼ of 1 standard portion of red meat.

10.2.5. Standard portion sizes and amounts of bread and cereals

1 standard portion of bread types 50 g = 2 thin slices. This quantity is considered as equivalent to ½ cup of cooked rice or macaroni, 2 standard bowl of soup, 30 g of breakfast cereals.

1 standard portion of rice, bulghur and pasta as raw weight are 30 g for rice and macaroni and 25 g for bulghur.

1 standard portion of rice, bulghur and macaroni correspond to the quantity served as garniture or 1 small portion in the traditional cuisine. The pilaf or macaroni is served as second dish after main dishes like meat, vegetables, and legumes at home or in institutions performing mass catering and serving size is equal to 2 standard portions(53, 54).

10.2.6. Portion sizes and amounts of fruits and vegetables

Standard portion amounts of fruits and vegetables were determined by considering serving amounts of fruits and vegetables in the traditional cuisine. These amounts are in same time the amounts which may be expressed ***by sizes of cup, fist, small and large bowl.*** Amounts which are included in one standard portion are ***edible amounts.***

1 standard portion of fruit = 150 g = 1 small bowl (for small ones or chopped ones) = 1 cup = 1 fist (for large ones)

- This amount is consistent with the serving amount in the cuisine of Turkey.

1 standard portion cooked vegetable = 150 g = 1 cup = 4-5 tablespoon = 2 medium size ladle.

- This amount is consistent with the amount served as first or second dish in traditional menus (53, 54).

1 standard portion of raw vegetables (except leafy ones)) = 150 g = full of one small bowl

- **1 standard portion of green leafy vegetables, chopped and raw** = 75 g = 2 cups = 1 large bowl = 2 small bowls.
- Raw green leafy vegetables differ from other vegetables because they are very voluminous.
- Vegetables of this kind weigh as half of other raw vegetables which are not leafy even though they are served in two times more voluminous.
- For this reason, their serving amounts as raw are considered as ½ of standard portion of raw - cooked other vegetables or cooked gren leafy vegetables

1 standard portion of potato or corn = 90 g

- Their portion amounts are smaller than others as their energy values are higher.

10.3. Establishment of Dietary Patterns for Turkey

TUBER 2015 Dietary Patterns (Appendix 3.1.1) were established

- consideration of portion numbers which meet the requirements of nutrients with respect to energy level, which is observed through evidence based data to decrease risk for disease and to promote health,
- allowing economic preferences and accessible in direction of seasonal differences.
- selecting

✓ semi-skimmed or full-fat products from the group of milk-yoghurt-cheese

✓ low fat ones for meat and chicken and fatty fish from the group of meat-poultry-fish-eggs-legumes-nuts-seeds

- targeting consumption of

✓eggs as ½ portion (1 small size) per dayfor children and adolescents and 4-5 small eggs per week for adults

✓ ¼ - ½ portion of legumes and ¼ - ½ portion of seeds-nuts per day for all energy levels

✓ whole grain/whole wheat bread and cereals instead of refined ones

- prioritizing

✓ the variety and compliance with WHO recommendations in the group of vegetables and fruits

✓ compliance with WHO recommendations in free or added sugar consumption

10.4. Assigning of essential energy and optional energy components of 1000-3200 kcal dietary patterns

The total energy content of dietary patterns (1000-3200 kcal) consist of either solely the energy coming from foods rich in essential nutrients and health protective components (nutrient dense foods) or the total of the energy coming from nutrient dense foods + from other foods(35). Other foods are referred as optional foods or optional preference foods in TUBER 2015 (Appendix 2.1.11).

Essential and optional components of dietary patterns

Essential energy is defined as energy provided by foods and oils which are rich in terms of nutrients and health protective components. Essential energy sources of diet meet almost all essential nutrient requirements or recommendations in terms of protein, fiber, essential fatty acid and micronutrients. Establishment of dietary pattern through essential energy sources is main principle in preparation of dietary patterns. However, it might be necessary to include other foods in higher energy levels of dietary patterns according to need.

- When total energy from nutrient dense foods is subtracted from the total energy level targeted with respect to age and gender and varying between 1000 and 3200 kcal, it remains energy to be assigned for optional pereference foods. Beverages with added sugar, other foods with added sugar , foods prepared by refined cereal products, potato products which are rich in starch and salt and processed meats are included in this category. These foods are generally rich in terms of free sugars,other refined carbohydrates, sodium, saturated fats and they may contain trans fatty acids and poor in essential nutrients and health protective components
- Consumption in high quantity of free sugars prevents adequate intake of essential energy and nutrients and causes increases in positive energy balance and increases in body weight and results in tooth decays (56-63).

World Health Organization recommends consuming free or added sugars low during lifetime, to ensure the consumption of free sugar by diet represents at a rate lower than 10% of total energy intake in children and adults. WHO recommends to take the sugar consumption to a level lower than 5% in next step if possible (56).

Total amount of sugar in the diet consists of the total of free sugars intrinsic sugars and the sugar in milk.

Free or added sugars are defined as all mono and disaccharides added by food producers and cookers to food and beverages as well as natural sugars existing in honey, fruit juices and fruit juice concentrates.

Energy adequacy of dietary patterns and allocation of essential and optional energy components of dietary patterns in TUBER 2015 are displayed in Appendix 3.1.2.

Assigned energy to optional preference foods can be lowered by consuming higher amounts of seeds-nuts. They are perfect snack foods rich in nutrients and health protective components.

Upper serving sizes of nuts-seeds (numbers displayed between parentheses) in Appendix 3.1.1 are accepted as achievable and sustainable amounts in economic preferences. Essential and optional energy components of 1000-3200 kcal dietary patterns were calculated separately for semi-skimmed and full-fat dairy products in consideration of recommendations of EFSA and WHO (64-65) and they are displayed in Appendix 3.1.2.

EFSA NDA Panel 2012 (5) recommended consumption in minimum amount of saturated fatty acids as possible in diet. This recommendation was adopted also by TUBER 2015. It is observed that the percent rate of saturated fats in energy levels are respectively 9, 9, 9, 8, 8, 8, 8, 8, 7, 7, 7, 7 when the foods of the group of milk-yoghurt-cheese are selected from the semi-skimmed products in order to control the saturated fatty acids intake. (Appendix 3.1.2) in low level and they are respectively 13, 14, 12, 12, 12, 12, 11, 11, 10, 10, 10, 10 in case of selection from full-fat products of the same group. While calculating these values,low-fat alternatives of chicken and red meat are selected and calculated and they are given for the purpose of comparison.

In a report published by Global Burden of Diseases Nutrition and Chronic Diseases Expert Group (NutriCoDE) (66) it was underlined that higher intake of trans fatty acids and lower intake of n-6 fatty acids affect essentially the global mortality of cardiovascular diseases and that excess of saturated fatty acids is effective in a lower rate on the mortality of coronary disease. It was noted as another important result that when decrease in saturated fatty acids in the diet is targeted the cardiovascular benefits of this is persuasive only in case of replacement with n-6 polyunsatured fatty acids, that increase in refined carbohydrate sources in the diet in case of decrease of saturated fatty acids would create more dangerous results than high quantity of saturated fatty acids. Cardio-metabolic benefits of extra virgin olive oils being an important part of Mediterranean diet and seeds were further emphasized (66).

When the data from TNHS 2010 were examined, it was seen that the frequency of who consume saturated fatty acids at or above the rate of 10% is above 50% in all age groups and across the population (Appendix 4.3.6). The frequency of individuals who consumed sugar at the level corresponding 5-10% of the energy is on the range of 30-40% while this percentage is on the range 30-40% in the individuals who consumed sugar at the level corresponding 10-20% in all age groups. The frequency of individuals who consumed sugar at the level corresponding more than 20% of the energy is below 10% (Figure 4.3.7). This situation reveals the importance of determination of the share of optional calories.The energy and nutrient contents of optionally consumed foods in Turkey are displayed in Appendix .3.2 and their portion sizes are shown in Appendix.2.1.11. The food composition analysis studies performed in Turkey, Food and Nutrition Photograph Catalog, label information of foods,Nutritional Information System (BEBIS-7),the National Database of Food Composition (TURKOMP) were used in preparation of tables of Appendix 2.1.1 and Appendix 2.3.3.(67-73).

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* We thank to Mrs. Canan ÖZDEMİR ÜNAL for preparing training materials taking place in the Appendixes of this book.

Appendix 1

Reference Values of Energy and Nutrients for Turkey

Appendix 1. 1. Reference Values For Energy

Appendix 1. 1. 1. Energy requirements and energy reference values according to physical activity levels for boys and adolescents[1,8]

Age (year)	WHO-MGRS 2006-2007			Resting Energy Expend [4,5] (kcal/day)	Total Energy Expenditure (kcal/day) [2]			
	Percentiles	Height[3] (cm)	Body Weight[3] (kg)		Low Active (PAL= 1.4)[6,7]	Moder. Active (PAL= 1.6)[6]	Active (PAL= 1.8)[6]	Very Active (PAL= (2.0)[6]
2	**Median**	**87**	**12.2**	**721**	**1017**			
	85th percentile	90	13.7	791	1115			
3	**Median**	**96**	**14.3**	**823**	**1160**			
	85th percentile	100	16.3	865	1220			
4	**Median**	**103**	**16.3**	**876**	**1235**	**1410**		
	85th percentile	108	18.7	926	1305	1490		
5	**Median**	**110**	**18.3**	**927**	**1307**	**1492**	**1677**	
	85th percentile	115	21.1	984	1388	1584	1781	
6	**Median**	**116**	**20.5**	**979**	**1380**	**1576**	**1772**	
	85th percentile	121	23.6	1042	1469	1677	1885	
7	**Median**	**122**	**22.9**	**1033**	**1456**	**1663**	**1870**	
	85th percentile	127	26.5	1104	1557	1778	1999	
8	**Median**	**127**	**25.4**	**1088**	**1534**	**1752**	**1970**	
	85th percentile	133	29.7	1171	1652	1886	2120	
9	**Median**	**133**	**28.1**	**1146**	**1615**	**1844**	**2073**	
	85th percentile	139	33.2	1242	1751	2000	2248	
10	**Median**	**138**	**31.2**	**1150**	*1621*	**1851**	**2081**	**2311**
	85th percentile	144	37.3	1262	*1780*	2032	2285	2537
11	**Median**	**143**	**34.6**	**1217**	*1716*	**1959**	**2203**	**2446**
	85th percentile	150	43.5	1374	*1937*	2211	2486	2761
12	**Median**	**149**	**38.9**	**1300**	*1832*	**2092**	**2352**	**2612**
	85th percentile	156	49.2	1479	*2085*	2381	2676	2972
13	**Median**	**156**	**44.3**	**1402**	*1976*	**2257**	**2537**	**2818**
	85th percentile	164	56.0	1604	*2262*	2583	2904	3225
14	**Median**	**163**	**50.6**	**1519**	*2142*	**2446**	**2750**	**3053**
	85th percentile	171	64.2	1752	*2470*	2820	3171	3521
15	**Median**	**169**	**56.6**	**1627**	*2294*	**2619**	**2945**	**3270**
	85th percentile	177	71.4	1880	*2650*	3026	3402	3778
16	**Median**	**173**	**61.3**	**1711**	*2412*	**2755**	**3097**	**3439**
	85th percentile	181	77.6	1987	*2802*	3199	3597	3994
17	**Median**	**175**	**64.8**	**1771**	*2498*	**2852**	**3206**	**3560**
	85th percentile	183	81.8	2057	*2901*	3312	3724	4135
18	**Median**	**176**	**67.3**	**1813**	*2556*	**2919**	**3282**	**3644**
	85th percentile	184	84.4	2102	*2964*	3384	3805	4225

[1] Average energy requirement determined according to the total energy expenditure: It has been calculated with help of the EFSA NDA Panel 2013. Scientific Opinion on Dietary Reference Values for Energy. EFSA Journal 2013;11(1):3005 [112 pp.]

[2] Total energy expenditure calculated by using factorial method (kcal/day). (Table 10.2)

[3] WHO MGRS 2006- 2007 Growth Standards 50th and 85th percentile heights (cm) and body weights (kg).

[4] Resting energy expenditure calculated by using Henry 2005 equations (kcal/day). (Table 10.3)

[5] Age limits (0-3 years, 3-10 years, 10-18 years) in Henry 2005 equations coincide. Resting metabolic rates were calculated in 0-<3 years old children with the equation recommended for ages 0-3 years, in 3-<10 years old children with the equation recommended for ages 3-10 years, and in 10-18 years old individuals with the equation recommended for ages 10-18 years.

[6] EFSA NDA Panel 2013. Scientific Opinion on Dietary Reference Values for Energy. EFSA Journal 2013;11(1):3005 [112 pp.]. Total energy expenditure has been classified as Low Active for PAL = 1.4, Moderately Active for PAL=1.6, Active for PAL = 1.8, Very Active for PAL = 2.0 (Appendix 4.8.3)..

[7] It is recommended for the total energy expenditure of the 10-17 age group to be at the minimum level of PAL=1.6. Therefore, energy expenditures of low active men in 10-17 age group are written in light color and italic font.

[8] Energy requirement values calculated according to age, median weight and height values were accepted as "reference values for energy".

Appendix 1. 1. 2. Energy requirements and energy reference values according to physical activity levels for girls and adolescents[11,7]

Age (year)	WHO-MGRS 2006-2007			Resting Energy Expend[4,5] (kcal/day)	Total Energy Expenditure (kcal/day)[2]			
	Percentiles	Height[3] (cm)	Body Weight[3] (kg)		Low Active (PAL=1.4)[6,7]	Moder. Active (PAL=1.6)[6]	Active (PAL=1.8)[6]	Very Active (PAL=(2.0)[6]
2	**Median**	**86**	**11.5**	**664**	**937**			
	85th percentile	89	13.1	737	1039			
3	**Median**	**95**	**13.9**	**770**	**1085**			
	85th percentile	99	15.9	810	1142			
4	**Median**	**103**	**16.1**	**821**	**1157**	**1321**		
	85th percentile	107	18.6	870	1227	1401		
5	**Median**	**109**	**18.2**	**868**	**1224**	**1398**	**1571**	
	85th percentile	114	21.3	928	1309	1494	1680	
6	**Median**	**115**	**20.2**	**912**	**1286**	**1468**	**1651**	
	85th percentile	120	23.7	979	1380	1576	1772	
7	**Median**	**121**	**22.4**	**959**	**1352**	**1544**	**1736**	
	85th percentile	127	26.5	1036	1461	1668	1876	
8	**Median**	**127**	**25.0**	**1013**	**1428**	**1630**	**1833**	
	85th percentile	133	29.8	1102	1553	1774	1994	
9	**Median**	**133**	**28.2**	**1076**	**1517**	**1732**	**1947**	
	85th percentile	139	33.9	1180	1664	1900	2135	
10	**Median**	**139**	**31.9**	**1105**	***1559***	**1780**	**2001**	**2222**
	85th percentile	145	38.5	1184	*1670*	1906	2143	2380
11	**Median**	**145**	**36.2**	**1161**	***1638***	**1870**	**2102**	**2334**
	85th percentile	152	46.1	1272	*1794*	2048	2303	2557
12	**Median**	**151**	**41.2**	**1224**	***1725***	**1970**	**2215**	**2460**
	85th percentile	158	52.4	1347	*1899*	2168	2438	2707
13	**Median**	**156**	**46.0**	**1282**	***1808***	**2064**	**2320**	**2577**
	85th percentile	164	58.6	1419	*2000*	2284	2567	2851
14	**Median**	**160**	**50.1**	**1329**	***1873***	**2139**	**2405**	**2671**
	85th percentile	167	63.9	1476	*2082*	2377	2672	2967
15	**Median**	**162**	**52.8**	**1359**	***1917***	**2189**	**2460**	**2732**
	85th percentile	169	67.5	1515	*2136*	2439	2742	3045
16	**Median**	**163**	**54.7**	**1379**	***1944***	**2220**	**2495**	**2771**
	85th percentile	170	69.6	1537	*2167*	2474	2781	3089
17	**Median**	**163**	**55.7**	**1390**	***1959***	**2237**	**2515**	**2793**
	85th percentile	170	71.2	1552	*2189*	2499	2810	3120
18	**Median**	**163**	**56.7**	**1399**	***1972***	**2252**	**2532**	**2812**
	85th percentile	170	71.9	1559	*2197*	2510	2824	3133

[1] Average energy requirement determined according to the total energy expenditure: It has been calculated with help the EFSA NDA Panel 2013. Scientific Opinion on Dietary Reference Values for Energy. EFSA Journal 2013;11(1):3005 [112 pp.]

[2] Total energy expenditure calculated by using factorial method (kcal/day). (Table 10.2)

[3] WHO MGRS 2006- 2007 Growth Standards 50th and 85th percentile heights (cm) and body weights (kg).

[4] Resting energy expenditure calculated by using Henry 2005 equations (kcal/day). (Table 10.3)

[5] Age limits (0-3 years, 3-10 years, 10-18 years) in Henry 2005 equations coincide. Resting metabolic rates were calculated in 0-<3 years old children with the equation recommended for age s of 0-3 years, in 3-<10 years old children with the equation recommended for ages of 3-10 years, and in 10-18 years old individuals with the equation recommended for ages 10-18 years.

[6] EFSA NDA Panel 2013. Scientific Opinion on Dietary Reference Values for Energy. EFSA Journal 2013;11(1):3005 [112 pp.]. Total energy expenditure has been classified as Low Active for PAL = 1.4, Moderately Active for PAL=1.6, Active for PAL = 1.8, Very Active for PAL = 2.0 (Appendix 4.8.3).

[7] Energy requirement values calculated according to age, median weight and height values were accepted as "reference values for energy".

Appendix 1. 1. 3. Energy requirements and energy reference values according to physical activity levels for adult men[1,9]

Age Groups (year)	TNHS 2010		BKI=22 kg/m² Body Weight[3] (kg)	Resting Energy Expenditure [4,5] (kcal/day)	Total Energy Expenditure (kcal/day)[2]			
	Persentiller	Percentile values of height[3] (cm)			Low Active (PAL=1.4)[6,7]	Moder Active (PAL=1.6) [6]	Active (PAL=1.8)[6]	Very Active (PAL=(2.0)[6]
18-29	5	162	57.4	1442	2018	2307	2595	2883
	25	170	63.6	1557	2180	2491	2803	3114
	50	**173**	**65.8**	**1599**	**2239**	**2558**	**2878**	**3198**
	75	178	69.7	1671	2339	2673	3007	3341
	95	185	75.3	1772	2481	2835	3190	3544
30-39	5	161	57.0	1381	1934	2210	2486	2762
	25	168	61.7	1470	2058	2352	2646	2940
	50	**172**	**65.1**	**1532**	**2145**	**2452**	**2758**	**3065**
	75	177	68.9	1603	2244	2565	2885	3206
	95	184	74.5	1704	2386	2727	3067	3408
40-49	5	159	55.9	1360	1904	2176	2448	2720
	25	166	60.6	1449	2029	2319	2608	2898
	50	**171**	**64.3**	**1518**	**2126**	**2429**	**2733**	**3037**
	75	175	67.6	1579	2211	2526	2842	3158
	95	183	73.7	1689	2365	2703	3041	3379
50-59	5	158	54.9	1341	1877	2146	2414	2682
	25	164	59.2	1422	1991	2275	2559	2844
	50	**169**	**62.5**	**1484**	**2077**	**2374**	**2670**	**2967**
	75	173	65.8	1546	2165	2474	2783	3093
	95	180	71.3	1646	2304	2634	2963	3292
60-69	5	157	53.9	1205	1687	1928	2169	2410
	25	162	57.7	1279	1790	2046	2302	2558
	50	**166**	**60.6**	**1334**	**1867**	**2134**	**2400**	**2667**
	75	172	65.1	1417	1984	2267	2550	2834
	95	177	69.0	1490	2086	2384	2682	2980
70-79	5	154	51.8	1166	1632	1865	2098	2331
	25	159	55.6	1239	1734	1982	2229	2477
	50	**165**	**59.9**	**1320**	**1848**	**2112**	**2376**	**2640**
	75	169	62.8	1375	1925	2200	2475	2750
	95	174	66.6	1445	2023	2312	2601	2890

[1] Average energy requirement determined according to the total energy expenditure: It has been calculated with help the EFSA NDA Panel 2013. Scientific Opinion on Dietary Reference Values for Energy. EFSA Journal 2013;11(1):3005 [112 pp.]

[2] Total energy expenditure calculated by using factorial method (kcal/day). (Table 10.2)

[3] Height (cm) measured with 5th, 25th, 50th, 75th, 95th percentiles and body weight (kg) values adjusted according to BMI = 22 kg/m² in the database of TNHS (Turkey Nutrition and Health Survey) 2010.

[4] Resting energy expenditure calculated by using Henry 2005 equations (kcal/day). (Table 10.3). For Henry 2005 equations see Table 10.3.

[5] Age limits (ages 18-30, ages 30-60, ages ≥60) in Henry 2005 equations coincide. Therefore, resting metabolic rates were calculated in 18-29 years old adults with the equation recommended for the ages of 18-30 years, in 30-39, 40-49, and 50-59 years old adults with the equation recommended for ages 30-60, and in 60-69 and 70-79 years old individuals with the equation recommended for ages ≥60.

[6] EFSA NDA Panel 2013. Scientific Opinion on Dietary Reference Values for Energy. EFSA Journal 2013;11(1):3005 [112 pp.]. Total energy expenditure has been classified as Low Active for PAL = 1.4, Moderately Active for PAL=1.6, Active for PAL = 1.8, Very Active for PAL = 2.0. For Lifestyle classification see Appendix 4.8.3.

[7] Most of the adults in the population take place in the Low Active category (Appendix 4.8.1-4.8.2)

[8] It was reported that Physical Activity Level at PAL=1.7 or higher values decreases the risk of obesity, cardiovascular diseases, diabetes and some cancer types (Appendix 4.8.4-4.8.6).

[9] Energy expenditure values calculated according to age groups and 50th percentile height and BMI = 22 kg/m2 were accepted as the "reference values for energy".

Appendix 1. 1. 4. Energy requirements and energy reference values according to physical activity levels for adult women[1,9]

Age Groups (year)	TNHS 2010		BKI=22 kg/m² Body Weight[3] (kg)	Resting Energy Expenditure [4,5] (kcal/day)	Total Energy Expenditure(kcal/day)[2]			
	Persentiller	Percentile values of height[3] (cm)			Low Active (PAL=1.4)[6,7]	Moder.Active (PAL=1.6)[6]	Active (PAL=1.8)[6]	Very Active (PAL=(2.0)[6]
18-29	5	150	49.5	1152	1612	1843	2073	2303
	25	155	52.9	1217	1704	1947	2191	2434
	50	**159**	**55.9**	**1276**	**1786**	**2041**	**2296**	**2551**
	75	164	58.8	1331	1863	2129	2396	2662
	95	169	62.8	1406	1969	2250	2531	2813
30-39	5	148	48.5	1130	1582	1808	2034	2260
	25	155	52.5	1194	1671	1910	2148	2387
	50	**159**	**55.3**	**1236**	**1730**	**1977**	**2224**	**2472**
	75	163	58.5	1284	1798	2055	2312	2569
	95	169	62.9	1351	1892	2162	2432	2703
40-49	5	147	47.5	1115	1561	1784	2007	2230
	25	153	51.2	1172	1641	1875	2110	2344
	50	**156**	**53.5**	**1209**	**1693**	**1934**	**2176**	**2418**
	75	161	57.0	1263	1768	2020	2273	2525
	95	167	61.4	1328	1859	2125	2391	2656
50-59	5	145	46.2	1094	1531	1750	1969	2188
	25	151	50.2	1156	1619	1850	2081	2313
	50	**155**	**52.9**	**1198**	**1678**	**1917**	**2157**	**2397**
	75	160	56.3	1252	1752	2003	2253	2503
	95	166	60.6	1317	1844	2107	2371	2634
60-69	5	143	44.8	970	1358	1552	1746	1940
	25	150	49.5	1041	1458	1666	1875	2083
	50	**153**	**51.6**	**1073**	**1502**	**1717**	**1931**	**2146**
	75	157	54.2	1111	1556	1778	2000	2222
	95	163	58.5	1173	1643	1877	2112	2347
70-79	5.	139	42.5	936	1310	1497	1684	1871
	25.	146	46.9	1003	1404	1604	1805	2005
	50	**150**	**49.6**	**1043**	**1460**	**1668**	**1877**	**2085**
	75	154	52.4	1084	1518	1735	1952	2169
	95	160	56.3	1142	1598	1826	2055	2283
PREGNANCY	First trimeste	+70 kcal/day		**LACTATION**		First 6 months	+500 kcal/day	
	Secondtrimester	+260 kcal/day						
	Last trimester	+500 kcal/day						

[1] *Average energy requirement determined according to the total energy expenditure: It has been calculated with help the EFSA NDA Panel 2013. Scientific Opinion on Dietary Reference Values for Energy. EFSA Journal 2013;11(1):3005 [112 pp.]*

[2] *Total energy expenditure calculated by using factorial method (kcal/day). (Table 10.2)*

[3] *Height (cm) measured with 5th, 25th, 50th, 75th, 95th percentiles and Body Weight (kg) values adjusted according to BMI = 22 kg/m² in the database of TNHS (Turkey Nutrition and Health Survey) 2010*

[4] *Resting energy expenditure calculated by using Henry 2005 equations (kcal/day). (Table 10.3). For Henry 2005 equations see Table 10.3.*

[5] *Age limits (ages 18-30, ages 30-60, ages ≥60) in Henry 2005 equations coincide. Therefore, resting metabolic rates were calculated in 18-29 years old adults with the equation recommended for the ages of 18-30 years, in 30-39, 40-49, and 50-59 years old adults with the equation recommended for ages 30-60, and in 60-69 and 70-79 years old individuals with the equation recommended for ages ≥60.*

[6] *EFSA NDA Panel 2013. Scientific Opinion on Dietary Reference Values for Energy. EFSA Journal 2013;11(1):3005 [112 pp.]. Total energy expenditure has been classified as Low Active for PAL = 1.4, Moderately Active for PAL=1.6, Active for PAL = 1.8, Very Active for PAL = 2.0. For Lifestyle classification see Appendix 4.8.3.*

[7] *Most of the adults in the population take place in the Low Active category (Appendix 4.8.1-4.8.2)*

[8] *It was reported that Physical Activity Level at PAL=1.7 or higher values decreases the risk of obesity, cardiovascular diseases, diabetes and some cancer types (Appendix 4.8.4-4.8.6).*

[9] *Energy expenditure values calculated according to age groups and 50th percentile height and BMI = 22 kg/m² were accepted as the "reference values for energy".*

Appendix 1. 2. Reference Values for Protein

Appendix 1. 2. 1. Recommended adequate intakes (g /day) and reference intake range (%) for protein - Men

	Age (year)	Body Weight[1] (kg)	Protein Quality (DIAAS=100)[2] Recommended Dietary Allowance (RDA/PRI)[3,4]		Adequate Intakes (g/day)[5] Calculated for Avarage Turkey Diet (DIAAS=83)[2]		Protein Reference Intake Range of Turkey Average Diet (%)	
			(g/kg/ day)	(g/day)	(g/kg/day)	(g/day)	Lower Limit[6] (Reference Protein/ Energy Ratio)	Upper Limit[7] (97.5th percentile)
MEN	2	12.2	0.97	11.8	1.21	14.8	4.7	21.5
	3	14.3	0.90	12.9	1.13	16.1	4.5	20.9
	4	16.3	0.86	14.0	1.08	17.5	4.6	20.4
	5	18.3	0.85	15.6	1.06	19.4	4.8	22.4
	6	20.5	0.89	18.2	1.11	22.8	5.3	19.4
	7	22.9	0.91	20.8	1.14	26.0	5.8	20.7
	8	25.4	0.92	23.4	1.15	29.2	6.2	20.3
	9	28.1	0.92	25.9	1.15	32.3	6.5	21.2
	10	31.2	0.91	28.4	1.14	35.5	7.2	19.7
	11	34.6	0.91	31.5	1.14	39.4	7.6	20.8
	12	38.9	0.90	35.0	1.13	43.8	7.9	20.3
	13	44.3	0.90	39.9	1.13	49.8	8.2	24.8
	14	50.6	0.89	45.0	1.11	56.3	8.5	18.7
	15	56.6	0.88	49.8	1.10	62.2	8.9	22.6
	16	61.3	0.87	53.3	1.09	66.6	9.0	18.5
	17	64.8	0.86	55.7	1.08	69.6	9.1	18.0
	18	63.8	0.83	53.0	1.04	66.4	9.7	20.3
	19-29	71.9	0.83	59.7	1.04	74.8	10.1	19.6
	30-39	78.9	0.83	65.5	1.04	82.1	11.0	22.4
	40-49	79.0	0.83	65.6	1.04	82.2	11.0	22.1
	50-59	78.4	0.83	65.1	1.04	81.5	11.1	21.0
	60-69	76.8	0.83	63.7	1.04	79.9	11.9	22.2
	>70	74.1	0.83	61.5	1.04	77.1	11.8	23.1

Appendix 1. 2. 1. (Continued) Recommended adequate intake (g /day) and reference intake range (%) for protein - Women

	Age (year)	Body Weight[1] (kg)	Protein Quality (DIAAS=100)[2] Recommended Dietary Allowance Miktar (RDA/PRI)[3,4]		Adequate Intakes (g/day)[5] Calculated for Average Turkey Diet (DIAAS=83)[2]		Protein Reference Intake Range of Turkey Average Diet (%)	
			(g/kg/day)	(g/day)	(g/kg/day)	(g/day)	Lower Limit[6] (Reference Protein/Energy Ratio)	Upper Limit[7] (97.5th percentile)
WOMEN	2	11.5	0.97	11.2	1.21	13.9	4.8	21.0
	3	13.9	0.90	12.5	1.13	15.6	4.7	21.3
	4	16.1	0.86	13.8	1.08	17.3	4.8	19.8
	5	18.2	0.85	15.5	1.06	19.3	5.1	21.6
	6	20.2	0.89	18.0	1.11	22.5	5.7	19.0
	7	22.4	0.91	20.4	1.14	25.5	6.1	21.7
	8	25.0	0.92	23.0	1.15	28.8	6.6	18.5
	9	28.2	0.92	25.9	1.15	32.4	7.0	17.2
	10	31.9	0.91	29.0	1.14	36.3	7.7	22.8
	11	36.2	0.90	32.5	1.13	40.7	8.1	15.7
	12	41.2	0.89	36.6	1.11	45.8	8.6	23.8
	13	46.0	0.88	40.5	1.10	50.6	9.0	24.0
	14	50.1	0.87	43.5	1.09	54.4	9.4	23.7
	15	52.8	0.85	44.9	1.06	56.1	9.5	21.0
	16	54.7	0.84	45.9	1.05	57.4	9.6	20.0
	17	55.7	0.83	46.3	1.04	57.8	9.5	17.5
	18	57.0	0.83	47.3	1.04	59.3	10.2	18.6
	19-29	60.0	0.83	49.8	1.04	62.4	10.8	20.4
	30-39	67.6	0.83	56.1	1.04	70.3	11.9	20.0
	40-49	74.0	0.83	61.4	1.04	77.0	12.7	22.3
	50-59	75.6	0.83	62.7	1.04	78.6	12.9	21.7
	60-69	76.2	0.83	63.2	1.04	79.2	14.0	21.3
	>70	67.9	0.83	56.4	1.04	67.9	13.4	21.6
	PREGNANCY[8]		First trimester	+1				
			Second trimester	+9				
			Last trimester	+28				
	LACTATION [8]		First 6 months	+19				
			>6 months	+13				

[1] PRI (g/day). In calculation of adequate intake (g/day) and Reference protein energy rate (%), 50th percentile body weights (kg) in WHO MGRS 2006- 2007 Growth Standards were used for children and adolescents and Median body weights (kg) of TNHS 2010 measured according to age groups were used for adults.

[2] DIAAS= Digestible Indispensable Amino Acid Score

[3] Taken for EFSA NDA Panel 2012. Scientific Opinion on Dietary Reference Values for Protein EFSA Journal 2012;10(2):2557. 66.pp

[4] See Appendix 10.1 for Dietary Reference Values and their meanings.

[5] DIAAS calculated by using daily food consumption data records of TNHS-2010 and FAO (Food and Agriculture Organization of the United Nations). 2013. Dietary Protein Quality Evaluation in Human Nutrition Report of an FAO Expert Consultation Rome. 2013. FAO Food and Nutrition Paper 92. 79 pp., has been found to be 83 % for lysine adequate intakes are calculated by adjusting according to this score

[6] Reference protein/energy ratio: It shows the lower limit of the contribution of the protein in the diet on energy. This value has been calculated by using estimated average requirement (EAR) and energy requirement values for the level of PAL=1.4 (Low active) which are determined for protein according to the age and gender. The reference protein/energy ratio (%) is lower in children than in adults, is higher in women than in males, increases with increased age and decreases with increased PAL.

[7] Upper limit 97.5th percentile values of protein/energy rate in TNHS-2010 food consumption data were found to be 20.7% across Turkey.

[8] Protein supplements in pregnant or lactating women in a diet with protein quality of DIAAS=100.

Appendix 1. 2. 2. Amino acid scoring pattern recommended for infants, children, adolescents and adults[1]
(Reference values used in determination of protein quality of foods or diet)

Age Group (year)	Histidine	Isoleucine	Leucine	Lysine	Sulphur Amino Acids	Aromatic Amino Acids	Threonine	Tryptophan	Valine
Indispensable Amino Acid Scoring pattern mg/g protein requirement									
Infants: 0-6 months[2]	21	55	96	69	33	94	44	17	55
Children: 6 months-3 yrs	20	32	66	57	27	52	31	8.5	43
Older children, adolescents and adults	16	30	61	48	23	41	25	6.6	40

[1] The values indicated in the table show the digestible indispensable amino acid amounts recommended to be present in 1 g of protein according to ages.

[2] It was determined from raw amino acid content of breast milk.

Appendix 1. 3. Recommended Intake Ranges for Macronutrients

Appendix 1. 3. 1. Reference intake ranges for protein, carbohydrate and fat (%) and the contribution of indispensable fatty acids to energy intake (%)

Age/Gender	Protein[2] (%)	CHO (%)	Fat (%)	ALA (%)	LA (%)
Children					
2-3 year	5-20	45-60	35-40	0.5	4
4-6 year	5-20	45-60	20-35	0.5	4
Men					
7-10 year	5-20	45-60	20-35	0.5	4
11-14 year	8-20	45-60	20-35	0.5	4
15-17 year	9-20	45-60	20-35	0.5	4
18-50 year	10-20	45-60	20-35	0.5	4
51-64 year	10-20	45-60	20-35	0.5	4
65-70 year	12-20	45-60	20-35	0.5	4
≥70 year	12-20	45-60	20-35	0.5	4
Women					
7-10 year	7-20	45-60	20-35	0.5	4
11-14 year	9-20	45-60	20-35	0.5	4
15-17 year	10-20	45-60	20-35	0.5	4
18-50 year	12-20	45-60	20-35	0.5	4
51-64 year	14-20	45-60	20-35	0.5	4
65-70 year	14-20	45-60	20-35	0.5	4
≥70 year	14-20	45-60	20-35	0.5	4

See: Reference No: 4,6

[1] It was determined by taking into consideration reference intake range of average Turkey diet given in Appendix 1.2.1.

CHO: Carbohydrate, ALA: Alpha linolenic acid (n-3 fatty acid),, LA: Linolenic acid (n-6 fatty acid)

Appendix 1. 4. Reference Values for Fatty Acids , Carbohydrates and Fiber

Appendix 1. 4. 1. Adequate intakes of fatty acids, carbohydrates and fiber[1]

Age/Gender	EPA+DHA (mg)	Saturated Fatty Acids	CHO (g)	Fiber (g)
Children				
2-3 year	250	As less as possible	130	10
4-6 year	250	As less as possible	130	14
Men				
7-10 year	250	As less as possible	130	16
11-14 year	250	As less as possible	130	19
15-17 year	250	As less as possible	130	21
18-50 year	250	As less as possible	130	25
51-64 year	250	As less as possible	130	25
65-70 year	250	As less as possible	130	25
≥70 year	250	As less as possible	130	25
Women				
7-10 year	250	As less as possible	130	16
11-14 year	250	As less as possible	130	19
15-17 year	250	As less as possible	130	21
18-50 year	250	As less as possible	130	25
51-64 year	250	As less as possible	130	25
65-70 year	250	As less as possible	130	25
≥70 year	250	As less as possible	130	25
Pregnancy	250	As less as possible	175	25
Lactation	250	As less as possible	210	25

See: Source No:: 5,6

[1] Intake of 100-200 mg of DHA is recommended in addition to the adequate intake.

EPA: Eicosapentaenoic acid, DHA: Docosahexaenoic acid, CHO: Carbohydrate

Appendix 1. 5. Reference Values for Micronutrients

Appendix 1. 5. 1. Recommended adequate intakes for vitamins

Age (year)and gender	Vitamin A[1,8] (mg)	Vitamin B_6[8] (mcg)	Vitamin B_{12}[8] (mcg)	Vitamin C[8] (mg)	Vitamin D[2,8] (mcg)	Vitamin E[3,8] (mg)	Vitamin K[8] (mcg)	Folate[4,8] (mcg)	Niacin[5,8] (mg /1000kcal)	Thiamin[8] (mg)	Riboflavin[8] (mg)	Biotin (mcg)[8]	Pantothenic[8] Add (mg)
Children													
2	250	0.5	1.5	20	15	6	30	120	6.7	0.5	0.5	20	4
3	250	0.5	1.5	20	15	9	30	120	6.7	0.5	0.5	20	4
4	300	0.6	1.5	30	15	9	55	140	6.7	0.6	0.6	25	4
Men													
5	300	0.6	1.5	30	15	9	55	140	6.7	0.6	0.6	25	4
6	300	0.6	1.5	30	15	9	55	140	6.7	0.6	0.6	25	4
7	400	0.6	2.5	45	15	9	55	200	6.7	0.6	0.6	25	4
8	400	0.6	2.5	45	15	9	55	200	6.7	0.6	0.6	25	4
9	400	1	2.5	45	15	9	60	200	6.7	0.9	0.9	25	4
10	400	1	2.5	45	15	13	60	200	6.7	0.9	0.9	25	4
11	600	1	3.5	70	15	13	60	270	6.7	0.9	0.9	35	5
12	600	1	3.5	70	15	13	60	270	6.7	0.9	0.9	35	5
13	600	1	3.5	70	15	13	60	270	6.7	0.9	0.9	35	5
14	600	1.3	3.5	70	15	13	75	270	6.7	1.2	1.3	35	5
15	750	1.3	4	100	15	13	75	330	6.7	1.2	1.3	35	5
16	750	1.3	4	100	15	13	75	330	6.7	1.2	1.3	35	5
17	750	1.3	4	100	15	13	75	330	6.7	1.2	1.3	35	5
18	750	1.3	4	110	15	13	75	330	6.7	1.2	1.3	40	5
19-50	750	1.3	4	110	15	13	120	330	6.7	1.2	1.3	40	5
51-64	750	1.7	4	110	15	13	120	330	6.7	1.2	1.3	40	5
65-70	750	1.7	4	110	15	13	120	330	6.7	1.2	1.3	40	5
≥70	750	1.7	4	110	20	13	120	330	6.7	1.2	1.3	40	5
Women													
5	300	0.6	1.5	30	15	9	55	140	6.7	0.6	0.6	25	4
6	300	0.6	1.5	30	15	9	55	140	6.7	0.6	0.6	25	4
7	400	0.6	2.5	45	15	9	55	200	6.7	0.6	0.6	25	4
8	400	0.6	2.5	45	15	9	55	200	6.7	0.6	0.6	25	4
9	400	1	2.5	45	15	9	60	200	6.7	0.9	0.9	25	4
10	400	1	2.5	45	15	11	60	200	6.7	0.9	0.9	25	4
11	600	1	3.5	70	15	11	60	270	6.7	0.9	0.9	35	5
12	600	1	3.5	70	15	11	60	270	6.7	0.9	0.9	35	5
13	600	1	3.5	70	15	11	60	270	6.7	0.9	0.9	35	5
14	600	1.2	3.5	70	15	11	75	270	6.7	1	1	35	5
15	650	1.2	4	90	15	11	75	330	6.7	1	1	35	5
16	650	1.2	4	90	15	11	75	330	6.7	1	1	35	5
17	650	1.2	4	90	15	11	75	330	6.7	1	1	35	5
18	650	1.2	4	95	15	11	75	330	6.7	1	1	40	5
19-50	650	1.3	4	95	15	11	90	330	6.7	1.1	1.1	40	5
51-64	650	1.5	4	95	15	11	90	330	6.7	1.1	1.1	40	5
65-70	650	1.5	4	95	15	11	90	330	6.7	1.1	1.1	40	5
≥70	650	1.5	4	95	20	11	90	330	6.7	1.1	1.1	40	5
Pregnancy	700	1.9	4.5	+10[6]	15	11	90[7]	600	6.7	1.4	1.4	40	5
Lactation	1300	2	5	+60[6]	15	11	90[7]	500	6.7	1.4	1.6	45	7

See: Referances No. 8-35

[1] Retinol equilavent (RE)

[2] 1 mcg = 40 IU

[3] a-tocopherol value

[4] Dietary folate equivalent (DFE) is calculated with the formula of DFE (mcg) = Folate (mcg) obtained with foods + 1.7 x Folic acid (mcg) when folic acid is added in pregnancy.

[5] Niacin equivalent (NE); niacin in foods + niacin synthesized from the tryptophan in the body"

[6] According to the age group, pregnant and lactating women are supplemented with defined amounts.

[7] Same with the requirement values of adult age groups.

[8] Vitamin A, Vitamin B6, Vitamin C, Niacin, Thiamine, Riboflavin are PRI/RDA values, Vitamin B12, Vitamin D, Vitamin E, Vitamin K, Folate, Biotin, Panthotenic Acid are AI values and have been accepted as adequate intake for Turkey.

Appendix 1. 5. 2. Recommended adequate intakes for minerals

Age gender	Calcium[1,9] (mg/day)	İron [2,9] (mg/day)	Copper (mg/day)	Magnesium [9] (mg/day)	Phosphorus [9] (mg/day)	Sodium [9] (g/day)	Potassium [9] (g/day)	Selenium [9] (mcg/day)	Zinc [3,4,9] (mg/day)	Iodine [9] (mcg/day)	Fluoride [8,9] (mg/day)	Manganese (mg day)	Molybdenum [9] (mcg/day)	Water (mL/day)
Children														
2	450	7	0.7	170	250	1	3	15	4.3	90	0.6	0.5	15	1300
3	450	7	1	230	250	1	3	15	4.3	90	0.7	0.5	15	1300
4	800	7	1	230	440	1.2	3.8	20	5.5	90	0.8	1	20	1600
Men														
5	800	7	1	230	440	1.2	3.8	20	5.5	90	0.9	1	20	1600
6	800	7	1	230	440	1.2	3.8	20	5.5	90	1	1	20	1600
7	800	11	1	230	440	1.2	3.8	35	7.4	90	1.1	1.5	30	1600
8	800	11	1	230	440	1.2	3.8	35	7.4	90	1.3	1.5	30	1600
9	800	11	1	230	440	1.5	4.5	35	7.4	90	1.4	1.5	30	2100
10	800	11	1.3	300	440	1.5	4.5	35	7.4	90	1.6	1.5	30	2100
11	1150	11	1.3	300	640	1.5	4.5	55	10.7	120	1.7	2	45	2100
12	1150	11	1.3	300	640	1.5	4.5	55	10.7	120	1.9	2	45	2100
13	1150	11	1.3	300	640	1.5	4.5	55	10.7	120	2.2	2	45	2100
14	1150	11	1.3	300	640	1.5	4.7	55	10.7	120	2.5	2	45	2500
15	1150	11	1.3	300	640	1.5	4.7	70	14.2	130	2.8	3	65	2500
16	1150	11	1.3	300	640	1.5	4.7	70	14.2	130	3.1	3	65	2500
17	1150	11	1.3	300	640	1.5	4.7	70	14.2	130	3.2	3	65	2500
18	1000	11	1.6	350	550	1.5	4.7	70	9.4-16.3[5]	150	3.4	3	65	2500
19-50	950-1000[1]	11	1.6	350	550	1.5	4.7	70	9.4-16.3[5]	150	3.3	3	65	2500
51-64	950	11	1.6	350	550	1.3	4.7	70	9.4-16.3[5]	150	3.1	3	65	2500
65-70	950	11	1.6	350	550	1.3	4.7	70	9.4-16.3[5]	150	3	3	65	2500
≥70	950	11	1.6	350	550	1.2	4.7	70	9.4-16.3[5]	150	3	3	65	2500
Women														
5	800	7	1	230	440	1.2	3.8	20	5.5	90	0.9	1	20	1600
6	800	7	1	230	440	1.2	3.8	20	5.5	90	1	1	20	1600
7	800	11	1	230	440	1.2	3.8	35	7.4	90	1.1	1.5	30	1600
8	800	11	1	230	440	1.2	3.8	35	7.4	90	1.3	1.5	30	1600
9	800	11	1	230	440	1.5	4.5	35	7.4	90	1.4	1.5	30	1900
10	800	11	1.1	250	440	1.5	4.5	35	7.4	90	1.6	1.5	30	1900
11	1150	11	1.1	250	640	1.5	4.5	55	10.7	120	1.8	2	45	1900
12	1150	13	1.1	250	640	1.5	4.5	55	10.7	120	2.1	2	45	1900
13	1150	13	1.1	250	640	1.5	4.5	55	10.7	120	2.3	2	45	1900
14	1150	13	1.1	250	640	1.5	4.7	55	10.7	120	2.5	2	45	2000
15	1150	13	1.1	250	640	1.5	4.7	70	11.9	130	2.6	3	65	2000
16	1150	13	1.1	250	640	1.5	4.7	70	11.9	130	2.7	3	65	2000
17	1150	13	1.1	250	640	1.5	4.7	70	11.9	130	2.8	3	65	2000
18	1000	11-16[2]	1.3	300	550	1.5	4.7	70	7.5-12.7[6]	150	2.9	3	65	2000
19-50	950-1000[1]	11-16[2]	1.3	300	550	1.5	4.7	70	7.5-12.7[6]	150	2.7	3	65	2000
51-64	950	11-16[2]	1.3	300	550	1.3	4.7	70	7.5-12.7[6]	150	2.6	3	65	2000
65-70	950	11-16[2]	1.3	300	550	1.3	4.7	70	7.5-12.7[6]	150	2.6	3	65	2000
≥70	950	11-16[2]	1.3	300	550	1.2	4.7	70	7.5-12.7[6]	150	2.5	3	65	2000
Pregnancy	950-1000[1]	16	1.5	300	550	1.5	4.7	70	+1.6[7]	200	***	3	65	2000
Lactation	950-1000[1]	16	1.5	300	550	1.5	5.1	85	+2.9[7]	200	***	3	65	2000

[1] 1000 mg for age of 19-24 years, 950 mg for age of 25-50 years.

[2] In premenopausal period 16 mg, in postmenopausal period 11 mg.

[3] Average and median phytate consumption amounts calculated by using food consumption data of TNHS (Turkey Nutrition and Health Survey) 2010 for adults of 18-64 years old are have been determined to be 507.2 mg ad 429.9 mg for women and 622.1 mg and 528 mg for men, respectively. (Harland BF. Appendix Table A.7. Phytate Content of Foods in CRC Handbook of Dietary Fiber in Human Nutrition 2001(Ed.Gene A Spiller).

[4] According to WHO/FAO report (World Health Organization/Food and Agriculture Organization of the United Nations), 2004. Vitamin and Mineral Requirements in Human Nutrition. Report of a joint FAO/ WHO Expert consultation. Bangkok. Thailand. 21-30 September 1998.341) diets containing phytate less than 500 mg have been categorized as having high potential for absorption of zinc, and the diets containing phytate between 500-1000 mg have been categorized as having moderate potential for absorption of zinc. According to this, the potential for absorption of zinc in adult diet in Turkey has been estimated to be of high-moderate level.

[5] For intake of phytate of 300,600,900 and 1200 mg in men, 9.4,11.7, 14 and 16.3 mg, respectively.

[6] For intake of phytate of 300,600,900 and 1200 mg in women, 7.5 ,9.3,11 and 12.7 mg, respectively.

[7] Amount to be added according to the requirement values of adult age groups.

[8] Adequate intake amount of fluoride was found basing on the reference value of 0.05 mg/kg and using 50th percentile body weights (kg) in WHO MGRS 2006-2007 Growth Standards for children and adolescents and body weights (kg) adjusted according to BMI=22 kg/m² from median height of TNHS 2010 measured according to age groups for adults.

**** It is determined according to the body weight before pregnancy.*

[9] Calcium, iron, zinc are PRI/RD values, copper, magnesium, phosphorus, sodium, potassium, selenium, iodine, fluoride , manganez, molybdenum, water are AI values and have been accepted as adequate intake for Turkey

Appendix 1. 5. 3. Tolerable upper intake levels (UL) for vitamins[1]

Age (year) and gender	Vitamin A[2] (mcg/day)	Vitamin B_6 (mg/ day)	Vitamin B_{12}[3] (mcg/ day)	Vitamin C (mg/day)	Vitamin D (mcg/ day)	Vitamin E (mg/day)	Vitamin K[3] (mcg/day)	Folate (mcg/day)	Niacin[6] (mg/day)	Nicotinamide[4] (mg/day)	Thiamin[3] (mg/day)	Riboflavin[3] (mg/day)
Children												
2	800	5	-	400	50	100	-	200	10	150	-	-
3	800	5	-	400	50	100	-	200	10	150	-	-
4	1100	7	-	650	50	120	-	300	15	220	-	-
Men												
5	1100	7	-	650	50	120	-	300	15	220	-	-
6	1100	7	-	650	50	120	-	300	15	220	-	-
7	1500	10	-	650	50	160	-	400	15	350	-	-
8	1500	10	-	650	50	160	-	400	15	350	-	-
9	1500	10	-	1200	50	160	-	400	20	350	-	-
10	1500	10	-	1200	50	160	-	400	20	350	-	-
11	2000	15	-	1200	100	220	-	600	20	500	-	-
12	2000	15	-	1200	100	220	-	600	20	500	-	-
13	2000	15	-	1200	100	220	-	600	20	500	-	-
14	2000	15	-	1800	100	220	-	600	30	500	-	-
15	2600	20	-	1800	100	260	-	800	30	700	-	-
16	2600	20	-	1800	100	260	-	800	30	700	-	-
17	2600	20	-	1800	100	260	-	800	30	700	-	-
18	3000	25	-	1800	100	300	-	1000	30	900	-	-
19-50	3000	25	-	2000	100	300	-	1000	35	900	-	-
51-64	3000	25	-	2000	100	300	-	1000	35	900	-	-
65-70	3000	25	-	2000	100	300	-	1000	35	900	-	-
≥70	3000	25	-	2000	100	300	-	1000	35	900	-	-
Women												
5	1100	7	-	650	50	120	-	300	15	220	-	-
6	1100	7	-	650	50	120	-	300	15	220	-	-
7	1500	10	-	650	50	160	-	400	15	350	-	-
8	1500	10	-	650	50	160	-	400	15	350	-	-
9	1500	10	-	1200	50	160	-	400	20	350	-	-
10	1500	10	-	1200	50	160	-	400	20	350	-	-
11	2000	15	-	1200	100	220	-	600	20	500	-	-
12	2000	15	-	1200	100	220	-	600	20	500	-	-
13	2000	15	-	1200	100	220	-	600	20	500	-	-
14	2000	15	-	1800	100	220	-	600	30	500	-	-
15	2600	20	-	1800	100	260	-	800	30	700	-	-
16	2600	20	-	1800	100	260	-	800	30	700	-	-
17	2600	20	-	1800	100	260	-	800	30	700	-	-
18	3000	25	-	1800	100	300	-	1000	30	900	-	-
19-50	3000	25	-	2000	100	300	-	1000	35	900	-	-
51-64	3000	25	-	2000	100	300	-	1000	35	900	-	-
65-70	3000	25	-	2000	100	300	-	1000	35	900	-	-
≥70	3000	25	-	2000	100	300	-	1000	35	900	-	-
Pregnancy	3000	25	-	-[5]	100	-	-	1000	30-35[7]	-	-	-
Lactation	3000	25	-	-[5]	100	-	-	1000	30-35[7]	-	-	-

[1] Tolerable upper limits are not valid for the individuals who are under a medical nutrient treatment or who are sensitive to a nutrient.

[2] A Vitamin A retinol and retinyl esters (RE: retinol equivalent); EFSA recommends women who carry the risk of osteoporosis or fracture in post-menopause period to limit the intake to 1500 mcg RE/day.

[3] Tolerable upper limit could not be determined due to insufficient data by EFSA and IOM. Lack of tolerable upper limit values requires extra attention on consumption above recommended levels. It is recommended for the individuals in the population not to exceed the tolerable upper limit values routinely.

[4] It is the form generally used in food supports and it has less toxicity compared to nicotinic acid.

[5] Same with the values given by age.

[6] Niacin equivalent (NE); niacin in foods + niacin synthesized from the tryptophan in the body"

[7] 30 mg/day for age of 14-18 years, 35 mg/day for age of 19-50 years.

Appendix 1. 5. 4. Tolerable upper intake levels (UL) for minerals[1]

Age (year) and gender	Calcium[1] (mg/day)	Iron (mg/day)	Copper (mcg/day)	Magnesium (mg/day)	Phosphorus (mg/day)	Sodium (mg/day)	Potassium [2] (g/day)	Selenium (mcg/day)	Zinc (mg/day)	Iodine (mcg/day)	Fluoride (mg/day)
Children											
2	-	40	1	65	3000	1500	-	60	7	200	1.5
3	-	40	1	65	3000	1500	-	60	7	200	1.5
4	-	40	2	110	3000	1900	-	90	10	250	2.5
Men											
5	-	40	2	110	3000	1900	-	90	10	250	2.5
6	-	40	2	110	3000	1900	-	90	10	250	2.5
7	-	40	3	110	3000	1900	-	130	10	300	2.5
8	-	40	3	110	3000	1900	-	130	13	300	2.5
9	-	40	3	350	4000	2200	-	130	13	300	5
10	-	40	3	350	4000	2200	-	130	13	300	5
11	-	40	4	350	4000	2200	-	200	18	450	5
12	-	40	4	350	4000	2200	-	200	18	450	5
13	-	40	4	350	4000	2200	-	200	18	450	5
14	-	45	4	350	4000	2300	-	200	18	450	5
15	-	45	4	350	4000	2300	-	250	22	500	7
16	-	45	4	350	4000	2300	-	250	22	500	7
17	-	45	4	350	4000	2300	-	250	22	500	7
18	2500	45	5	350	4000	2300	-	300	25	600	7
19-50	2500	45	5	350	4000	2300	-	300	25	600	7
51-64	2500	45	5	350	4000	2300	-	300	25	600	7
65-70	2500	45	5	350	4000	2300	-	300	25	600	7
≥70	2500	45	5	350	3000	2300	-	300	25	600	7
Women											
5	-	40	2	110	3000	1900	-	90	10	250	2.5
6	-	40	2	110	3000	1900	-	90	10	250	2.5
7	-	40	3	110	3000	1900	-	130	10	300	2.5
8	-	40	3	110	3000	1900	-	130	13	300	2.5
9	-	40	3	350	4000	2200	-	130	13	300	5
10	-	40	3	350	4000	2200	-	130	13	300	5
11	-	40	4	350	4000	2200	-	200	18	450	5
12	-	40	4	350	4000	2200	-	200	18	450	5
13	-	40	4	350	4000	2200	-	200	18	450	5
14	-	45	4	350	4000	2300	-	200	18	450	5
15	-	45	4	350	4000	2300	-	250	22	500	7
16	-	45	4	350	4000	2300	-	250	22	500	7
17	-	45	4	350	4000	2300	-	250	22	500	7
18	2500	45	5	350	4000	2300	-	300	25	600	7
19-50	2500	45	5	350	4000	2300	-	300	25	600	7
51-64	2500	45	5	350	4000	2300	-	300	25	600	7
65-70	2500	45	5	350	4000	2300	-	300	25	600	7
≥70	2500	45	5	350	3000	2300	-	300	25	600	7
Pregnancy	2500	45	5	350	3500	2300	-	300	25	600	7
Lactation	2500	45	5	350	4000	2300	-	300	25	600	7

[1] EFSA Committee does not recommend tolerable upper limit based on age for children and adolescents.

[2] Tolerable upper limit was not determined due to insufficient data from EFSA and IOM.

Appendix 1. 5. 5. Estimated average requirements of protein and some micronutrients (EAR/AR)

Age/gender	Protein (g /kg/ day)	Vitamin A (mcg/day)	Vitamin B_1 (mg/day)	Vitamin B_2 (mg/day)	Vitamin B_6 (mg/day)	Vitamin C (mg/day)	Vitamin D (mcg/day)	Calcium (mg/day)	Iron (mg/day)	Zinc (mg/day)	Folate[10] (mcg/day)
Children											
2	0.79	205	0.4	0.4	0.4	15	10	390	5	3.6[5]	90
3	0.73	205	0.4	0.4	0.4	15	10	390	5	3.6[5]	90
4	0.69	245	0.5	0.5	0.5	25	10	680	5	4.6[5]	110
Men											
5	0.69	245	0.5	0.5	0.5	25	10	680	5	4.6[5]	110
6	0.72	245	0.5	0.5	0.5	25	10	680	5	4.6[5]	110
7	0.74	320	0.5	0.5	0.5	40	10	680	8	6.2[5]	160
8	0.75	320	0.5	0.5	0.5	40	10	680	8	6.2[5]	160
9	0.75	320	0.7	0.8	0.8	40	10	680	8	6.2[5]	160
10	0.75	320	0.7	0.8	0.8	40	10	680	8	6.2[5]	160
11	0.75	480	0.7	0.8	0.8	60	10	960	8	6.2[5]	210
12	0.74	480	0.7	0.8	0.8	60	10	960	8	8.9[5]	210
13	0.73	480	0.7	0.8	0.8	60	10	960	8	8.9[5]	210
14	0.72	480	1.0	1.1	1.1	60	10	960	8	8.9[5]	210
15	0.72	580	1.0	1.1	1.1	85	10	960	8	11.8[5]	250
16	0.71	580	1.0	1.1	1.1	85	10	960	8	11.8[5]	250
17	0.70	580	1.0	1.1	1.1	85	10	960	8	11.8[5]	250
18	0.66	570	1.0	1.1	1.1	90	10	860	6	7.5-12.7[6]	250
19-50	0.66	570	1.0	1.1	1.1	90	10	750-860[3]	6	7.5-12.7[6]	250
51-64	0.66	570	1.0	1.1	1.4	90	10	750	6	7.5-12.7[6]	250
65-70	0.66	570	1.0	1.1	1.4	90	10	750	6	7.5-12.7[6]	250
≥70	0.66	570	1.0	1.1	1.4	90	10	750	6	7.5-12.7[6]	250
Women											
5	0.69	245	0.5	0.5	0.5	25	10	680	5	4.6[5]	110
6	0.72	245	0.5	0.5	0.5	25	10	680	5	4.6[5]	110
7	0.74	320	0.5	0.5	0.5	40	10	680	8	6.2[5]	160
8	0.75	320	0.5	0.5	0.5	40	10	680	8	6.2[5]	160
9	0.75	320	0.7	0.8	0.8	40	10	680	8	6.2[5]	160
10	0.75	320	0.7	0.8	0.8	40	10	680	8	6.2[5]	160
11	0.73	480	0.7	0.8	0.8	60	10	960	8	6.2[5]	210
12	0.72	480	0.7	0.8	0.8	60	10	960	7	8.9[5]	210
13	0.71	480	0.7	0.8	0.8	60	10	960	7	8.9[5]	210
14	0.70	480	0.9	0.9	1.0	60	10	960	7	8.9[5]	210
15	0.69	490	0.9	0.9	1.0	75	10	960	7	9.9[5]	250
16	0.68	490	0.9	0.9	1.0	75	10	960	7	9.9[5]	250
17	0.67	490	0.9	0.9	1.0	75	10	960	7	9.9[5]	250
18	0.66	490	0.9	0.9	1.0	80	10	860	6-7[4]	6.2-10.2[7]	250
19-50	0.66	490	0.9	0.9	1.1	80	10	750-860[3]	6-7[4]	6.2-10.2[7]	250
51-64	0.66	490	0.9	0.9	1.3	80	10	750	6-7[4]	6.2-10.2[7]	250
65-70	0.66	490	0.9	0.9	1.3	80	10	750	6-7[4]	6.2-10.2[7]	250
≥70	0.66	490	0.9	0.9	1.3	80	10	750	6-7[4]	6.2-10.2[7]	250
Pregnancy	+0.5-2[1]	540	1.2	1.2	1.6	-[8]	10	750-860[3]	-[9]	+1.3[2]	-
Lactation	-[8]	1020	1.2	1.3	1.7	+50[2]	10	750-860[3]	-[9]	+2.4[2]	380

See: Referances No. 4,9-11,14,20,23,30,32

[1] In addition to the estimated average requirement values of the adult age group; 1st trimester 0.5 g/day, 2nd trimester 7.3 g/day, 3rd trimester 23 g/day.

[2] Amount to be added to the estimated average requirement values of adult age groups.

[3] 860 mg for age of 19-24 years, 750 mg for age of 25-50 years.

[4] In premenopausal period 7 mg, in postmenopausal period 6 mg.

[5] Values calculated according to body weight when physiologic requirement is taken into consideration and when the absorption activity is accepted as 30% in a mix diet.

[6] For intake of phytate of 300, 600, 900 and 1200 mg in men, 7.5 ,9.3,11 and 12.7 mg, respectively.

[7] 6 For intake of phytate of 300, 600, 900 and 1200 mg in women, 6.2, 7.6, 8.9 and 10.2 mg, respectively.

[8] There are no data about the average requirement amounts.

[9] Same with the requirement values of adult age groups.

[10] Dietary folate equivalent.

Appendix 2

Standard Portion Sizes and Amounts of Foods for Turkey According to Food Groups

MILK, YOGHURT, CHEESE GROUP

Appendix 2.1. Standard Portion Sizes and Amounts of Foods According to Food Groups

1 standart portion: Approximately 150 kcal

SIZE/ AMOUNT	
Milk	1 cup *or* 240 mL
Yoghurt	1 cup *or* 1 small bowl or 200 mL
Yoghurt (home made)	1 cup *or* 1 small bowl or 240 mL
Kephir	1 cup *or* 240 mL
Diluted yoghurt (ayran)	1.5 cup *or* 1 big glass *or* 1 big readymade diluted yoghurt (ayran) *or* 350 mL
White Cheese	3 fingers *or* 2 matchboxes *or* 60 g
Kashar Cheese	2 fingers *or* 40 g

Appendix 2.1.1. Standard portion sizes and amounts of foods for milk, yoghurt and cheese group

Total Daily Portion Amounts Recommended for Milk-Yoghurt-Cheese

	PORTION	PORTION
2-3 years	2½	2
4-6 years	2½	2½
7-10 years	3	3
11-14 years	3	3
15-18 years	3	3
18-49 years	3	3
50-70 years	3	3
70 years and older	3	3

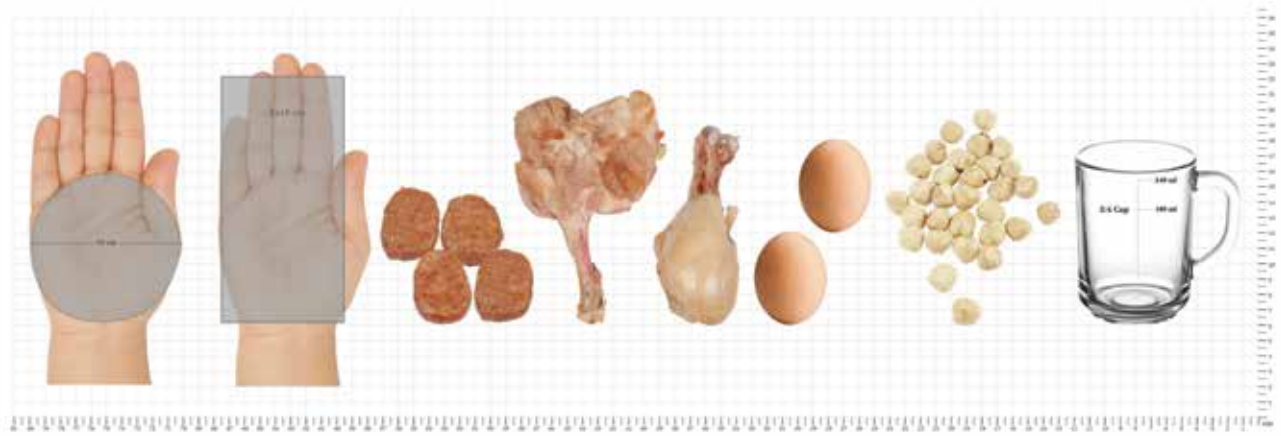
Appendix 2.1.2. Total daily portion amounts recommended for milk-yoghurt-cheese

[1] *For detailed evaluation see Appendix 2.3.1 and Appendix 3.1.1.*

MEAT-POULTRY-FISH-EGGS-LEGUMES-NUTS-SEEDS GROUP

1 Standard Portion: Approximately 150-200 kcal

	SIZE/AMOUNT
Egg	2 small eggs *or* 100 g
Cooked red meat [1,2,3]	3-4 grilled meatballs *or* 1 Adana meatball *or* 10-14 İnegöl meatball *or* 2 hamburger meatballs *or* 1 meat at the size of palm *or* 1 large meat chop *or* 80 g
Cooked poultry meat [1,2,3]	1 medium sized chicken baguette *or* poultry meat at the size of a palm *or* 80 g
Cooked fish	1 slice at the size of a hand *or* 1 thick slice at the size of a palm *or* 150 g
Cooked small fishes such as anchovy	12-13 pieces *or* 150 g
Canned tuna	Drained 100 g
Cooked shrimp and other sea products	12-15 small pieces *or* 100 g
Chickpea, beans, cranberry bean, shelled broad beans1, cowpea (boiled)	¾ cup *or* 2 small ladle[4] *or* 8-10 tablespoonsor 130 g
Hazelnut [5]	28-30 pieces *or* 1 handful *or* 30 g
Walnut [5]	4-5 large pieces *or* 6-7 medium sized pieces *or* 10-12 small full crushed walnut *or* 1 handful *or* 30 g
Almond [5]	24-26 pieces *or* 1 handful *or* 30 g
Peanut [5]	27-30 pieces *or* 1 handful *or* 30g
Cashew [5]	18-20 pieces *or* 1 handful *or* 30 g
Sunflower Seed [5]	*1 cup or 5 handful or 60g (measure with shells)*
Pumpkin Seed [5]	*½ cup or 2,5 handful or 40 g (measure with shells)*
Pistachio [5]	*2 handful or 60 g (measure with shells)*



Appendix 2.1.3. Standard portion sizes and amounts for meat-poultry-fish-eggs-legumes-nuts-seeds

[1] *The contribution of fat added in meal during preparation to energy was ignored.*

[2] *Skinless meat separated from their visible fats should be preferred.*

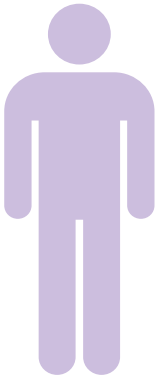
[3] *See 10.2.4 for water loss with cooking and raw weights.*

[4] *Ladle no. 1 with a diameter of 8 cm, 90 mL*

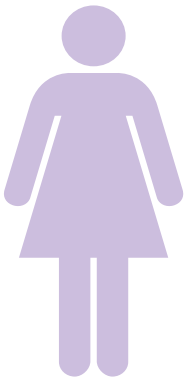
[5] *Salt-free seeds and nuts should be preferred. Nuts should be consumed with their inner shells as a whole and raw if possible. Since most of the antioxidant materials protecting health are found in "soft inner shell", more than half of the antioxidants disappear when the shell is removed. Toasting process also may cause loss of antioxidant materials and makes it easier for shell to separate from the surface. Therefore, they are recommended to be consumed raw. Some of them may be consumed after application of low heat for a short time since this may promote sensorial capabilities and make them easier to consume. It must be noted that the antioxidant capacity will decrease in all conditions and acrylamide, potentially a carcinogenic material, will occur in products toasted in high temperatures and/or for long time; therefore such products should not be preferred.*



Portion Amounts Recommended For Meat-Poultry-Fish-Eggs-Legumes- Nuts-Seeds[1]



	Meat, Poultry, Fish, Eggs[2]	Meat, Poultry[2,3]	Eggs	Fish	Legumes[4]	Seeds[5]
	Total Portion/day	Portion/day	Portion	Portion/week	Portion/week	Portion/day
2-3 years	¾ - 1	¼ - ⅓	daily ½	⅔-1	1	⅛ (⅓)
4-6 years	1 - 1½	⅓ - ¾	daily ½	1 - 1 ½	1 - 2	¼ (½)
7-10 years	1½	¾	daily ½	1 ½ - 2	3	½ (1)
11-14 years	1½	¾	daily ½	2	3	½ (1)
15-18 years	2	1¼	daily ½	2	3-4	1 (1⅓)
18-49 years	1½	¾	weekly 2½	2	3	½ (1)
50-70 years	1½	¾	weekly 2½	2	3	½ (1)
70 years and older	1½	¾	weekly2½	2	3	½ (1)



2-3 years	¾-1	¼ - ⅓	daily ½	⅔ -1	1	⅛ (⅓)
4-6 years	1	½	daily ½	1 - 1½	1 - 2	¼ (½)
7-10 years	1½	¾	daily ½	1½ - 2	3	½ (1)
11-14 years	1½	¾	daily ½	2	3	½ (1)
15-18 years	1½	1	daily ½	2	3	½ (1)
18-49 years	1½	¾	weekly 2½	2	3	½ (1)
50-70 years	1½	¾	weekly 2½	2	3	½ (1)
70 years and older	1½	¾	weekly 2½	2	3	½ (1)

Appendix 2.1.4. Daily portion amounts recommended for meat-poultry-fish-eggs-legumes-nuts-seeds[1]

[1] Determined according to moderately active energy requirement for 10-18 age group and according to low active energy requirement for other age groups.

[2] It is accepted that 1/3 portion corresponds to about 25-30g as cooked, ¾ portion corresponds to 60g, 1 portion corresponds to 80 g, and 1¼ portion corresponds to 100 g.

[3] It is recommended to meet maximum ½-⅓ of 60-100 g/day of total meat consumption recommended by TUBER 2015 from red meat and to meet the remaining amount from winged animal meat. This amount equals to 2½-3 TUBER portions in total. Processed meat products should be evaluated in the optional preferences class shown in Appendix 2.1.12 and their consumption should be decreased to minimum amount given their high sodium content.

[4] Everyday consumption of legumes should be encouraged in all age groups. Therefore, legume use should be varied with development of new recipes in addition to the traditional legume meals. (See 10.3.3) The share of legumes in the diet were increased to meet the energy requirements of individuals at the age of 15-18 years (Appendix 4.7.9) who have the highest energy requirements among all age groups and mostly consume white bread.

[5] It is recommended for all age groups to consume seeds-nuts frequently or every day, if possible, separately from meat, poultry, fish, eggs. These foods are also perfect alternatives for control of optional calories. Therefore, lower and upper portion amounts were provided for these foods. If the optional calories are wished to be decreased, the upper portion number can be consumed (See Table 10.4). Upper portion amount can be 1⅓ in boys at the age of 15-18 years in active group (3200 kcal/day). Sizes and weights of seeds and nuts corresponding to ½, ⅔, ¾, 1, 1 ⅓ portions are given in Appendix 2.1.12.

FOODS OF BREAD AND CEREALS GROUP

1 Standard Portion: Approximately 150 kcal

	SIZE/AMOUNT
Bread[1]	2 thin slices *or* 50 g
Pita-Flatbread-lavash[1]	¼ small *or* ⅛ large *or* 50 g
Bagel[1]	½ piece *or* 50 g
Hamburger bread[2]	1 small *or* ¾ medium sized *or* ¾ large
Bulghur, cooked[3-6]	½ cup *or* 1 levelled off medium sized ladle[7] *or* 4-5 tablespoons *or* 90 g[6]
Rice, cooked[1,3,4,5]	½ cup *or* 1 levelled off medium sized l ladle[7] *or* 4-5 tablespoons *or* 90 g
Pasta, boiled[1,4,5]	½ cup *or* 1 levelled off medium sized ladle[7] *or* 4-5 tablespoons *or* 75 g
Soup types[10]**, grains, legumes, vegetables etc.**	¾ cup *or* 1.5 levelled off medium sized ladle[7] *or* [8,10]
Hardtack or Grissini[1]	30 g
Wheat/rice flakes	½ cup *or* 1 levelled off medium sized ladle[7] *or* 30 g
Oatmeal/Muesli	¼ cup *or* 30 g *or* 1 levelled off medium sized ladle[9]
Cornflakes	1 cup *or* 2 levelled off medium sized ladle[7] *or* 30 g
Filo[1]	⅓ filo *or* 50 g
Popcorn	3 cup *or* 1 large bowl *or* 25 g

Appendix 2.1.5. Standard portion sizes and amounts for foods of bread and cereals group

[1] *Whole grains or products prepared with whole grains should be preferred.*

[2] *A small sized hamburger has a diameter of 10 cm and weight of 50 g; a medium sized hamburger has a diameter of 11 cm and weight of 65 g; and a large size hamburger has a diameter of 12.5 cm and weight of 75-80 g.*

[3] *Standard portion is 30 g for raw rice and pasta and 25 g for raw bulghur. One package of pasta of half kilogram corresponds to 15 portions.*

[4] *1 standard portion of rice, bulghur and pasta corresponds to the amount served as garniture. Rice or pasta served as a second plate following main meals such as meat, vegetables, legumes at home or institutions with catering services correspond to 2 standard portions.*

[5] *The contribution of fat added in meal during preparation to energy was ignored.*

[6] *1 portion of bulghur pilaf cooked with plenty of vegetables is 100-110 grams.*

[7] *Ladle No. 2 with a diameter of 9 cm, 125 mL*

[8] *Small bowl with a diameter of 14 cm*

[9] *Sauce ladle No. 3 with a diameter of 7 cm, 60 mL*

Total Daily Portion Amounts Recommended for Bread and Cereals

	PORTION	PORTION
2-3 years	2½	2½
4-6 years	2½ - 3	2½
7-10 years	3 - 4	3 - 3½
11-14 years	4½ - 5	4 - 4½
15-18 years	7 - 8	4-5
18-49 years	5	3½ - 4
50-70 years	4 - 4½	3½
70 years and older	4	3

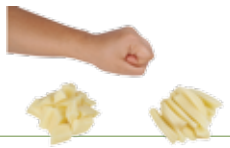
Appendix 2.1.6. Total daily portion amounts recommended for bread and cereals[1,2]

[1] Determined according to moderately active energy requirement for 10-18 age group and according to low active energy requirement for other age groups.

[2] For detailed evaluation see Appendix 2.3.1 and Appendix 3.1.1.

VEGETABLES GROUP

1 Standard Portion: Approximately 25-85 kcal

SIZE/AMOUNT [1,2]	
Dark green leafy vegetables; Mediterranean/salad greens like Spinach, chard, purslane, savoy cabbage, vine leaves(cooked) Cabbage lettuce, lettuce, spinach, purslane, parsley, watercress, rocket, mint, lamb's-ear, basil, dill, chicory, cabbage lettuce -succory (Sliced, chopped or as salad)	1 cup *or* 1 fist *or* 5-6 tablespoons *or* 2 middle-sized laddle[3] *or* 10-25 vine leaves 2 cup *or* 2 fist *or 1 large bowl* *1 large bowl or 6 cup of un-chopped raw spinach*  *1 cup of spinach dish is obtained from 6 cups of raw spinach*
Other green vegetables; Broccoli, okra, green bean, fresh broad bean, green peas, zucchini, artichoke, asparagus, brussell sprouts (cooked) green or sweet pepper types, cucumber (chopped, raw) Iceberg lettuce (Sliced, chopped or as salad	1 cup *or* 1 fist *or* 5-6 tablespoons *or* 2 middle-sized laddle[3] 1 cup *or* 1 fist *or* 1 small bowl 2 cup *or* 2 fist *or* 1 large bowl
Red-orange-blue-purple vegetables; Tomato, carrot (raw or cooked), red pepper, radish, pumkin, red beet, egg-plant, red cabbage (chopped, raw or cooked),	1 medium size or 1 cup *or* 1 fist 1 cup *or* 1 small bowl *or* 5-6 tablespoons *or* 2 middle-sized laddle[3]
White vegetables; Onion, cellery, cabbage, cauliflower, leek mushroom, sunchoke, turnip (chopped, raw or cooked)	1 cup *or* 1 fist *or* 2 middle-sized laddle[3] *or* 5-6 tablespoons
Starchy vegetables *1 ½ standard portion* 	Potato ½ medium size *or* 1 piece at the size of computer mouse ½ cup chopped *or* puree *or* 8-10 pieces cutted in 6-10 cm Fresh corn ½ cup boiled *or* ½ piece large corncob in 20-22 cm
Vegetable juices	150 mL

Appendix 2.1.7. Standard portion sizes and amounts for vegetables

[1] Since Turkey has great food variety in markets and bazaars, standard portion measures were given as grouped according to their colors. The elements giving color to vegetables have protective effects on health. Consumption of vegetables accessible and/or economical depending on the season in varied colors and in adequate amounts increases the protective effect.

[2] One standard portion size is 150 g for cooked vegetables, 75 g for large-chopped green leafy vegetable, 150 g for other chopped or whole foods consumed raw, and 90 grams for potato and corn.

[3] Ladle No. 2 with a diameter of 9 cm, 125 mL

Total Daily Portion Amounts Recommended for Vegetables[1,2]

	PORTION	PORTION
2-3 years	1-2	1-2
4-6 years	2	2
7-10 years	2-2 ½	2-2½
11-14 years	2-2½ - 3½	2-2½ - 3
15-18 years	3½ - 4	3½
18-49 years	3½	2½
50-70 years	2½ - 3	2½
70 years and older	2½	2½

Appendix 2.1.8. Total daily portion amounts recommended for vegetables

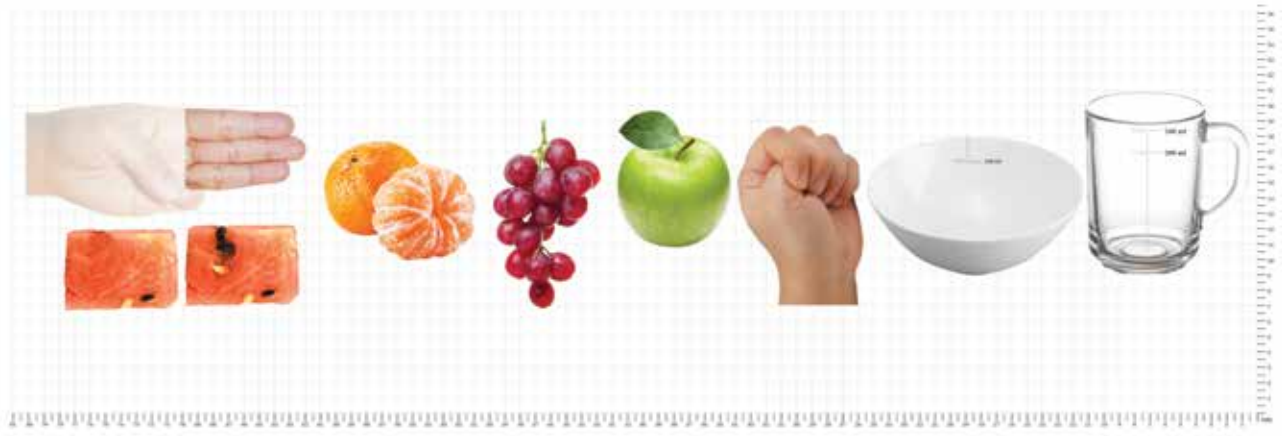
[1] *Determined according to moderately active energy requirement for 10-18 age group and according to low active energy requirement for other age groups.*

[2] *For detailed evaluation see Appendix 2.3.1 and Appendix 3.1.1.*

FRUITS GROUP

1 Standart Portion: 50-100 kcal

SIZE/AMOUNT[1]	
Apple, orange, peach, nektarine	1 medium size; in diameter 7 cm *or* at the size a 1 fist
Pear, quince	1 small size *or* In a size that 5 pieces weight 1 kg
Mandarin	1 medium size; 6 cm in diameter
Lemon	2 large size; 6.5 cm in diameter
Kiwi	2 medium size; in diameter 5 cm
Banana	1 in hand lenght *or* slices ⅔ small bowl
Japanese persimmon	*2* heaping tablespoons
Watermelon, melon	4-5 slices at a size of a match boxe *or* 2 slices in thickness and lengh of 3 fingers *or* 3 triangular pieces in size 9 cm x 6 cm x 2 cm *or* 1/16 of watermelon of 8 kg
Cherry, sour cherry	13-15 large size *or* 1 small bowl
Strawberry	7-8 large *or* 15 medium size
Grape types	20 large *or* 25-30 small size *or* 1 small bowl
Blackberry, raspberry, mulberry	50-60 pieces *or* 1 small bowl
Bilberry	1 small bowl
Pomegranate	half in diameter 10 cm *or* grained in 1 small bowl
Apricot	4 large *or* 7-8 small
Fig	2 pieces; 6.5 cm in diameter
Japanese plum	8 large *or* 12 small
Pineapple	1 finger - 2 thin slices in 1.5 cm in thickness
Plum	1 large *or* 3-5 small
Dried apricots, plum, fig	3-4 pieces
Dried grape (raisin),	20-30 pieces, 30 g
Dates	1 large *or* 3 small pieces



Appendix 2.1.7. Standard portion sizes and amounts for fruits

[1] One standard portion is 30 g for dried fruits, 100 g from banana, 80 g for persimmon, and 150 g for all other fruits. 1 small bowl of chopped large fruits or small grained fruits is 1 standard portion.

Total Daily Portion Amounts Recommended for Fruits[1,2]

	PORTION	PORTION
2-3 years	1½	1½
4-6 years	1½ - 2	1½
7-10 years	2	2
11-14 years	2½	2 - 2½
15-18 years	2½ - 3	2½
18-49 years	2½	2
50-70 years	2 - 2½	2
70 years and older	2	2

Appendix 2.1.10. Total daily portion amounts recommended for fruits

[1] Determined according to moderately active energy requirement for 10-18 age group and according to low active energy requirement for other age groups.

[2] For detailed evaluation see Appendix 2.3.1 and Appendix 3.1.1.

Optionally Preferred Foods

Appendix 2.1.11. Energy contents of optionally preferred foods as multipliers of one standard energy (75 kcal)[1,2]

1 standard energy : 75 kcal			
Optional preferences (various serving sizes and amounts)	Energy content as multipliers of 1 standard energy	**Optional preferences (various serving sizes and amounts)**	Energy content as multipliers of 1 standard energy
BUTTER, 1 level teaspoon / 5 g	½	**PASTRY PRODUCTS, SALTY**	
1 heaping teaspoon / 15 g	1 ½	Rusk sticks, 3 pieces, small / 15 g	1
1 level tablespoon / 8-9 g	1	Salty cookies, 1 piece / 15-20 g	1
1 picnic size / 15 g	1 ½	Pastry sticks covered with sesame seeds, 2 pieces / 15 g	1
1 picnic size / 20 g	2	Bagels, covered with sesame seeds, 1 piece, small / 15-17 g	1
DAIRY CREAM, CLOTTED, 5 level teaspoons / 25 g	2	1 piece, large/ 60-90 g	3-5
1 heaping teaspoon / 15 g	1	Home rolled flaky pastries, 1 piece/ 20-90 g	1-4
1 level tablespoon / 8-9 g	⅔	Pastry shop, rolled flaky pastry (Karakoy böreği), 1 piece / 120 g	6
1 heaping tablespoon / 25 g	2	Puff pastry(Talaş böreği) , 1 piece / 135 g	8
DAIRY CREAM,LIQUID, 1 cup / 238 g	11	Pastry from boiled phyllo-sheets with shredded cheese filling (Su böreği), 2 slices / 110-160 g	4-6
Whipped, 1 cup / 120 g	6	Pastry with vegetable or minced meat fillings, 2 slices / 150 g	6-7
1 tablespoon / 15 g	¾	Flaky yeast buns with margarine or butter(Poğaça), 1 piece / 75-100 g	4-5
	1	Pizza with sausage or cheese, 1 piece of mini pizzas / 20 g	1
COFFEE CREAM, POWDER, 2 level teaspoons / 5 g	⅓	**PASTRY PRODUCTS , SUGAR SWEETENED**	
HONEY, 1 teaspoon / 6 g	½	Sweet cookies, 1 piece / 10-20 g	1-2
1 tablespoon / 15 g	⅔	Easter yeast bread, 1 piece / 215-225 g	6-12
1 picnic size / 25 g	1	Tahini roll, 1 piece, in 20 diameter / 300 g	18-20
JAM, 4 teaspoons / 30 g	1	Coconut cookies (Koko), 4 pieces / 80-100 g	5-7
1 tablespoon / 15 g	½	Crosissant , 1 piece / 90-115 g	4-7
1 picnic size / 30 g	1	Cakes (Yaş pasta), in 2 boxes size / 50 g	2
SUGAR, 5 level teaspoons / 20 g	1	Cakes(Yaş pasta), 1 commercial portion size/150 g	6
1 heaping teaspoon / 10 g	½	Profiteroles covered with chocolate sauce 2 pieces / 120 g	5
2½ level tablespoons / 20 g	1	Eclairs with cream filling and topped with chocolate, 3-4 small pieces / 90-110 g	4-5
1 heaping tablespoon / 20 g	1	**PASTRY PRODUCTS, SYRUP SWEETENED**	
FRUIT MOLASSES (PEKMEZ)		**Pastries from phyllo dough sheets with chopped nuts filling**	
3 teaspoons / 27 g	1	Diamond shaped(Baklava), 3 pieces / 75-120 g	4-7
1 tablespoon / 18 g	⅔	Diamond shaped and syrup drained(Kuru baklava) 3 pieces / 130-150 g	8-9
HAZELNUT SPREAD, 1 level teaspoon / 8-9 g	½	Finger like shaped, wrapped in ground pistachio nuts (Fistikli sarma) 4 pieces/ 75-130 g	4-6
1 heaping teaspoon / 25 g	1 ½	Sultan's desert, 4 large pieces / 120-140 g	7-8
1 level tablespoon /15 g	1	Birth's nest shaped (Bülbül yuvası), 5 small pieces / 70 g	
1 heaping tablespoon / 38 g	2 ½	Pleated turban shaped(Sarigi Burma), 1 small piece / 30-35 g	3
1 picnic size / 15 g	1	Triangular (Şöbiyet), 3 pieces /130 g	6
TAHINI(SESAME PASTE) PRODUCTS		Carrot sized and shaped (Havuç dilimi), 1 large triangular / 100 g	5
Tahini and fruit molasses mixture 1 picnic size / 20 g	1	Rose shaped, 1 piece / 60-90 g	4-5
Tahini halva, 1 picnic size / 20 g	1	**Pastries from shredded phyllo dough filled with nuts or cheese**	
CHOCOLATE, 3 small sizes/ 15 g	1	Product with chopped nut filling (Kadayif), 1 slice / 140-160 g	6-7
CARROT CONFECTIONAY (CEZERYE), 1 small package / 50 g	1	Product with cheese filling (Kunefe), 1 slice / 100 g	4
ICE CREAMS		**Other products without filling**	
Ice cream stick, mini / 60 -70 mL	3	Fried cream puff products shaped in pump, belly button or finger	4
large / 75-85 mL	4	**MERINGUES,** 4 pieces / 20 g	1
Ice cream cone, small / 100-120 mL	3	**PISTACHIO NUT BUTTER CONFECTIONARY** 1 piece / 15 g	1
large / 160 mL	4	**PACKAGED BISCUITS, CAKES, CRACKERS, WAFERS, BARS**	
Ice cream cup, mini / 100 mL	2	Plain biscuits such as petit beurre, finger biscuits, 3 pieces/ 20 g	1

Appendix 2.1.11. (continued) Energy contents of optionally preferred foods as multipliers of one standard energy (75 kcal)[1,2]

1 standard energy : 75 kcal			
Optional preferences (various serving sizes and amounts)	Energy content as multipliers of 1 standard energy	**Optional preferences (various serving sizes and amounts)**	Energy content as multipliers of 1 standard energy
Ice cream sandwich, mini / 60 mL	1	Cacao or cacao dropped biscuits 2-2 ½ pieces, / 17 g	1
large / 145 mL	3	Sandwich biscuits with cream, 2 pieces / 15 -20 g	1 - 1 ½
Goat milk ice cream, 2 balls / 80-90 g	2	Baby biscuits, 4 pieces / 17 g	1
2 slices / 100 g	2 ½	Cookies with chopped hazelnuts, 2-2 ½ pieces / 15 g	1
		Biscuits with whole wheat flour or wheat bran, 2 pieces / 14-18 g	1-1½
		Cake, plain 1 piece / 40-45 g	2 ½
CAFE PRODUCTS		**PACKAGED BISCUITS, CAKES, CRACKERS, WAFERS, BARS**	
Caffe latte, with fat-free or whole- fat milk, 1 cup / 240 mL	1-1½	Cake, in a size of 1 match box / 15 g	1
Cappuccino, with fat-free or whole-fat milk, 1 cup / 240 mL	¾ - 1¼	Wafers, 4 small or 2 large pieces / 16 g	1
Caffe mocha creamed with fat-free or whole- fat milk, 1 cup / 240 mL	2-2½	Chocolate coated bars/wafers/biscuits, 1 piece / 40-45 g	3
White chocolate mocha, with fat-free or whole- fat milk / 240 mL	3-3½	Salty stick crackers, 16-17 pieces / 18 g	1
Filtered coffee, 1 cup / 240 mL	0	Sesame stick crackers, 4 pieces / 16 g	1
Iced caffe latte, with fat-free or whole-fat milk, 1 cup/ 360 mL	1-1½	Cheese crackers , 11-12 small / 5 medium/ 2 large pieces / 16 g	1
Iced caramel macchiato, with fat-free milk / 360 mL	1	Fish shaped crackers, 24-25 pieces / 16 g	1
Cookie types, 1 piece / 80-90 g	5-6	Wheat bran crackers, 4 pieces / 18 g	1
Croissant types, 1 piece / 50-100 g	3-5	**CHIPS**	
Muffin types, 1 piece / 130-140 g	7	Classic , ½ small bowl, 6-7 pieces / 15 g	1
Cake types, 1 large slice / 130-150 g	6-7	Onion rings, ½ small bowl, 6-7 pieces / 15 g	1
Waffle, 1 piece / 75 g	5	Baked, ½ small bowl, 6-7 pieces / 15 g	1
Cream-cake types, 1 slice / 130-160 g	6-7	**SUGAR ADDED BEVERAGES**	
Brownie / wet cake, 1 slice / 75-160 g	5-10	½ cup / 125 mL	1
Cheesecake types, 1 slice / 175-200 g	9	**CREAM AND SYRUPS ADDED TO DRINKS**	
Sandwich types, 1 piece / 160-180 g	6-7	Cream extra amount added to 240-700 mL of hot and cold drinks (1 serving)	¾- 1
Cupcake types, 1 large piece, with or without filling / 120-150 g	7-8	Syrups ,3 pumps /30 g	1
Cupcake varieties, 1 small piece /20-25 g	1	**PROCESSED MEATS , 20-30 g**	1

[1] *This table can be used for the assignment of optional preferences in Appendix 3.1.1*

[2] *Pastry products, carbonated drinks and Cafe products may contain high amounts of sodium or/and trans-fatty acid containing fats*

75 kcal multiplications of the serving amounts of optional foods are shown in Appendix 2.1.11. These amounts are not the **recommended** amounts but prepared for informing the professionals and for helping individuals control their consumption. Consumption according to this table can be realized taking into account the share allocated for the optionally consumed foods in Appendix 3.1.1.

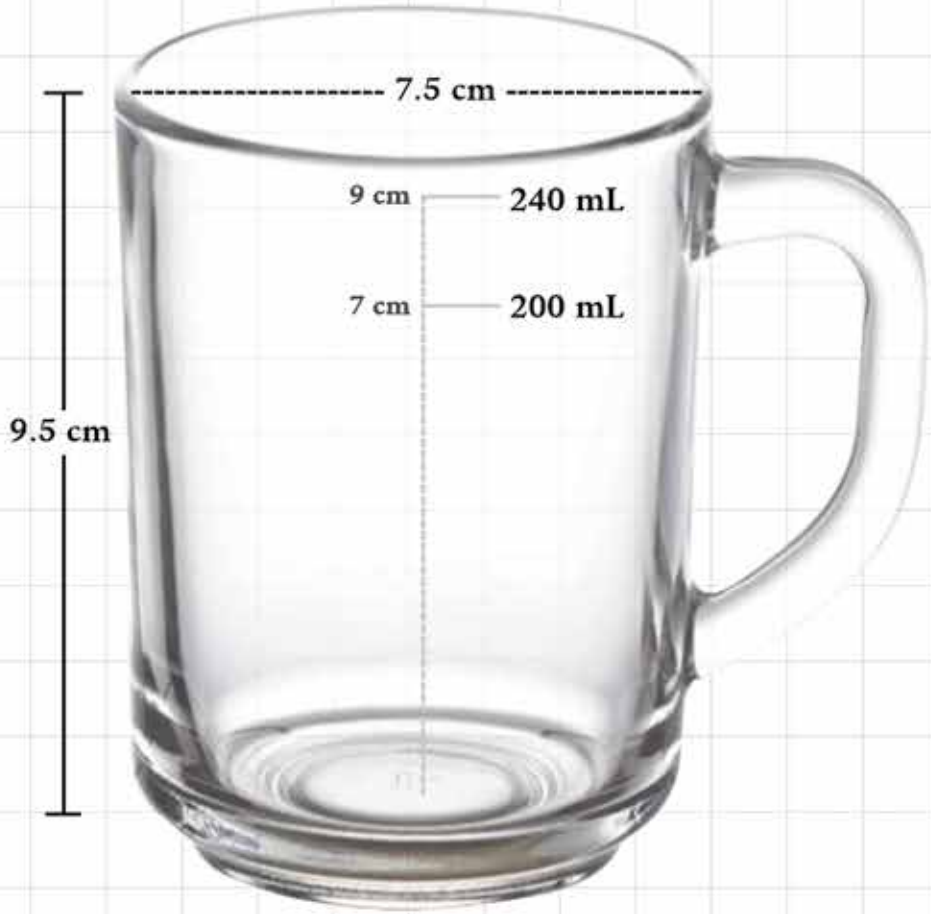
Serving size and weights of seeds and nuts that can be healthy alternatives to be preferred in the first place as optional foods are shown in Appendix 2.1.12 basing on the standard portion amount of the foods in *meat, poultry, fish, eggs, seeds, nust groups.*

Appendix 2.1.12. Practical sizes and amounts of nuts and seeds corresponding to standard portion amounts

Standard portion equivalents	Net weight (g) and sizes					Weight (g) and sizes with shells		
	Walnut	Peanut	Almond	Cashew	Hazelnut	Sunflower seed	Pumkin seed	Pistachio
1 1/3	40 g	40 g	40 g	40 g	40 g	74g	54 g	75 g
	14-18 half	¼ cup	¼ cup	¼ cup	¼ cup	6 handful	⅔ cup 2.5 handful	½ cup
		32-40 pieces	34-36 pieces	25-26 pieces	38-40 pieces			2.5 handful
		1 x 60 mL level ladle	1 x 60 mL level ladle	1 x 60 mL level ladle	1 x 60 mL level ladle			1 x 125 mL level ladle
1	30 g	30 g	30 g	30 g	30 g	56 g	41 g	57 g
	10-13 half	27-30 pieces	24-26 pieces	18-20 pieces	28-30 pieces	1 cup	½ cup	2 handful
	1 handful	1 handful	1 handful	1 handful	1 handful	5 handful	2 handful	
						2 x 125 mL level ladle	1 x 125 mL level ladle	1 x 90 mL level ladle
3/4	25 g	25 g	25 g	25 g	25 g	46 g	34 g	47 g
	9-10 half	23-25 pieces	20-22 pieces	16-17 pieces	23-25 pieces	4 handful	1.5 handful	⅓ cup
						2 x 125 mL level ladle	1 x 90 mL level ladle	1.5 handful
2/3	20 g	20 g	20 g	20 g	20 g	37 g	27 g	38 g
	7-8 half	16-20 pieces	17- 18 pieces	12-13 pieces	19-20 pieces	3 handful	1/3 cup	¼ cup
		1 x 30 mL level ladle	1 x 30 mL level ladle	1 x 30 mL level ladle	1 x 30 mL level ladle			1 x 60 mL level ladle
1/2	15 g	15 g	15 g	15 g	15 g	28 g	20 g	28 g
	5-7 half	13-15 pieces	12-13 pieces	9-10 pieces	14-15 pieces	½ cup	¼ cup	1 handful
		1 half a handful	1 half a handful	1 half a handful	1 half a handful	2.5 handful	1 handful	
						1 x 125 mL level ladle	1 x 60 mL level ladle	

Appendix 2.2.1 Cup

Diameter: 7.4 cm,height: 9.5 cm

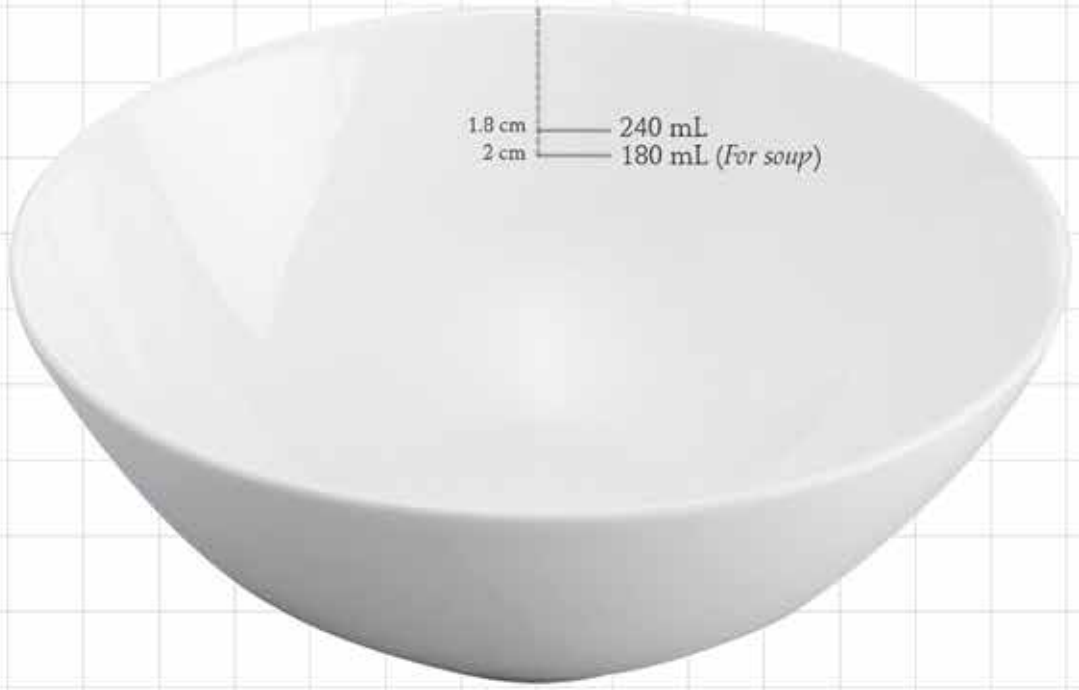


Appendix 2.2.2 Large Glass

Diameter: 8 cm,height: 13.5 cm

Appendix 2.2.3 Small Bowl

Diameter: 14-16 cm,height: 5 cm



14-16 cm

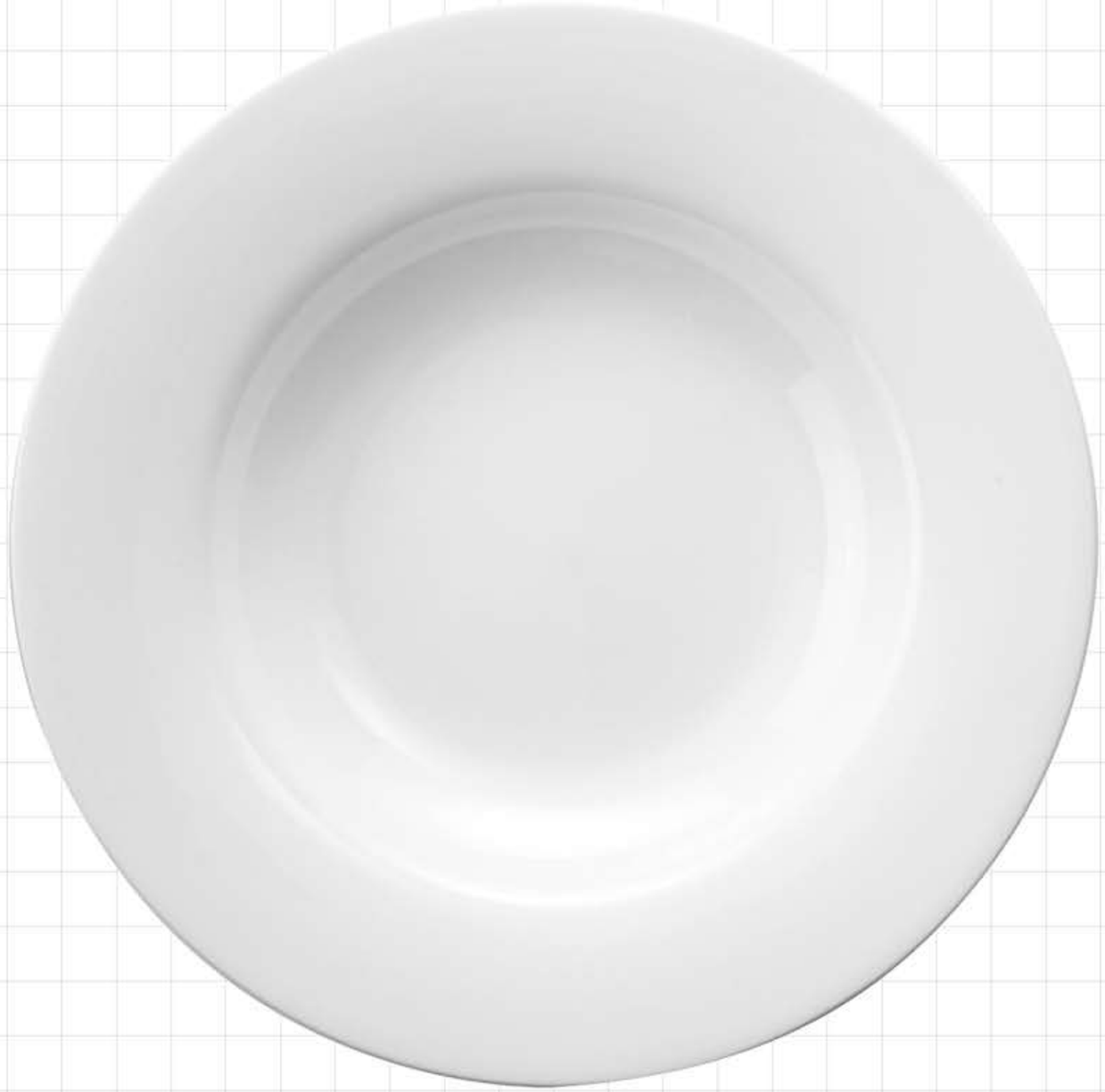
Standard portion of soup, yoghurt,
breakfast, cereals, chooped vegetables and fruits.

Appendix 2.2.4 Large Bowl

Diameter: 18-22 cm,height: 7-8 cm

Standard portions of chopped leafy vegetables and salads.

Appendix 2.2.5. Soup Plate



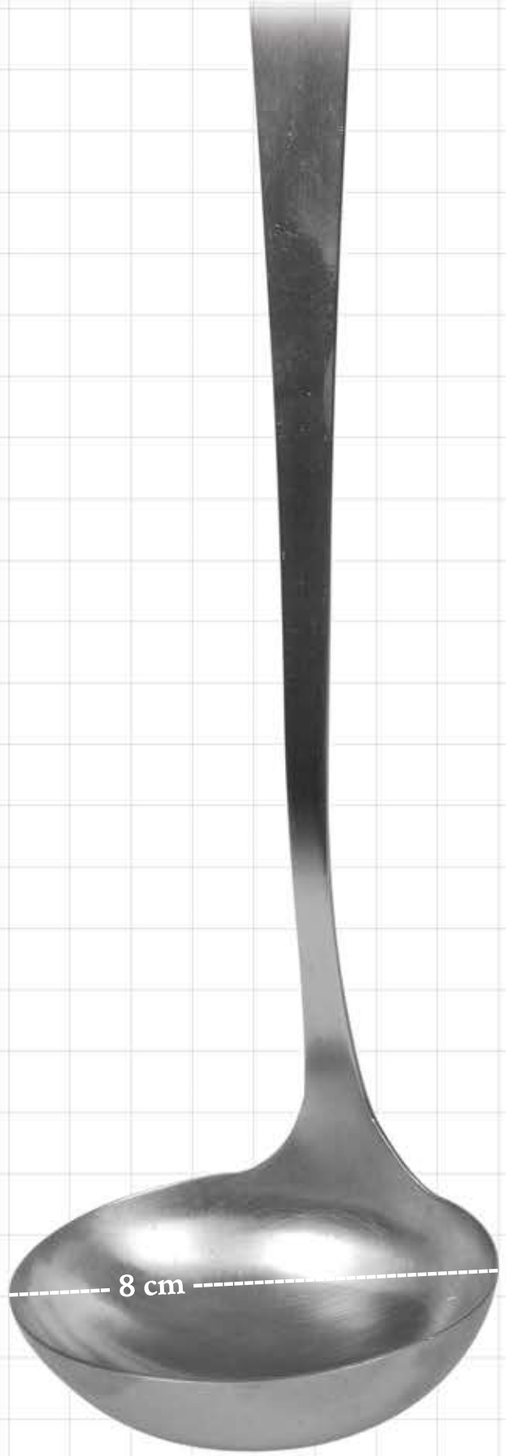
20 cm

Obtained from the Nutrition Materials archive of Prof. Sevil Başoğlu

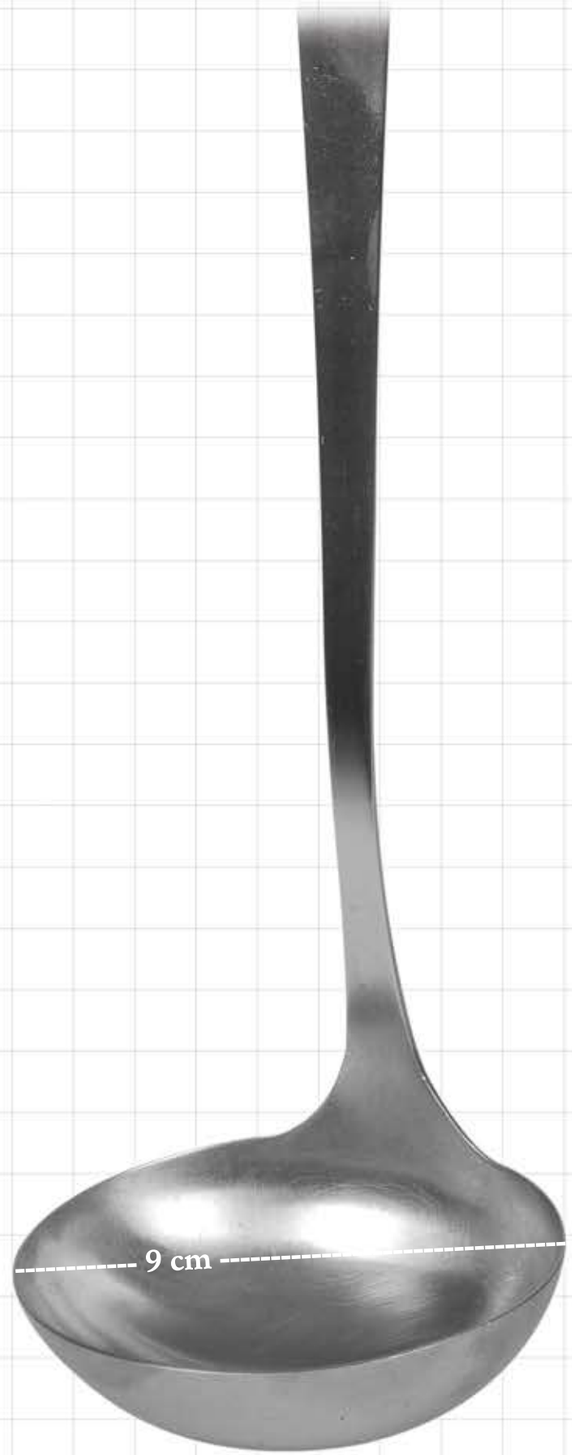
Appendix 2.2.6
Large Dinner Plate

Appendix 2.2.7. Ladles

Sauce ladle no. 3: Diameter of 7 cm, depth of 2.5 cm, 60 cc
(4 ladles equal to 1 cup) for breakfast cereals



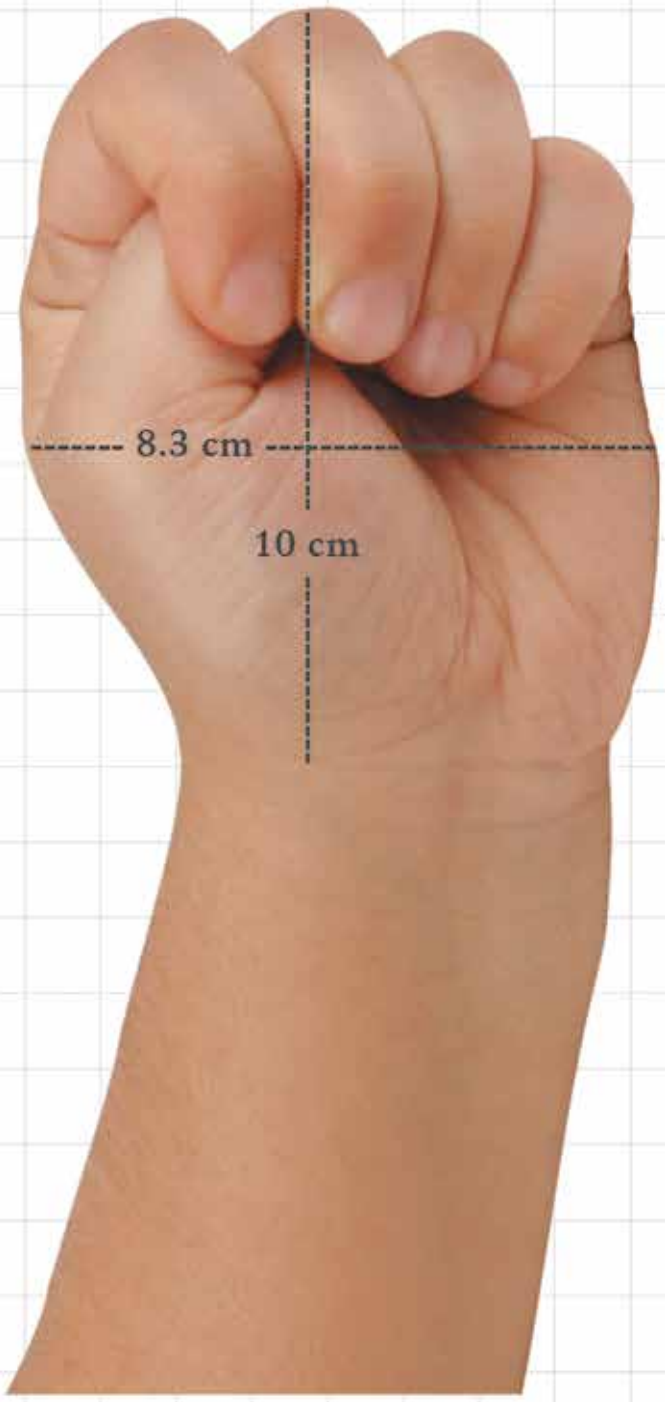
Ladle no. 1: Diameter of 8 cm and depth of 3.2 cm, 90 cc
(2 ladles equal to 3/4 cup)



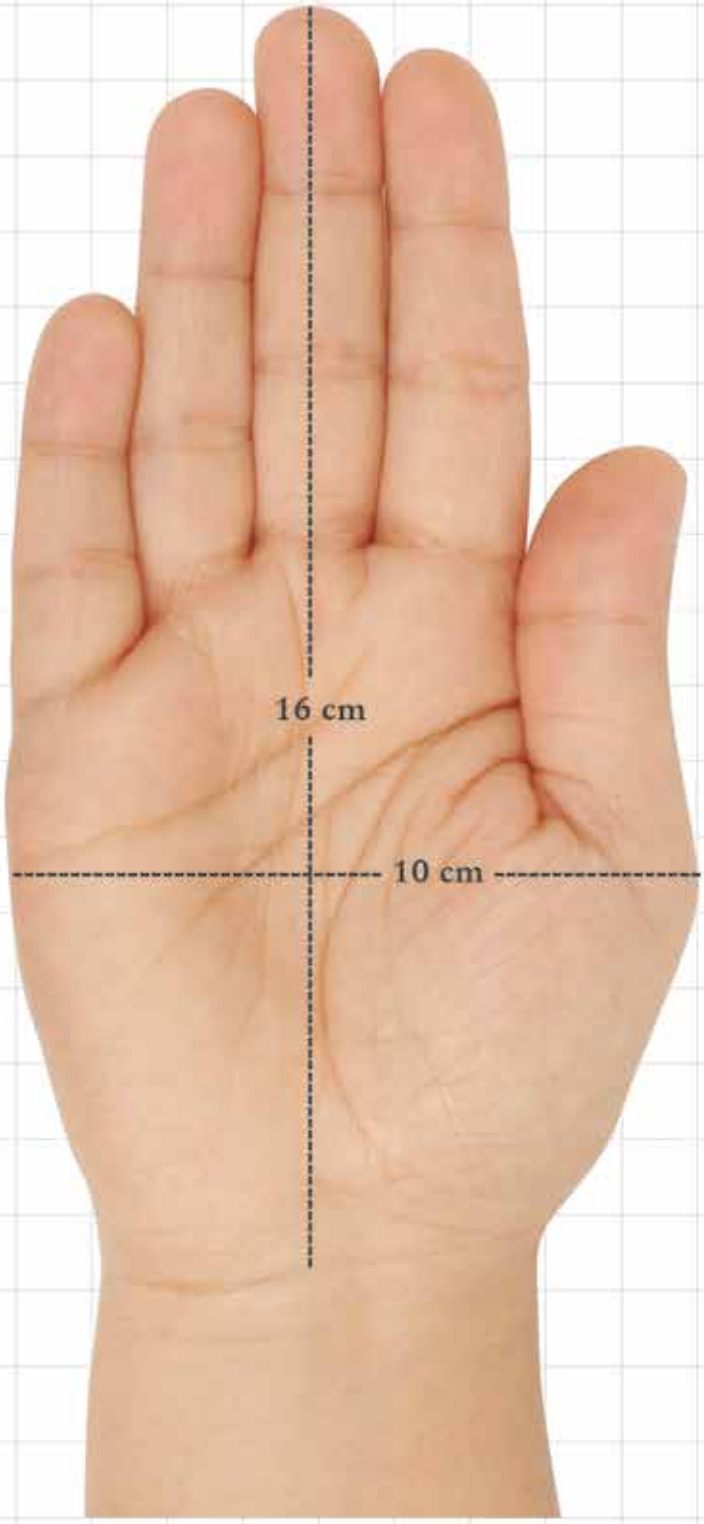
Ladle no. 2: Diameter of 9 cm and depth of 3.2 cm, 125 cc
(2 ladles equal to 1 cup) for pasta, rice and cooked vegetables

Appendix 2.2.8. Fist

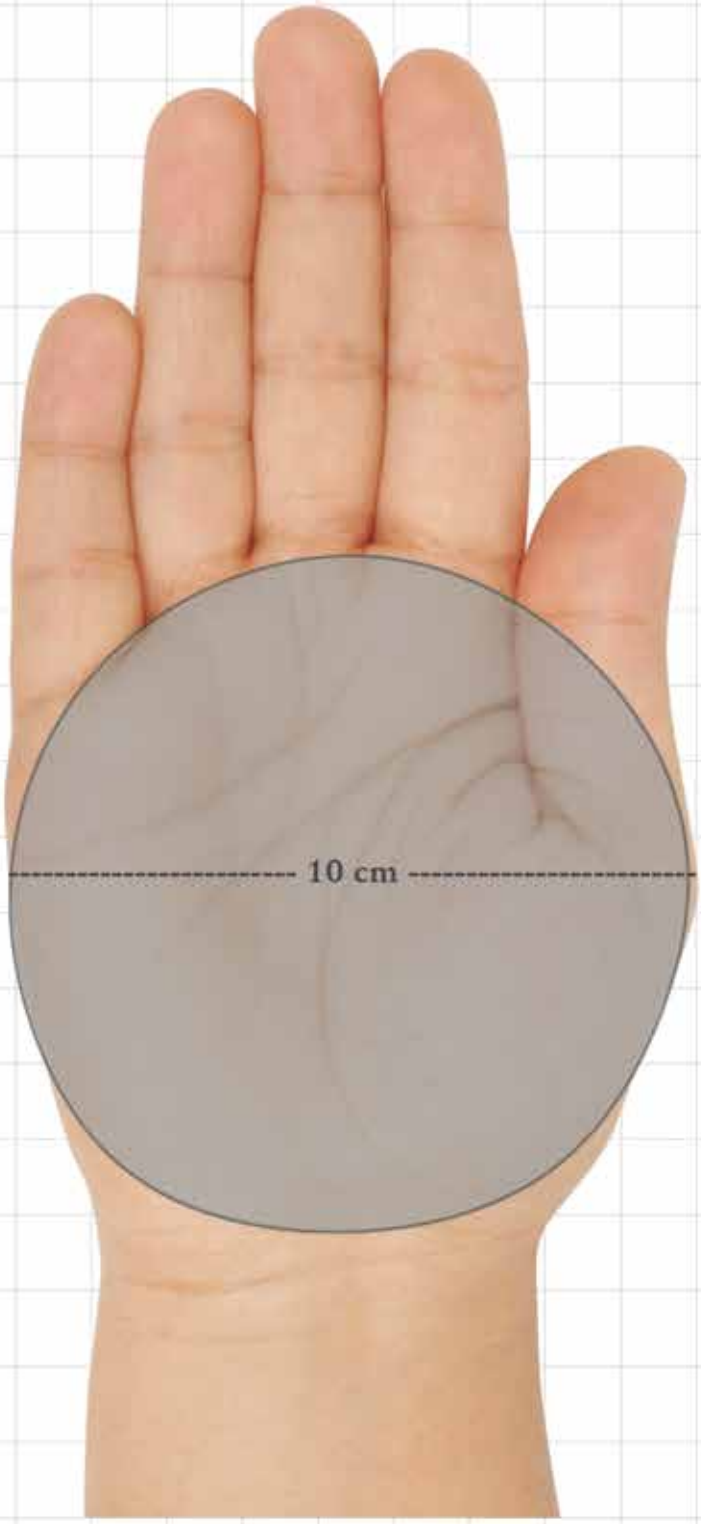
Circumference: 23 cm



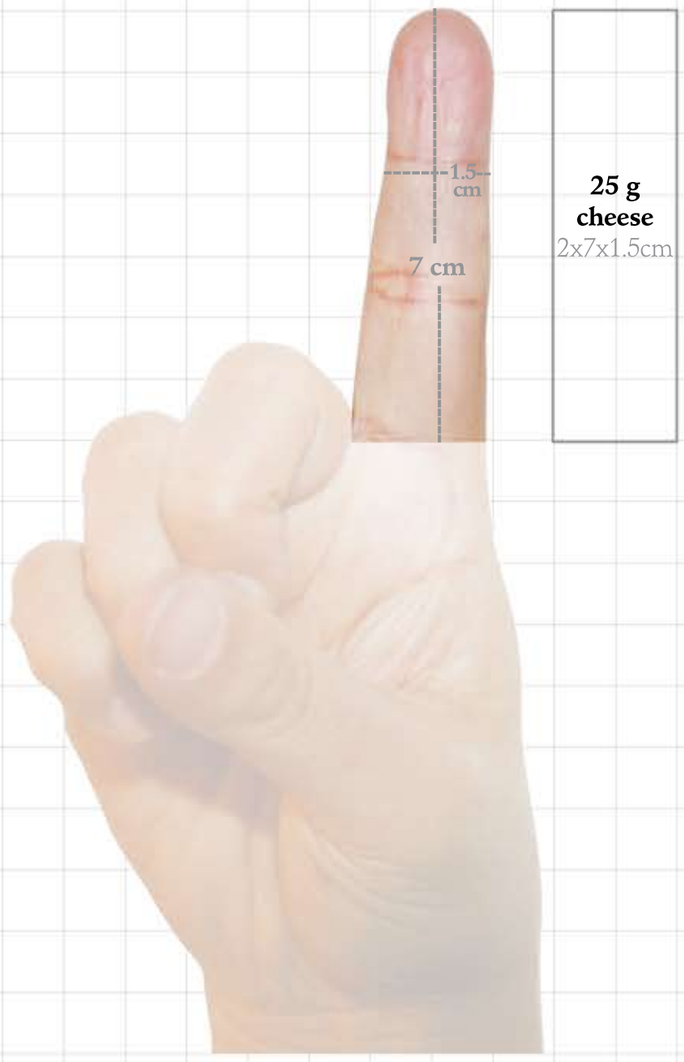
Appendix 2.2.9. Hand



Appendix 2.2.10. Palm



Appendix 2.2.11. Finger sizes for the portion sizes of cheese



25 g cheese
2x7x1.5cm

42 g cheese
3.5x7x1.5 cm

60 g cheese
5x7x1.5 cm

Appendix 2.3. Energy and Nutrient Values of One Standard Portion Amounts of Foods According to Food Groups

Appendix 2.3.1. Energy and nutrient values of one standard portion of foods for edible weights according to food groups

	Foods	Standard portion (g)	Energy (kcal)	Protein (g)	CHO (g)	Fiber (g)	Fat (g)	Cholesterol (mg)	Calcium (mg)	Iron (mg)	Zinc (mg)	Potassium (mg)	Vitamin A (mcg)	Vitamin C (mg)	Vitamin B_1 (mg)	Vitamin B_2 (mg)	Niacin eqv. (mg)	Vitamin B_6 (mg)	Vitamin B_{12} (mcg)	Total Folic Acid (mcg)
Milk-Yoghurt-Cheese	Cow's milk, whole-fat	240	154	7.9	11	0	8	31	288	0.1	0.9	360	79	4	0.1	0.4	1.9	0.1	1.9	12
	Yoghurt, whole-fat	240	158	7.9	10	0	9	34	312	0.1	1.1	384	79	2	0.1	0.4	2.1	0.1	0.5	24
	Cow's milk, low fat	240	116	8.2	12	0	4	14	288	0.1	1.0	360	34	2	0.1	0.4	2.0	0.1	1.9	12
	Yoghurt, low fat	240	111	8.2	10	0	4	12	312	0.1	1.0	384	52	2	0.1	0.4	2.2	0.1	0.5	24
	Kephir, whole fat	240	159	7.9	10	0	8	31	288	0.2	0.9	360	127	2	0.1	0.4	1.9	0.1	2.4	12
	Ayran (diluted yoghurt)	350	125	6.3	8	0	7	25	256	0.1	1.0	298	63	3	0.1	0.3	1.6	0.1	1.1	14
	White cheese, whole fat	60	165	12.1	0	0	13	32	240	0.2	1.8	90	178	0	0.0	0.3	3.3	0.1	1.2	30
	Kashar cheese, whole fat	40	170	7.6	0	0	16	36	240	0.2	1.2	40	187	0	0.0	0.2	1.9	0.0	0.8	18
Meat-Poultry-Fish-Eggs-Legumes-Seeds-Nuts	Eggs	100	154	12.9	1	0	11	396	56	2.1	1.4	147	278	0	0.1	0.3	3.1	0.1	2.0	65
	Beef, regular, cooked	80	187	19.9	0	0	12	62	14	1.9	3.9	150	2	0	0.0	0.2	7.0	0.1	1.8	9
	Beef medium fat, cooked	80	161	20.8	0	0	9	61	14	2.0	4.2	158	2	0	0.0	0.2	7.2	0.1	2.2	9
	Beef trimmed of visible fat, cooked	80	125	22.3	0	0	4	62	14	2.0	4.2	180	6	0	0.1	0.2	8.0	0.1	2.2	10
	Chicken breast, cooked	80	88	20.4	0	0	1	57	12	0.4	0.6	286	14	0	0.0	0.1	9.6	0.3	0.0	6
	Chicken thigh, skinless, cooked	80	172	22.5	0	0	9	68	14	1.6	1.4	218	27	0	0.1	0.2	9.7	0.3	0.0	12
	Salmon, cooked	150	228	32.0	0	0	11	62	23	1.5	1.4	494	51	0	0.2	0.2	14.6	1.0	4.5	35
	Anchovy, cooked	150	178	34.9	0	0	4	23	147	4.9	3.1	513	26	1	0.1	0.3	30.8	0.2	1.5	6
	Trout, cooked	150	184	35.8	0	0	4	104	23	1.0	2.0	536	23	4	0.1	0.1	10.4	9.0	0.3	8
	Canned tuna fish, low fat	100	174	17.3	0	0	12	55	29	0.8	0.7	319	247	1	0.1	0.1	7.6	0.3	2.0	9
	White beans. cooked	130	156	12.6	24	10	1	0	66	3.6	1.6	789	34	1	0.2	0.1	2.8	0.2	0.0	87
	Chickpeas, cooked	130	148	11.0	21	12	2	0	69	3.7	1.7	373	16	1	0.2	0.1	2.4	0.2	0.0	104
	Red/Green lentils, cooked	130	150	11.4	24	5	1	0	35	3.4	1.8	339	8	0	0.2	0.1	2.6	0.2	0.0	62
	Hazelnuts	30	191	3.6	3	3	19	0	68	1.1	0.6	191	2	1	0.1	0.1	1.2	0.1	0.0	21
	Walnuts	30	196	4.3	3	2	19	0	26	0.8	0.8	163	2	1	0.1	0.0	1.0	0.3	0.0	23
	Almonds	30	171	5.6	1	5	16	0	75	1.2	0.8	251	6	0	0.1	0.2	2.0	0.0	0.0	29
Fruits	Apples raw with skin	150	78	0.5	17	3	1	0	11	0.7	0.2	216	12	18	0.0	0.0	0.3	0.1	0.0	11
	Oranges, raw	150	71	1.5	14	3	0	0	63	0.6	0.2	266	23	75	0.1	0.1	0.7	0.1	0.0	36
	Pears, raw	150	79	0.8	19	4	1	0	14	0.4	0.3	188	5	8	0.0	0.0	0.3	0.0	0.0	21
	Peaches, raw	150	61	1.2	13	3	0	0	11	0.7	0.2	264	110	15	0.0	0.1	1.5	0.0	0.0	5
	Tangerines, raw	150	75	1.0	15	3	1	0	50	0.5	0.1	315	86	45	0.1	0.0	0.5	0.0	0.0	11
	Figs, raw	150	95	1.9	19	3	1	0	81	0.9	0.4	360	12	4	0.1	0.1	0.9	0.2	0.0	11
	Kiwi fruit, raw	150	91	1.5	16	6	1	0	57	1.2	0.7	443	93	107	0.0	0.1	0.9	0.0	0.0	30
	Pineapples, raw	150	88	0.7	20	2	0	0	24	0.6	0.4	260	15	29	0.1	0.0	0.5	0.1	0.0	6
	Melon, raw	150	39	1.3	8	2	0	0	21	0.8	0.2	464	500	50	0.1	0.0	1.0	0.1	0.0	45
	Watermelon, raw	150	57	0.9	12	0	0	0	17	0.6	0.2	237	50	9	0.1	0.1	0.4	0.1	0.0	8
	Cherries,sweet, raw	150	95	1.3	20	2	1	0	26	0.6	0.1	315	21	23	0.0	0.1	0.6	0.1	0.0	9
	Strawberries, raw	150	48	1.2	8	3	1	0	38	1.4	0.2	218	12	98	0.0	0.1	1.1	0.1	0.0	24
	Grapes, raw	150	107	1.0	23	1	1	0	27	0.8	0.1	285	6	6	0.1	0.0	0.4	0.1	0.0	8
	Loquats, raw	150	80	0.8	18	2	0	0	29	0.5	0.1	395	200	6	0.0	0.0	0.2	0.1	0.0	12
	Plums, raw	150	71	0.9	15	3	0	0	21	0.7	0.1	330	92	8	0.1	0.1	0.7	0.1	0.0	3
	Bananas, raw	100	95	1.1	214	2	0	0	9	0.6	0.2	393	38	12	0.0	0.1	0.9	0.4	0.0	20
	Persimmons, raw	80	100	0.6	27	3	0	0	22	2.0	0.1	248	267	53	0.0	0.0	0.4	0.1	0.0	8
	Figs, dried	30	85	1.8	18	3	1	0	73	0.8	0.3	325	10	3	0.1	0.1	0.7	0.1	0.0	8
	Apricots, dried	30	75	1.6	15	3	0	0	30	1.2	0.2	496	477	13	0.1	0.1	1.3	0.1	0.0	5
	Plums, dried	30	78	1.0	17	3	0	0	23	0.7	0.1	365	91	7	0.1	0.1	0.6	0.1	0.0	3
	Raisins, seedless	30	89	0.7	20	2	0	0	9	0.1		235	2	0	0.0	0.0	0.2	0.0	0.0	1
	Orange juice	125	56	1.2	11	0	0	0	54	0.5	0.1	193	19	40	0.1	0.0	0.5	0.1	0.0	19

Appendix 2.3.1. (Continued) Energy and nutrient values of one standard portion of foods for edible weights according to food groups

	Foods	Standard portion amount (g)	Energy (kcal)	Protein (g)	CHO (g)	Fiber (g)	Fat (g)	Cholesterol (mg)	Calcium (mg)	Iron (mg)	Zinc (mg)	Potassium (mg)	Vitamin A (mcg)	Vitamin C (mg)	Vitamin B_1 (mg)	Vitamin B_2 (mg)	Niacin eqv.(mg)	Vitamin B_6 (mg)	Vitamin B_{12} (mcg)	Total Folic Acid (mcg)
Vegetables	Spinach, cooked	150	29	4.2	1	5	1	0	224	5.7	0.8	590	1307	44	0.1	0.3	1.7	0.3	0.0	72
	Chard, cooked	150	38	3.6	4	5	1	0	183	3.8	0.5	351	987	33	0.1	0.2	1.6	0.1	0.0	29
	Fresh beans, cooked	150	38	3.6	5	5	0	0	95	1.2	0.5	309	84	18	0.1	0.1	1.4	0.3	0.0	36
	Brokoli, cooked	150	35	4.7	3	5	0	0	168	1.8	0.9	447	206	92	0.1	0.2	1.8	0.2	0.0	72
	Zucchini, cooked	150	29	2.4	3	2	1	0	48	2.1	0.3	251	87	13	0.1	0.1	0.9	0.1	0.0	41
	Purslane, cooked	150	35	2.2	5	4	1	0	152	4.5	0.4	329	269	17	0.0	0.1	0.9	0.2	0.0	14
	Green peas, cooked	150	67	5.2	12	5	0	0	64	3.2	0.7	384	83	77	0.2	0.1	0.9	0.2	0.0	46
	Cabbage lettuce	75	8	1.3	0	1	0	0	41	1.0	0.3	260	210	8	0.0	0.1	0.5	0.0	0.0	37
	Lettuce	75	12	1.2	1	1	0	0	27	0.8	0.2	218	195	18	0.1	0.0	0.7	0.0	0.0	41
	Parsley	75	39	3.3	6	3	0	0	184	4.1	0.7	750	677	125	0.1	0.2	1.9	0.2	0.0	87
	Garden watercress	75	29	3.1	1	2	1	0	161	2.2	0.1	413	274	44	0.1	0.1	1.8	0.2	0.0	83
	Rocket	75	19	1.9	3	1	1	0	120	1.1	0.4	277	89	11	0.0	0.1	0.0	0.1	0.0	73
	Spinach leaf	75	13	1.9	0	2	0	0	95	3.1	0.4	475	586	39	0.1	0.2	0.9	0.2	0.0	59
	Purslane	75	20	1.1	3	2	0	0	71	2.7	0.2	293	133	17	0.0	0.1	0.6	0.1	0.0	12
	Banana pepper	150	31	1.8	4	5	1	0	17	1.1	0.3	266	270	209	0.1	0.1	0.8	0.4	0.0	27
	Hot/green pepper	150	57	2.4	11	5	0	0	21	1.5	0.2	420	500	300	0.1	0.1	1.8	0.5	0.0	78
	Tomato	150	26	1.4	4	1	0	0	21	0.8	0.3	363	126	37	0.1	0.1	1.0	0.2	0.0	59
	Tomato, cooked	150	29	1.6	4	2	0	0	24	0.8	0.3	339	141	23	0.1	0.0	0.9	0.1	0.0	36
	Carrot	150	65	1.5	15	5	0	0	41	0.8	0.3	485	4220	14	0.1	0.1	0.0	0.2	0.0	21
	Red pepper	150	55	1.9	10	5	1	0	15	0.8	0.4	390	531	210	0.1	0.2	2.7	0.7	0.0	75
	Red pepper, cooked	150	55	1.9	10	5	1	0	15	0.8	0.4	390	479	168	0.1	0.2	2.6	0.6	0.0	53
	Radish	150	20	1.6	3	4	0	0	50	1.2	0.4	483	3	41	0.0	0.0	0.7	0.1	0.0	36
	Pumkin, cooked	150	37	1.7	7	3	0	0	33	1.2	0.3	575	191	18	0.1	0.1	1.1	0.2	0.0	54
	Potato, cooked	90	62	1.8	13	2	0	0	5	0.3	0.3	300	1	11	0.1	0.0	1.2	0.2	0.0	14
	Corn, cooked	90	96	2.7	18	3	1	0	5	0.5	0.8	116	59	0	0.1	0.1	0.7	0.1	0.0	6
	Cellery, cooked	150	23	2.3	2	6	0	0	96	0.7	0.4	213	3	7	0.0	0.1	1.4	0.2	0.0	9
	Cellery	150	29	2.6	3	6	1	0	102	0.8	0.6	482	5	12	0.1	0.1	1.9	0.3	0.0	18
	White cabbage	75	19	1.0	3	2	0	0	35	0.4	0.2	156	9	34	0.0	0.0	0.4	0.1	0.0	59
	White cabbage, cooked	150	30	1.9	5	4	0	0	69	0.6	0.2	162	17	32	0.0	0.0	0.6	0.1	0.0	62
	Cauliflower, cooked	150	28	3.3	2	4	0	0	30	0.8	0.3	368	3	55	0.1	0.1	1.3	0.2	0.0	41
	Mushroom, cooked	150	23	4.1	1	3	0	0	17	1.6	0.8	458	3	6	0.1	0.6	7.5	0.1	0.0	21
	Green pepper	150	57	2.0	11	5	0	0	15	1.0	0.2	420	116	353	0.1	0.1	2.0	0.5	0.0	78
	Onion	150	42	1.9	7	3	0	0	47	0.8	0.3	203	2	12	0.0	0.0	0.8	0.2	0.0	26
	Onion, cooked	150	36	1.9	6	3	0	0	50	0.6	0.3	114	2	6	0.0	0.0	0.7	0.1	0.0	15
	Egg-plant, cooked	150	26	1.9	4	4	0	0	20	0.6	0.4	281	11	4	0.0	0.1	1.0	0.1	0.0	26
	Carrot juice	150	33	1.3	6	1	0	0	63	3.0	0.9	407	2213	4	0.1	0.1	0.9	0.1	0.0	8
	Tomato juice	150	22	1.2	3	0	0	0	21	0.7	0.2	332	116	15	0.0	0.0	0.8	0.1	0.0	24
Bread and Cereals	Whole grain bread	50	106	3.9	21	3	1	0	15	1.3	1.0	111	1	0	0.1	0.1	2.4	0.1	0.0	17
	White bread	50	128	4.0	27	2	0	0	9	0.7	0.5	63	0	0	0.1	0.1	1.1	0.0	0.0	24
	Pita/ Flatbread/ Lavash.	50	118	3.5	24	2	1	0	8	0.6	0.4	48	2	0	0.0	0.0	1.0	0.1	0.0	9
	Bulghur, cooked	90	75	2.8	17	4	0	0	9	0.9	0.5	61	0	0	0.1	0.0	0.0	0.1	0.0	16
	White rice, cooked	90	84	1.8	18	0	0	0	2	0.2	0.1	17	0	0	0.0	0.0	0.6	0.0	0.0	6
	Pasta/Readymade noodles cooked	75	95	4.0	19	2	0	0	8	0.4	0.5	44	0	0	0.0	0.0	1.1	0.0	0.0	8
	Oaten biscuits	30	125	2.3	15	1	6	33	12	0.6	0.5	47	52	0	0.0	0.0	0.6	0.0	0.0	3
	Hardtrack bread/ grissini.	30	83	2.8	17	1	1	0	36	0.5	0.2	36	0	0	0.1	0.0	1.3	0.0	0.0	6
	Oatmeal	30	111	3.8	19	2	2	0	16	1.4	1.2	104	0	0	0.2	0.0	1.0	0.0	0.0	7
	Rice flakes	30	113	1.8	26	1	0	0	2	0.3	0.3	21	0	0	0.3	0.4	4.8	0.1	0.0	4
	Cornflakes	30	107	2.1	24	1	0	0	4	0.6	0.1	36	8	0	0.0	0.0	0.7	0.0	0.0	2
	Bagel	50	132	4.0	24	2	2	0	25	0.9	0.6	59	2	0	0.1	0.0	1.2	0.0	0.0	6
	Filo	50	136	4.0	29	2	0	0	11	0.6	0.4	44	0	0	0.0	0.0	0.9	0.1	0.0	4
	Popcorn	30	110	3.8	20	3	2	0	4	0.5	0.5	72	24	0	0.1	0.0	0.8	0.1	0.0	3

Appendix 2.3.2. One standard energy (75 kcal) providing amounts and nutrient of optionally preferred foods

Optionally Consumed Foods	"Amount providing" 75 kcalories	Energy (kcal)	Protein (g)	CHO (g)	Sugar (g)	Fiber (g)	Fat (g)	Saturated Fatty acid (g)	Trans Fatty acid (g)	Cholesterol (mg)	Calcium (mg)	Iron (mg)	Zinc (mg)	Potassium (mg)	Sodium (mg)	Vitamin A (mcg)	Vitamin C (mg)	Vitamin B_1 (mg)	Vitamin B_2 (mg)	Niacin eqv. (mg)	Vitamin B_6 (mg)	Vitamin B_{12} (mcg)	Total Folic Acid (mcg)
Butter/Margarin,% 83 fat	10	74	0.1	0	-	0	8.3			24 /0	1	0	0	2		65	0	0	0	0	0	0.0	0.0
Tub margarine,% 59-60 fat	14	75	0.04	-	-	-	8.4	2-2.4	0	0	-	-	-	-	-	112	-	-	-	-	-	-	-
Package margarine,% 70 fat	12	75	0.04	-	-	-	8.4	3-4.8	0	0	-	-	-	-	-	96	-	-	-	-	-	-	-
Liquid margarine, % 65 fat	13	75		-	-	-	8.5	1	<0.08	0	-	-	-	-	-	104	-	-	-	-	-	-	-
Processed cheese	23	75	3	0.2	0	0	7	4.2	-	20	138	0.3	0.7	30	253	68	0	0.1	0.1	0.7		0.2	4.1
Sugar	18	73	0	18	18	0	0	-	-	0	0	0	0	0	0	0	0						
Honey	25	77	0.1	19	0.6	0	0	-	-	0	1	0.3	0.1	12	1.8	0	0	0	0	0.1	0	0.0	0
Molasses	30	80	0.9	17	0.5	0	0.3	-	-	0	25	0.7	0.1	226	2.7	6	0	0.1	0	0.4	0.1	0.0	7
Jam	30	81	0	20	19.5	1	0.1	-	-	0	1	0.1	0	23	0.0	0	0	0	0	0	0	0.0	0
Plain Hazelnut Spread	15	0	0.0	0	1.0	0.3	0.0	0.7	-	-	11	0.7	0.3	76	0.3	-	-	-	-	-	-	-	-
Chocolate Hazelnut Spread	14	75	0.4	9	1.0	0.3	4.2	0.7	-	-	7	0.5	0.2	61	2.4	-	-	-	-	-	-	-	-
Tahini halva	20	87	2.1	11	7.2	1	4.3	0.4	-	0	10	0.6	0.8	32	2.4	1	0	0.1	0	0	0	0.0	7
Chocolate	15	75	1.1	7	8.9	2	4.9	3.8	-	0.0	6	0.7	0.3	103	11.6	0	0	0	0	0.4	0	0.0	2
Cezerye	50	75	0.8	14	7.8	1.4	1.8	1.0	-	-	13	0.3	0.2	89	30	929	0.9	0	0	0.1	0.1	0	5.5
Vanilla, cream, caramel, fruit, croquant, chocolate or pistachio ice cream	27	75	0.9	9	6.7	0.3	3.8	2.9	-	51	49	0.3	0.3	60	0.04	44	0.6		0.1	0.4	-	0.3	6.5
Maras ice cream	44	75	1.2	13	9.2	0.2	2.3	1.4	-	82	79	0.5	0.5	97	0.05	72	1		0.1	0.7	-	0.4	10.6
Sandwich ice cream	27	75	1.1	12	5.9	0.3	2.3	1.6	-	51	49	0.3	0.3	60	0.02	44	0.6		0.1	0.4	-	0.3	6.5
Waffle sandwich ice cream	23	75	0.8	11	5.8	0.0	3.1	1.7	-	43	41	0.2	0.2	51	0.01	38	0.5		0.1	0.4	-	0.2	5.5
Chocolate coated, caramel, fruit, vanilla, cacao, pistachio, hazelnut or almond stick ice cream	24	75	0.8	7	6.0	0.3	4.6	3.5	-	45	43	0.2	0.2	53	0.02	39	0.5		0.1	0.4	-	0.2	5.8
Chocolate coated sandwich ice cream with almonds	19	75	1.0	6	6.1	0.3	5.2	3.5	-	36	34	0.2	0.2	42	0.06	31	0.4		0.1	0.4	-	0.2	4.6
PACKAGED BISCUITS, CAKES, CRACKERS, WAFERS, BARS																							
Plain Biscuits such as Petit Beure, Finger Biscuits	18	77	1.4	14	-	0.2	1.7	-	-	0	13	1.2	0.1	62	52	0	0	0.1	0	0	0	0.0	13
Cacao Biscuits	16	75	1.1	12	3.6	-	2.7	1.3	-	-	3	0.5	0.2	35	53	-	-	-	-	-	-	-	-
Cacao Dropped Biscuits	15	75	1.0	10	-	-	3.5	-	-	-	3	0.3	0.1	17	39	-	-	-	-	-	-	-	-
Hazelnut, Sesame Biscuits	15	72	1.1	10		-	3.0	-	-	-	3	0.3	0.1	18	41	-	-	-	-	-	-	-	-
Whole-Wheat Biscuits	16	76	1.2	11	3.3	-	3.0	1.5	-	-	4	0.4	0.2	22	67	-	-	-	-	-	-	-	-
Biscuits with Cream	15	73	1.0	10	-	-	3.1	-	-	-	2	0.3	0.1	22	42	-	-	-	-	-	-	-	-
Chocolate Coated	10	74	0.1	0	0	8.3	24	1	0	0	2	65	0	0	0	0	0	0.0	0.0	0.0	0.0	0.	0.
Biscuits with Marshmallows	16	73	0.9	10	-	-	3.1	-	-	-	4	0.4	0.1	26	38	-	-	-	-	-	-	-	-
Baby Biscuits	16	73	1.1	12	3.9		2.4	1.2	0.01		74	1.5	0.1	16	37								
Coated wafer	14	75	1.0	9	-	-	4.2	-	-	-	4	0.4	0.1	41	14	-	-	-	-	-	-	-	-
Hazelnut, Cacao	10	74	0.1	0	0	8.3	24	1	0	0	2	65	0	0	0	0	0	0.0	0.0	0.0	0.0	0.	0.
Wafer with Fruit Cream	15	76	0.8	10	-	-	3.4	-	-	-	2	0.4	0.1	20	32	-	-	-	-	-	-	-	-
Chocolate Bar	14	74	0.9	8	-	7.5	4.1	1.8	0	-	10	0.4	0.2	40	27	-	-	-	-	-	-	-	-
Fruit Cake	18	75	1.3	9	-	-	3.5	-	-	-	4	0.4	0.1	33	49	-	-	-	-	-	-	-	-
Cacao Cake	17	76	1.4	9	-	-	4.0	-	-	-	3	0.4	0.1	23	42	-	-	-	-	-	-	-	-
Salty Pastry Products																							
Sade Stick Cracker	18	73	1.8	14	-	-	1.0	-	-	-	3	0.3	0.1	19	197	-	-	-	-	-	-	-	-
Cheese, Sesame, Almond, Stick, etc. Crackers	16	76	1.7	10	1.3	-	3.2	1.8	0.01	-	4	0.4	0.1	27	161	-	-	-	-	-	-	-	-
Salty cookies, hardtack, bagel, stick cakes	15	76	2,0	7	-	-	4,4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Home-rolled pastry	20	73	2,3	6	-	-	4,3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Appendix 2.3.2. (continued) One standard energy (75 kcal) providing amounts and nutrient values of optionally preferred foods

Optionally Consumed Foods	"Amount providing" 75 kcalories	Energy (kcal)	Protein (g)	CHO (g)	Sugar (g)	Fiber (g)	Fat (g)	Saturated Fatty acid (g)	Trans Fat (g)	Cholesterol (mg)	Calcium (mg)	Iron (mg)	Zinc (mg)	Potassium (mg)	Sodium (mg)	Vitamin A (mcg)	Vitamin C (mg)	Vitamin B_1 (mg)	Vitamin B_2 (mg)	Niacin eqv. (mg)	Vitamin B_6 (mg)	Vitamin B_{12} (mcg)	Total Folic Acid (mcg)
PACKAGED BISCUITS, CAKES, CRACKERS, WAFERS, BARS																							
Cakes	25	69	1.6	8	-	-	3.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Kanafeh	25	68	1.7	13	-	-	1.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Puff pastry	20	89	2.0	7	-	-	5.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Water pastry	20	54	1.9	5	-	-	3.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Small pizza	20	66	3.1	7	-	-	3.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Buns	20	75	2.8	7	-	-	4.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sweet yeast bread	20	80	1.7	11	-	-	3.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Jam	30	81	0	20	19,5	1	0.1	-	-	0	1	0.1	0	23	0.0	0	0	0	0	0	0	0.0	0
Sweet cookies, mixed	15	79	1.5	8	-	-	4.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tahini rool	15	72	2.1	7	-	-	4.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Meringue	15	81	1.4	18	-	-	0.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Macaroon	15	73	1.3	9	-	-	3.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Croissant	20	72	1.6	10	-	-	3.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Baklava and similar types	20	81	1.4	10	-	-	3,7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Small éclair	20	72	1.9	6	-	-	4.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Kadaif	25	78	1.4	16	-	-	0.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

[1] *(-) Cannot be analyzed.*

Appendix 2.3.3. Commercial types of olives amounts of providing 45 kilocalories as oil alternatives and their salt content [1,2]

Types of olives according to the nutrient content claim on the food label	Olives ; amounts providing 45 kcal[3]	Salt in olives g/45 kcal	Label or Communique information (per edible100 g)
Sterilized "light" olives low in oil and salt	10-12 olives 40 g gross ,30 g net	0,50	Energy 150 kcal Fat 13 g Salt 1,75 g Sodium 0,7 g
Pickled/canned olives "low in salt and low in oil"	6-8 olives 25 g gross, 20 g net	0,40	Energy 245 kcal Fat 20 g Salt 2 g Sodium 0,8 g
Other olives with claim "low in salt"	4-5 olives 15 g gross, 12 g net	0,48[4] - 0,96[5]	Energy 360 kcal Fat 35 g Salt 4 g minimum, 7-8 g maximum

[1] *According to Turkish Food Codex Communique on Table Olives (Communique No: 2014/33); small sized olives are 2.5-3.0 g/piece, medium-large sized olives are 3.5-4.0 g/piece, and very large olives are 4.5 g-15 g/piece. Calculated amounts of olives on the table are based on the size of 3-4 g/piece.*

[2] *Salt content of olives were calculated according to the nutrient information on the label or the communique claims that maximum 4% of salt is permitted in olives low in salt and maximum 8% of salt is permitted in other olives.*

[3] *Energy equivalent of one teaspoon of oil*

[4] *Minimum amount of salt in other olives" low in salt".*

[5] *The highest amount of salt that can be obtained from other types of olives according to the communique. In order to decrease olive-related salt consumption; individuals should look for salt information on the labels of the packaged olives or consult the sales stands about the salt contents in the non-packaged olives and the olives with the least salt content should be preferred.*

Appendix 3

Recommended Dietary Patterns for Turkey

Appendix 3. 1. Recommended Cotend Food Patterns for Turkey According To the Levels of Energy Intake(1000-3200 kcal)

Appendix 3.1.1. Recommended daily and weekly portion amounts of food groups according to the target energy levels

Food Groups/Energy Values of Dietary Patterns (kcal)	1000	1200	1400[2]	1600[2]	1800	2000	2200	2400	2600	2800	3000	3200
Milk, yoghurt, cheese group[2,3,4] *(total portion/day)*	2	2 ½	2 ½	2 ½	3	3	3	3	3	3	3	3
(Minimum amount which meets EAR level of calcium (total portion/day)[5]	(1½)	(1½)	(1½ - 2½)	(1½)	(1¾ - 2½)	(1¾ - 2 ½)	(2½)	(2½)	(2½)	(2½)	(2½)	(2½)
Meat, poultry, fish, eggs, legumes seeds-nuts group[6]												
Meat, poultry or fish, eggs (total portion/day)	¾	1	1½	1½	1½	1½	1½	1½	2	2	2	2
Fish *(portion/week)*[7]	(⅔)	(1)	(1 ½)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)
Eggs *(portion/week)*[8]	(3)	(3)	(2½)	(2½)	(2½)	(2½)	(2½)	(2½)	(3)	(3)	(3)	(3)
Legumes *(portion/day)*[9,14]	⅛	⅛	¼ - ½	½	½	½	½	½	½	½	½	⅔
(portion/week)[9,14]	(1)	(1)	(2)	(3)	(3)	(3)	(3)	(3½)	(3½)	(3½)	(4)	(4)
Seeds, nuts *(portion/day)*[10]	⅛ (⅓)	¼ (½)	½ (¾)	½ (1)	½ (1)	½ (1)	½ (1)	½ (1)	½ (1)	½ (1)	½ (1)	1 (1⅓)
Bread and Cereals Group *(total portion/day)*[11,14]	2½	2 ½	3	3 ½	4	4 ½	5	6	7	7	8	8
Fruits Group *(total portion/day)*[12,13]	1½	1½	2	2	2	2½	2½	2½	2½	3	3	3
Vegetables Group *(total portion/day)*[12,13,14]	1¼	1½	2	2½	2½	3	3½	3½	3½	4	4	4
Green leafy vegetables *(portion/week)*	(1)	(1)	(1)	(1½)	(2)	(3)	(4)	(4)	(4)	(4)	(4)	(4)
Other green vegetables *(portion/week)*	(2)	(2)	(3-4)	(3-4)	(3-4)	(3-5)	(3-5)	(3-5)	(3-5)	(3-6)	(3-6)	(3-6)
Red, orange, blue and purple vegetables *(portion/(week)*	(3)	(3)	(4)	(5)	(5)	(7)	(8)	(8)	(8)	(9)	(9)	(9)
White vegetables *(portion/week)*	(2)	(2)	(3-4)	(3-4)	(3-4)	(3-5)	(3-6)	(3-6)	(3-6)	(3-6)	(3-6)	(3-6)
Starchy vegetables (portion/week)	(1)	(2)	(2)	(3)	(3)	(3)	(3½)	(3½)	(3½)	(6)	(6)	(6)
Oil *(g/day)*[15]	35	15	15	20	25	30	35	40	40	45	50	50
Energy assigned for optionally preferred foods as multipliers of standard energy (75 kcal)[16,17]	0-1	1-2	0-1	0-2	1-2	2-3	3-4	3-5	4-5	5-6	5-7	7-8
Decreased energy for optional preferences as multipliers of standard energy when healthy alternatives (nuts and seeds) are consumed in upper portion level,75 kcal	0	0-1	0	0-1	0-1	0-2	2-3	3	2-4	4-5	4-5	5-6

[1] *Energy and age-appropriate nutrient requirements are met with 1000-1400 kcal in low active boys at the age of 2-7 years, low active girls at the age of 2-8 years and women at the age of 70 years or more; 1600 kcal in low active boys at the age of 8-9 years, moderately active boys at the age of 10 years, moderately active girls at the age of 10-11 years and low active women at the age of 40-70 years; 1800 kcal in moderately active boys at the age of 11-12 years, low active men at the age of 65 years or more, moderately active girls at the age of 12-14 years and low active women at the age of 19-39 years; 2000 kcal in moderately active boys at the age of 13 years, low active boys at the age of 51-64 years and low active women at the age of 15-16 years; 2200 kcal in moderately active boys at the age of 14 years, low active men at the age of 19-50 years and low active women at the age of 17-18 years; 2400 kcal in moderately active boys at the age of 15-16 years; 2600 kcal in moderately active boys at the age of 17-18 years. See Appendix 1.1.1-1.1.4 for reference energy requirement values.*

[2] *Consumption of 3 portions of milk, yoghurt and cheese is recommended for low active women older than who spend 1400 kcal of energy and low active girls at the age of 11 years and women at the age of 40-70 years who spend 1600 kcal of energy.*

[3] *1 standard cup (240 mL) of milk or 1 standard small bowl of yoghurt (240 mL) or, 60 g of white cheese or 40 g of kashar cheese are foods that are equivalent to one another and each one of those foods constitutes 1 standard portion.*

[4] *Recommended portion numbers are at an amount to meet 70-100% of daily adequate intake amount recommended for calcium, excluding plant sources.*

[5] *Milk-yoghurt amount to meet calcium EAR were calculated in the view that approximately 220 mg of plant-based calcium is obtained upon consumption of at least 1.5 portions of vegetables, 1.5 portions of fruits, ½ portion of legumes and 3 portions of grains (cereals).*

[6] *150 g of cooked fish or 2 eggs, or 80 g of cooked red meat-poultry or ¾ standard cup of cooked legumes or 30 g of seeds-nuts constitute 1 standard portion. Dietary patterns were calculated supposing that low-fat red meat and chicken were consumed.*

[7] *Consumption of fish is recommended instead of red meat or chicken. In contrast to red meat and chicken, oily fish types should be preferred.*

[8] *Children and adolescents can consume ½ portion or 1 egg each day. Weekly consumption of 4-5 eggs or 2½ portions of egg is recommended for adults.*

[9] *Portion amounts of legumes, the cheapest sources of protein, are given in daily and weekly amounts to encourage their daily consumption. Different recipes should be developed and the use of legumes should be varied in addition to the traditional legume meals. Bread consumption in young individuals at the age of 15-18 years, the age group with the highest energy requirements, is at the highest amount in the population and it mostly consists of white bread (Appendix 4.7.9). The share of legumes in the diet was increased (4 portions a week) to meet the energy requirements of this age group.*

[10] *Seed-nuts are perfect alternatives for control of optional calories and their lower and upper portion amounts are given in the table (in parenthesis in red color). If the optional calories are wished to be decreased, the upper portion number is consumed.*

[11] *2 thin slices or 50 g of bread types or ½ cup or 1 middle-sized ladle of cooked rice-pasta constitute 1 portion. Minimum half of the portion numbers recommended for bread and grains should consist of whole grain products. For example; whole grain/whole wheat breads should be preferred to white bread, white rice to bulghur, brown rice or whole wheat flour pasta. Whole grain flour should be used instead of white flour. Protein quality of grain meals should be increased with addition of legumes. 58% of total protein consumption in Turkey is plant sourced and 40% of this rate comes from grains poor in lysine.*

[12] *150 g of fresh fruits or 30 g. dried fruits and/or 150 g of raw or cooked vegetables constitute 1 standard portion. 1 large bowl, determined as 75 g, of raw vegetables constitutes 1 portion.*

[13] *Priority should be given to fruits and vegetables which are more economical based on the season and foods should be varied according to their colors. Portion range (upper and lower portion number) of other green vegetables and white vegetables were given to provide variety in different seasons. As accessible and/or economical preferences based on season, other green vegetables can be consumed in the upper portion number in summer and lower portion number in winter and white vegetables can be consumed in lower portion number in winter and upper portion number in winter. It is possible to vary other vegetable groups among themselves in the portion amounts specified for summer and winter.*

[14] *In the dietary patterns of 1000, 1200, 1400, 1600 kcal appropriate for low, moderate and high active children at the age of 2-6 years with UL value of Vitamin A differing between 800-1100 mcg; the consumption of green leafy vegetables, carrot from red, orange, blue, purple vegetable group and whole fat milk and dairy products together was determined to provide vitamin A below UL value.*

[15] *Nutritional values of the patterns were calculated using olive oil. The amount of olive oil can be increased compared to the additional fat amount in Appendix 3.2.1 and fat consumption can be eliminated. See 2.3.3 for olive types that can be consumed as an alternative to oil and their amounts equivalent to 1 dessert spoon or 5 g of oil. Extra virgin olive oil is the healthiest type of olive oil.*

[16] *See Appendix 2.1.11 for multiplies of foods consumed optionally according to their standard amounts.*

[17] *Total portion amounts calculated with the low fat (blue colored) and whole fat (green colored) milk group alternatives of diet patterns, essential energy and optional energy contents and the share of optionally consumed foods are shown in Appendix 3.1.2.*

Appendix 3.1.2. Assigning of essential and optional energy levels of TUBER 2015 dietary patterns [1,7]

Energy values of dietary patterns(kcal)		1000	1200	1400	1600	1800	2000	2200	2400	2600	2800	3000	3200
		When consumed semi-skimmed milk and its products											
Essential[2] Energy	**Essential energy levels of dietary patterns,kcal** Essential energy levels of dietary patterns when nuts and seeds are consumed in upper portion level,kcal[3]	936 *(975)*	1073 *(1119)*	1312 *(1410)*	1482 *(1583)*	1635 *(1735)*	1790 *(1888)*	1897 *(1995)*	2069 *(2167)*	2237 *(2336)*	2330 *(2428)*	2504 *(2601)*	2640 *(2705)*
Optional energy	**Optional energy levels of dietary patterns,kcal** Decreased optional energy when nuts and seeds are consumed in upper portion level,kcal	64 *(25)*	127 *(81)*	88 *(5)*	118 *(17)*	165 *(65)*	210 *(111)*	303 *(206)*	331 *(233)*	363 *(264)*	470 *(372)*	496 *(399)*	560 *(495)*
	Amounts of added sugars for optional energy to fill, g [4,5] Decreased amounts of added sugars when nuts and seeds are consumed in upper portion level,g	5 *(0)*	16 *(10)*	12 *(0)*	12 *(5)*	19 *(5)*	24 *(20)*	35 *(25)*	44 *(30)*	44 *(32)*	59 *(45)*	62 *(55)*	69 *(55)*
	Contribution of added sugar to energy ,% Decreased contribution of added sugars to energy , when nuts and seeds are consumed in upper portion level,%	2% *(0%)*	5% *(4%)*	3% *(0%)*	3% *(1%)*	4% *(3%)*	5% *(4%)*	7% *(6%)*	7% *(6%)*	7% *(6%)*	8% *(7%)*	8% *(7%)*	9% *(8%)*
	Amounts of added fats[6] for optional energy to fill, g Decreased amounts of added fats when nuts and seeds are consumed in upper portion level,g	5 *(4)*	7 *(5)*	5 *(0)*	8 *(0)*	10 *(5)*	13 *(5)*	18 *(12)*	18 *(13)*	21 *(15)*	27 *(22)*	28 *(24)*	32 *(31)*
Maximum contribution of total fat to energy%		33%	33%	32%	32%	34%	34%	35%	34%	33%	34%	34%	35%

[1] *Prepared based on the comments of* **Scientific Report of the 2015 Dietary Guidelines Advisory Committee** *www.health.gov.*

[2] *Essential energy levels of dietary patterns were calculated supposing that trimmed meat or skinless chicken were consumed.*

[3] *It was calculated from the upper portion amounts (in parenthesis in red color) given for seed-nuts in Appendix 3.1.1.*

[4] *Sugar amounts were adjusted in view of TNHS 2010 Median and 97.5th percentile consumption and in a way that the share of sugar in energy intake level was to be <10%. Median consumption amount of sugar differs between 16-31 g in different age groups in Turkey. 97.5th percentile consumption amount of sugar is 79-122 g. The age groups with the highest sugar consumption amounts are 11-14, 15-18 and 19-64 years.*

[5] *Energy and nutritional values of the standard portion amounts of foods consumed optionally and the portion numbers for their serving amounts were given in Appendix 2.3.2; sizes and weights of seed and nuts equivalent to ½, ⅔, ¾, 1, 1 ⅓ portions are given in Appendix 2.1.12.*

[6] *Solid fats like butter or trans-fat free margarines or extra oils to add the amounts in Appendix 3.1.1.*

[7] *Seeds and nuts are the healthiest alternatives for consuming instead of foods consumed optionally. All values in parenthesis in the table show the condition of increase in seed consumption.*

Appendix 3.1.2. (Continued) Assigning of essential and optional energy levels of TUBER 2015 dietary patterns[1,7]

Energy values of dietary patterns(kcal)		1000	1200	1400	1600	1800	2000	2200	2400	2600	2800	3000	3200
		When consumed as whole fat milk and its products											
Essential[2] Energy	**Essential energy levels of dietary patterns,kcal** Essential energy levels of dietary patterns when nuts and seeds are consumed in upper portion level,kcal[3]	1013	1154 *(1200)*	1410	1565 *(1595)*	1733 *(1799)*	1886 *(1984)*	1993 *(2091)*	2165 *(2263)*	2334 *(2432)*	2426 *(2525)*	2600 *(2698)*	2735 *(2800)*
Optional energy	**Optional energy levels of dietary patterns,kcal** Decreased optional energy when nuts and seeds are consumed in upper portion level,kcal	0 *(0)*	46 *(0)*	0 *(0)*	35 *(5)*	67 *(0)*	114 *(16)*	207 *(109)*	235 *(137)*	266 *(168)*	374 *(275)*	400 *(302)*	465 *(400)*
	Amounts of added sugars for optional energy to fill, g 4,5 Decreased amounts of added sugars when nuts and seeds are consumed in upper portion level,g	0 *(0)*	12 *(0)*	0 *(0)*	10 *(0)*	17 *(0)*	26 *(4)*	35 *(25)*	35 *(25)*	38 *(28)*	55 *(48)*	60 *(52)*	65 *(65)*
	Contribution of added sugar to energy ,% Decreased contribution of added sugars to energy , when nuts and seeds are consumed in upper portion level,%	0% *(0%)*	4% *(0%)*	0% *(0%)*	3% *(0%)*	4% *(0%)*	4% *(1%)*	6% *(5%)*	6% *(4%)*	6% *(4%)*	8% *(7%)*	8% *(6%)*	8% *(8%)*
	Amounts of added fats6 for optional energy to fill,g Decreased amounts of added fats when nuts and seeds are consumed in upper portion level,g	0 *(0)*	0 *(0)*	0 *(0)*	0 *(0)*	0 *(0)*	4 *(0)*	9 *(0)*	12 *(8)*	15 *(8)*	20 *(10)*	21 *(12)*	27 *(18)*
Maximum contribution of total fat to energy%		35%	35% *(38%)*	34%	33% *(35%)*	34% *(37%)*	35% *(37%)*	35% *(36%)*	35% *(36%)*	34% *(35%)*	35% *(36%)*	34% *(35%)*	36% *(36%)*

[1] *Prepared based on the comments of* **Scientific Report of the 2015 Dietary Guidelines Advisory Committee** *www.health.gov.*

[2] *Essential energy levels of dietary patterns were calculated supposing that trimmed meat or skinless chicken were consumed.*

[3] *It was calculated from the upper portion amounts (in parenthesis in red color) given for seed-nuts in Appendix 3.1.1.*

[4] *Sugar amounts were adjusted in view of TNHS 2010 Median and 97.5th percentile consumption and in a way that the share of sugar in energy intake level was to be <10%. Median consumption amount of sugar differs between 16-31 g in different age groups in Turkey. 97.5th percentile consumption amount of sugar is 79-122 g. The age groups with the highest sugar consumption amounts are 11-14, 15-18 and 19-64 years.*

[5] *Energy and nutritional values of the standard portion amounts of foods consumed optionally and the portion numbers for their serving amounts were given in Appendix 2.3.2; sizes and weights of seed and nuts equivalent to ½, ⅔, ¾, 1, 1 ⅓ portions are given in Appendix 2.1.12.*

[6] *Solid fats like butter or trans-fat free margarines or extra oils to add the amounts in Appendix 3.1.1.*

[7] *Seeds and nuts are the healthiest alternatives for consuming instead of foods consumed optionally. All values in parenthesis in the table show the condition of increase in seed consumption.*

Appendix 3. 2. Energy and Nutrient Contents Of Dietary Patterns of TUBER 2015

Appendix 3.2.1. Energy and nutrient contents of dietary patterns

Energy Values of Patterns, kcal[6]/ Energy and Nutrients	1000	1200	1400	1600	1800	2000	2200	2400	2600	2800	3000	3200
Energy, kcal	1000	1200	1405	1601	1800	2002	2199	2395	2601	2799	3000	3198
Protein,g	46	59	77	84	91	95	98	102	117	118	122	127
Protein, %kcal	19%	20%	22%	21%	20%	19%	18%	17%	18%	17%	16%	16%
Protein quality score	100	100	100	100	100	100	100	100	100	100	100	100
Carbohydrate, g	122	142	161	185	209	237	261	293	314	340	370	384
Carbohydrate, %kcal	49%	47%	46%	46%	46%	47%	48%	49%	48%	49%	50%	48%
Fiber, g	17	17	24	29	30	35	38	40	43	45	47	51
Fat[1], g	40-38	48-46	55-51	61-60	70-69	80-78	89-89	97-94	102-100	112-110	118-117	133-131
Fat[1], % kcal	35-33%	35-33%	34-32%	33-33%	34-34%	35-34%	36-35%	35-34%	34-34%	35-34%	34-34%	36-36%
Oil in essential calories[2], g	15	15	15	20	25	30	35	40	40	45	50	50
Additional fat, g	0-5	0-7	0-5	0-8	0-10	4-13	8-18	10-18	13-21	17-27	18-28	23-32
Saturated fatty acids[4], g	15-10 (15-12)	18-12 (18-15)	20-13 (20-15)	20-15 (20-18)	24-17 (24-21)	25-18 (26-23)	26-19 (29-26)	27-20 (31-27)	29-21 (33-30)	30-23 (37-34)	31-24 (37-34)	33-26 (41-39)
Saturated fatty acids[4], %	13-9% (13-10%)	14-9% (14-11%)	12-8% (12-10%)	11-8% (11-10%)	12-8% (12-10%)	11-8% (12-10%)	11-8% (12-11%)	10-7% (12-10%)	10-7% (12-10%)	10-7% (12-11%)	9-7% (11-10%)	9-7% (12-11%)
Linoleic acid (C18,2:n-6)[4], g	9-9 (10-10)	10-11 (10-11)	13-13 (13-13)	15-16 (15-16)	17-17 (17-18)	20-20 (19-20)	22-22 (22-23)	24-24 (24-24)	25-25 (25-25)	26-27 (27-27)	29-29 (29-30)	31-31 (29-31)
Linoleic asit (C18,2:n-6), % kcal	8-8% (9-9%)	8-8% (8-8%)	8-8% (8-8%)	9-9% (9-9%)	8-9% (8-9%)	9-9% (9-9%)	9-9% (9-9%)	9-9% (9-9%)	8-9% (9-9%)	8-9% (9-9%)	9-9% (9-9%)	9-9% (8-9%)
α- linoleic acid (C18,3:n-3), g	0.8-0.8	1.2-1.1	1.7-1.6	1.8-1.7	1.9-1.8	2-1.9	2.1-2.0	2.1-2.0	2.1-2.0	2.3-2.2	2.4-2.3	3.4-3.3
α- linolenic acid (C18,3:n-3)[2,4], kcal	0.7-0.7%	0.9-0.8%	1.1-1.0%	1-0.9%	0.9-0.9%	0.9-0.8%	0.9-0.8%	0.8-0.8%	0.8-0.7%	0.7-0.7%	0.7-0.7%	1-0.9%
Cholesterol[4], mg %	222-193 (227-205)	257-215 (257-232)	282-238 (282-250)	282-240 (282-259)	298-247 (298-271)	298-247 (307-278)	298-247 (317-290)	298-247 (322-290)	329-278 (360-331)	329-278 (372-346)	329-278 (372-346)	329-278 (384-360)
Calcium, mg	762	926	1014	1052	1236	1284	1337	1346	1369	1388	1398	1429
Iron, mg	8.1	9.1	12.7	14.7	16.1	17.7	19.7	20.3	22.7	23.3	24.0	25.4
Magnesium, mg	214	244	313	355	393	427	474	481	536	550	558	598
Phosphorus, mg	1016	1225	1476	1613	1788	1879	1990	2042	2249	2282	2337	2458
Potassium , mg	2012	2330	2894	3135	3474	3839	4081	4143	4345	4623	4708	4869
Sodium , mg	875	961	1111	1242	1422	1549	1665	1890	2126	2132	2132	2132
Zinc , mg	7	8	11	12	13	14	15	15	19	19	19	20
Copper , mg	1.06	1.17	1.60	1.81	1.93	2.12	2.30	2.40	2.64	2.74	2.85	3.07
Vitamin A[5], mcg	729-702) (729-727)	747-756 (747-791	944-836 (944-861)	1006-961 (1006-1001)	1180-1073 (1180-1123)	1639-1516 (1659-1581)	1887-1766 (1927-1855)	1893-1769 (1943-1858)	1902-1778 (1966-1888)	2197-2074 (2254-2183)	2175-2054 (2265-2194)	2193-2071 (2307-2243)
Vitamin D, mcg	1.0	1.6	1.6	1.7	1.7	1.8	1.7	2,0	2.0	2.0	3.6	3.6
Vitamin E, mg	6.4	7.0	8.7	10.2	11.5	13.2	14.8	15.6	16.4	17.6	18.5	19.8
Vitamin K, mcg	94	150	186	215	223	243	267	275	284	302	329	381
Vitamin C, mg	83	86	116	121	130	159	172	172	172	195	197	195
Thiamine , mg	0.7	0.8	1.0	1.1	1.3	1.4	1,4	1.5	1.6	1.7	1.7	1.8
Riboflavin, mg	1.4	1.7	2.0	2.0	2.3	2.4	2.5	2.6	2.8	2.8	2.9	2.9
Vitamin B_6, mg	1.0	1.1	1.5	1.6	1.8	1.9	2,1	2.2	2.3	2.5	2.5	2.7
Vitamin B_{12}, mg	3.2	4.4	5.3	5.4	5.9	5.9	5.9	5.9	6.9	6.9	6.9	6.9
Folate , mcg	188	207	269	315	342	384	412	436	458	477	504	540
Niacin, mg	9	11	15	18	19	20	22	22	26	26	27	27

[1] It shows the values calculated for the conditions where respectively whole fat or low fat milk, yoghurt, cheese are used and the conditions where olive oil is used as additional fat.

[2] This amount shown in Appendix 3.1.1 was included in the calculation with use of olive oil and sunflower oil in half shares. An increase can be achieved in alpha linolenic acid amounts when soy oil is used instead of sunflower oil. In this case, the contribution obtained from alpha linolenic acid reaches 1,3-1,4%.

[3] It shows the additional fat amount of patterns prepared with whole or semi fat milk and dairy products. Additional fat was not used since the energy deficit is lower for foods consumed optionally when whole fat dairy products are used in patterns of 1000, 1200, 1400, 1600, 1800 kcal.

[4] Nutritional values of diet patterns were calculated separately for comparison using whole fat or low fat dairy products when low fatty meat and oily fish were consumed. Based on the use of whole fat or low fat dairy products, upper and lower values were shown respectively for saturated fat amount, saturated fat/energy rate, linoleic acid amount and its rate to energy, alpha linolenic acid amount and its rate to energy, and cholesterol amounts. The values in parenthesis show that butter was used as additional fat, and the others show that olive oil was used as additional fat. In the patterns where whole fat or

Appendix 3.3. Matching Energy Levels of TUBER Dietary Patterns with Energy Requirements of Children, Adolescents and Adults

Appendix 3.3.1. Matching of energy levels of dietary patterns with the energy requirements of children, adolescents and adults according to age, gender and physical activity condition[1,3]

Energy (kcal)	Children and adolescents			Adults		
	Low Active PAL=1.4	Moderately Active PAL=1.6	Active PAL=1.8	Low Active[2] PAL=1.4	Moderately Active[2] PAL=1.6	Active[1] PAL=1.8
1000	M: 2 years F: 2-3 years					
1200	M: 3-5 years F: 4-6 years					
1400	M: 6-7 years F: 7-9 years	M: 4-5 years F: 5-6 years		F: >70 years		
1600	M: 8 -9 years M: *10 years* F: *10-11 years*	M: 6-7 years F: 7-9 years	M: 5 years F: 5-6 years	F: 40-69 years	F: >70 years	
1800	M: *11-12 years* F: *12-14 years*	M 8-10 years F:10-11 years	M: 6-7 years F: 7-8 years	F: 18 -39 years M: >60 years	F: 40-69 years	F: >70 years
2000	M: *13 years* F: *15-18 years*	M: 11-12 years F: 12-14 years	M: 8-10 years F: 9-11 years	M: 50-59 years	F: 19-39 years M: >70 years	F: 60-69 years
2200	M: *14 years*	M: 13 years F: 15-18 years	M: 11 years K: 12-13 years	M: 18-49 years	M: 60-69 years	F: 30-59 years
2400	M: *15-16 years*	M: 14 years	M: 12 years F: 14-16 years		M: 30-59 years	M: >60 years F: 19-29 years
2600	M: *17-18 years*	M: 15 years	M: 13 years F: 17-18 years		M: 19-29 years	M: 40-59 years
2800		M: 16-17 years	M: 14 years			M: 19-39 years
3000		M: 18 years	M: 15-16 years			
3200			M: 17-18 years			

[1] See Appendix 1.1.1-Appendix 1.1.4 for detailed evaluation in children and adolescents according to WHO-MGRS 2006-2007 median and 85th percentile height and body weight and in adults according to age groups and TNHS 2010 height percentile.

[2] See Appendix 4.8.3 for classification of lifestyle defined by PAL in adults; see Appendix 4.8.4 for recommendations for achieving a physical activity level (PAL) protecting and promoting health.

[3] See Chapter 10: Table 10.2 and Table 10.3 for Calculation of Energy Requirements Related to Total Energy Expenditure

Appendix 3.2.1 cont.

Reducing the amount of saturated fat and filing the resulting energy gap with refined carbohydrate sources or using fats with low saturated fat content for obtaining products rich in refined carbohydrate does not reduce the risk of obesity, cardiovascular diseases and diabetes risk . It is evaluated as the most effective way in cardio-metabolic aspect to decrease the saturated fat and to fill the resulting energy with the polyunsaturated fatty acids. The healthiest way to realize this in a dietary pattern may be through increasing the consumption of nuts or seeds.

[5] Vitamin A contents calculated with olive oil and butter (in parenthesis) as additional fat are shown respectively according to the use of foods in whole fat and semi-skimmed milk group.

[6] Energy and nutrients were calculated using Bebis Nutrition Database.

Appendix 3.4 Evaluation of Adequacy of Dietary Patterns According to Matched Gender, Age and Physical Activity Groups

Appendix 3. 4. 1. Energy and nutrient targets according to age and gender for evaluation of adequacy of diet patterns: Men

Ages (Year) Activity Level	2 LA	3 LA	4 LA	5 LA	6 LA	7 LA	8 LA	9 LA	10 LA/ MA	11 LA/ MA	12 LA/ MA	13 LA/ MA	14 LA/ MA	15 LA/ MA	16 LA/ MA	17 LA/ MA/ A	18 LA/ MA / A	19-24 LA/ MA	25-50 LA/ MA	51-64 LA/ MA	65-70 LA/ MA	above 70 LA/ MA
Energy (kcal)	1000	1200	1200	1200	1400	1400	1600	1600	1600 1800	1800 2000	1800 2000	2000 2200	2200 2400	2400 2600	2400 2800	2600 2800 3200	2600 3000 3200	2200 2600	2200 2400	2000 2200	1800 2200	1800 2000
Carbohydrate, g/day	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130
Carbohydrate,% kcal	45-60	45-60	45-60	45-60	45-60	45-60	45-60	45-60	45-60	45-60	45-60	45-60	45-60	45-60	45-60	45-60	45-60	45-60	45-60	45-60	45-60	45-60
Fat, % kcal	35-40	35-40	20-35	20-35	20-35	20-35	20-35	20-35	20-35	20-35	20-35	20-35	20-35	20-35	20-35	20-35	20-35	20-35	20-35	20-35	20-35	20-35
Protein Quality,DIAAS %	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Protein, g/day	11.8	12.9	14.0	15.6	18.2	20.8	23.4	25.9	28.4	31.5	35.0	39.9	45.0	49.8	53.3	55.7	53.0	63.1	63.1	65.1	60.8	62.3
Protein, % kcal	5-20	5-20	5-20	5-20	5-20	5-20	5-20	5-20	5-20	8-20	8-20	8-20	8-20	9-20	9-20	9-20	10-20	10-20	10-20	10-20	12-20	12-20
Linoleic acid, %kcal	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
Alpha linolenic acid, % kcal	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Saturated Fatty Acids,%kcal	As low as possible																					
Fiber, g /day	10	10	14	14	14	16	16	16	16	19	19	19	19	21	21	21	25	25	25	25	25	25
Calcium, mg/day	450	450	800	800	800	800	800	800	800	1150	1150	1150	1150	1150	1150	1150	1000	1000	1000	950	950	950
Iron, mg/day	7	7	7	7	7	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11
Magnesium, mg/day	170	230	230	230	230	230	230	230	300	300	300	300	300	300	300	300	350	350	350	350	350	350
Phosphorus, mg/day	250	250	440	440	440	440	440	440	440	640	640	640	640	640	640	640	550	550	550	550	550	550
Potassium, mg/day	3	3	3.8	3.8	3.8	3.8	3.8	4.5	4.5	4.5	4.5	4.5	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7
Sodium, mg/day	1500	1500	1900	1900	1900	1900	1900	2200	2200	2200	2200	2200	2300	2300	2300	2300	2300	2300	2300	2300	2300	2300
Zinc, mg/day	4.3	4.3	5.5	5.5	5.5	7.4	7.4	7.4	7.4	10.7	10.7	10.7	10.7	14.2	14.2	14.2	9.4-16.3	9.4-16.3	9.4-16.3	9.4-16.3	9.4-16.3	9.4-16.3
Copper, mg/day	0.7	1	1	1	1	1	1	1	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.6	1.6	1.6	1.6	1.6	1.6
Vitamin A, mcg RE/day	250	250	300	300	300	400	400	400	400	600	600	600	600	750	750	750	750	750	750	750	750	750
Vitamin D, mcg	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	20
Vitamin E, mg/day	6	9	9	9	9	9	9	9	13	13	13	13	13	13	13	13	13	13	13	13	13	13
Vitamin K, mcg/day	30	30	55	55	55	55	55	60	60	60	60	60	75	75	75	75	75	120	120	120	120	120
Vitamin C, mg/day	20	20	30	30	30	45	45	45	45	70	70	70	70	100	100	100	110	110	110	110	110	110
Thiamine, mg/day	0.5	0.5	0.6	0.6	0.6	0.6	0.6	0.9	0.9	0.9	0.9	0.9	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
Riboflavin, mg/day	0.5	0.5	0.6	0.6	0.6	0.6	0.6	0.9	0.9	0.9	0.9	0.9	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3
Vitamin B_6, mg/day	0.5	0.5	0.6	0.6	0.6	0.6	0.6	1	1	1	1	1	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.7	1.7	1.7
Vitamin B_{12}, mcg/day	1.5	1.5	1.5	1.5	1.5	2.5	2.5	2.5	2.5	3.5	3.5	3.5	3.5	4	4	4	4	4	4	4	4	4
Folate, mcg/day	120	120	140	140	140	200	200	200	200	270	270	270	270	330	330	330	330	330	330	330	330	330
Niacin /1000kcal	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7

LA= Low Active, MA= Moderately active, A=Active

[1]Energy Targets according to age and sex are prepared using Appendix 1.1.1-1.1.5 and Appendix 3.3.1, Nutrient Targets were prepared using Appendix 1.2.1,Ek 1.3.1, Appendix 1.4.1, Appendix 1.5.1-1.5.2 and Appendix 1.5.4.

Appendix 3.4.2. Energy and nutrient targets according to age and gender for evaluation of adequacy of diet patterns: Women

Ages (Year) Activity Level	2 LA	3 LA	4 LA	5 LA	6 LA	7 LA	8 LA	9 LA	10 LA	11 LA/ MA	12 LA/ MA	13 LA/ MA	14 LA/ MA	15 LA	16 LA	17 LA	18 LA	19-24 LA	25-39 LA	40-50 LA/ MA	51-64 LA/ MA	65-70 LA/ MA	above 70 LA/ MA
Energy (kcal)	1000	1000	1200	1200	1200	1400	1400	1400	1600	1600 1800	1800 2000	1800 2000	1800 2000	2000	2000	2200	2200	1800	1800	1600 1800	1600 1800	1600 1800	1400 1600
Carbohydrate, g/day	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130
Carbohydrate,% kcal	45-60	45-60	45-60	45-60	45-60	45-60	45-60	45-60	45-60	45-60	45-60	45-60	45-60	45-60	45-60	45-60	45-60	45-60	45-60	45-60	45-60	45-60	45-60
Fat, % kcal	35-40	35-40	20-35	20-35	20-35	20-35	20-35	20-35	20-35	20-35	20-35	20-35	20-35	20-35	20-35	20-35	20-35	20-35	20-35	20-35	20-35	20-35	20-35
Protein Quality, DIAAS %	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Protein, g/day	11.2	12.5	13.8	15.5	18.0	20.4	23.0	25.9	29.0	32.5	36.6	40.5	43.5	44.9	45.9	46.3	47.3	55.2	55.2	55.2	63.3	60.2	58.0
Protein, % kcal	5-20	5-20	5-20	5-20	5-20	7-20	7-20	7-20	7-20	9-20	9-20	9-20	9-20	10-20	10-20	10-20	12-20	14-20	14-20	14-20	14-20	14-20	14-20
Linoleic acid, % kcal	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
Alpha-linolenic acid ,% kcal	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Saturated Fatty Acids, % kcal	as low as possible																						
Fiber, g /day	10	14	14	14	16	16	16	16	19	19	19	19	21	21	21	25	25	25	25	25	25	25	25
Calcium, mg/day	450	450	800	800	800	800	800	800	800	1150	1150	1150	1150	1150	1150	1150	1000	1000	1000	1000	950	950	950
Iron, mg/day	7	7	7	7	7	11	11	11	11	11	13	13	13	13	13	13	11-16	11-16	11-16	11-16	11-16	11-16	11-16
Magnesium, mg/day	170	230	230	230	230	230	230	230	250	250	250	250	250	250	250	250	300	300	300	300	300	300	300
Phosphorus, mg/day	250	250	440	440	440	440	440	440	440	640	640	640	640	640	640	640	550	550	550	550	550	550	550
Potassium, mg/day	3	3	3.8	3.8	3.8	3.8	3.8	3.8	4.5	4.5	4.5	4.5	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7
Sodium, mg/day	1500	1500	1900	1900	1900	1900	1900	2200	2200	2200	2200	2200	2300	2300	2300	2300	2300	2300	2300	2300	2300	2300	2300
Zinc, mg/day	4.3	4.3	5.5	5.5	5.5	7.4	7.4	7.4	7.4	10.7	10.7	10.7	10.7	11.9	11.9	11.9	7.5-12.7	7.5-12.7	7.5-12.7	7.5-12.7	7.5-12.7	7.5-12.7	7.5-12.7
Copper, mg/day	0.7	1	1	1	1	1	1	1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.3	1.3	1.3	1.3	1.3	1.3	1.3
Vitamin A, mcg RE/day	250	250	300	300	300	400	400	400	400	600	600	600	600	650	650	650	650	650	650	650	650	650	650
Vitamin D, mcg	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	20
Vitamin E, mg/day	6	9	9	9	9	9	9	9	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11
Vitamin K, mcg/day	30	30	55	55	55	55	55	60	60	60	60	60	75	75	75	75	75	90	90	90	90	90	90
Vitamin C, mg/day	20	20	30	30	30	45	45	45	45	70	70	70	70	90	90	90	95	95	95	95	95	95	95
Thiamine, mg/day	0.5	0.5	0.6	0.6	0.6	0.6	0.6	0.9	0.9	0.9	0.9	0.9	1	1	1	1	1	1.1	1.1	1.1	1.1	1.1	1.1
Riboflavin mg/day	0.5	0.5	0.6	0.6	0.6	0.6	0.6	0.9	0.9	0.9	0.9	0.9	1	1	1	1	1	1.1	1.1	1.1	1.1	1.1	1.1
Vitamin B_6, mg/day	0.5	0.5	0.6	0.6	0.6	0.6	0.6	1	1	1	1	1	1.2	1.2	1.2	1.2	1.2	1.3	1.3	1.3	1.5	1.5	1.5
Vitamin B_{12},mcg/day	1.5	1.5	1.5	1.5	1.5	2.5	2.5	2.5	2.5	3.5	3.5	3.5	3.5	4	4	4	4	4	4	4	4	4	4
Folate, mcg/day	120	120	140	140	140	200	200	200	200	270	270	270	270	330	330	330	330	330	330	330	330	330	330
Niacin /1000kcal	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7

LA= Low Active, MA= Moderately Active, A=Active

[1]Energy Targets according to age and sex are prepared using Appendix 1.1.1-1.1.5 and Appendix 3.3.1, Nutrient Targets were prepared using Appendix 1.2.1,Ek 1.3.1, Appendix 1.4.1, Appendix 1.5.1-1.5.2 and Appendix 1.5.4.

Appendix 3.4.3. Energy and nutrients adequacy of dietary patterns according to target levels of requirements[1,4]

Energy (kcal)	3200		3000	2800		2600			2400			2200					
Gender; Age (year)/ Activity Level	M;18	M;17	M;18	M;16	M;17	M;15	M;17	E;18	M;14	M;15	M;16	M;13	M;14	M;19-24	M;25-50	F;17	F;18
	Active	Active	Mod*. Active	Mod*. Active	Mod*. Active	Mod*. Active	Low Active	Low Active	Mod*. Active	Low Active	Low Active	Mod*. Active	Low Active	Low Active	Low Active	Low Active	Low Active
Coverage of energy target %	100 %	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Coverage of CHO target %	295%	295%	284%	262%	262%	241%	241%	241%	225%	225%	225%	200%	200%	200%	200%	200%	200%
CHO, % kcal	48%	50%	49%	49%	48%	48%	48%	49%	49%	49%	48%	48%	48%	48%	48%	48%	47%
Total dietary fiber, % adequate intake	243%	204%	188%	215%	215%	205%	205%	172%	209%	189%	189%	200%	200%	152%	152%	152%	152%
Protein, % kcal	16%	16%	16%	17%	17%	18%	18%	18%	17%	17%	17%	18%	18%	18%	18%	18%	18%
Protein, % adequate intake	228%	240%	230%	221%	212%	234%	210%	220%	226%	204%	191%	245%	217%	155%	155%	211%	206%
Fat, % kcal	36%	36%	34%	34%	34%	33%	33%	33%	34%	34%	34%	35%	35%	35%	35%	35%	35%
Linoleic acid (C18:2,n-6), % kcal	141%	141%	108%	111%	111%	113%	113%	113%	119%	119%	119%	123%	123%	123%	123%	123%	123%
Alpha-linolenic acid (C18:3,n-3), kcal	197%	197%	149%	156%	156%	158%	158%	158%	165%	165%	165%	175%	175%	175%	175%	175%	175%
Calcium, % adequate intake	124%	143%	140%	121%	121%	119%	119%	137%	117%	117%	117%	116%	116%	134%	141%	116%	134%
İron; % adequate intake	231%	231%	218%	212%	212%	206%	206%	206%	185%	185%	185%	179%	179%	179%	179%	151%	123 - 179%
Magnesium, % adequate intake	199%	171%	159%	183%	183%	179%	179%	153%	160%	160%	160%	158%	158%	135%	135%	190%	158%
Phosphorus, % adequate intake	384%	447%	425%	357%	357%	351%	351%	409%	319%	319%	319%	311%	311%	362%	362%	311%	362%
Potassium , % adequate intake[3]	104%	104%	100%	98%	98%	92%	92%	92%	88%	88%	88%	91%	87%	87%	87%	87%	87%
Sodium , % tolerable upper intake level[2]	103%	103%	93%	93%	93%	92%	92%	92%	82%	82%	82%	76%	72%	72%	72%	72%	72%
Zinc , % adequate intake	142%	124-214%	118-205%	132%	132%	131%	131%	114-197%	144%	109%	109%	139%	139%	92-159%	92-159%	125%	117-199%
Copper , % adequate intake	236%	192%	178%	211%	211%	203%	203%	165%	185%	185%	185%	177%	177%	144%	144%	209%	177%
Vitamin A, % adequate intake	305%	305%	302%	298%	298%	258%	258%	258%	317%	254%	254%	316%	316%	253%	253%	291%	291%
Vitamin D, % adequate intake	25%	25%	24%	14%	14%	13%	13%	13%	13%	13%	13%	11%	11%	11%	11%	11%	11%
Vitamin E, % adequate intake	153%	153%	142%	135%	135%	126%	126%	126%	120%	120%	120%	114%	114%	114%	114%	135%	135%
Vitamin K, % adequate intake	508%	508%	439%	403%	403%	379%	379%	379%	367%	367%	367%	445%	356%	223%	223%	356%	356%
Vitamin C , % adequate intake	195%	178%	179%	195%	195%	172%	172%	157%	246%	172%	172%	246%	246%	157%	157%	192%	181%
Thiamine, % adequate intake	153%	153%	145%	139%	139%	134%	134%	134%	124%	124%	124%	159%	119%	119%	119%	143%	143%
Riboflavin, % adequate intake	223%	223%	220%	215%	215%	212%	212%	212%	198%	198%	198%	279%	193%	193%	193%	251%	251%
Vitamin B_6, % adequate intake	207%	207%	193%	188%	188%	179%	179%	179%	166%	166%	166%	211%	162%	162%	162%	176%	176%
Vitamin B_{12}, % adequate intake	173%	173%	173%	173%	173%	173%	173%	173%	167%	146%	146%	167%	167%	146%	146%	146%	146%
Folate, % adequate intake	164%	164%	153%	144%	144%	139%	139%	139%	162%	132%	132%	153%	153%	125%	125%	125%	125%
Niacin, % adequate intake	126%	126%	134%	139%	139%	149%	149%	149%	137%	137%	137%	149%	149%	149%	149%	149%	126%

** Moderately*

[1] *Dietary patterns provide adequate amount (almost 100%, 100% or more than 100%) of nutrients other than Vitamin D. Patterns do not provide adequate amount of Vitamin D as foods contain quite small amounts of Vitamin D. Patterns provide only 6-25% of the adequate intake amounts determined for Vitamin D.*

[2] *Food-based sodium content of dietary patterns is below the tolerable intake amount.*

[3] *Coverage ratios of dietary patterns for potassium in adequate amount decrease as the energy content of the diet decreases. While the patterns between 2000-3200 kcal cover 85-100% of the adequate intake, the coverage ratio decreases to 70% in lower energy levels.*

[4] *Since it is recommended for children at the age of 10 years or more to be moderately active, the adequacy of the dietary patterns for >10 age group to cover energy and nutrient targets is determined according to both low active and moderately active energy expenditure and adquacy in other age groups was determined according to low active energy expenditure (excluding 3200 kcal). Since 3200 kcal is matched with energy requirement of boys at the age of 17-18 years in active category, 3200 kcal dietary pattern was compared with the nutrient targets of this group.*

Appendix 3.4.3. (Continued) Energy and nutrients adequacy of dietary patterns according to target levels of requirements[1,4]

Energy Level	2000 kcal									1800 kcal							
Gender; Age (year)/ Activity Level	M;11	M;12	M;13	M;51-64	F;12	F;13	F;14	F;15	F;16	M;10	M;11	M;12	M; 65-70	M;> 70	F;11	F;12	F;13
	Mod*. Active	Mod*. Active	Low Active	Low Active	Mod*. Active	Mod*. Active	Mod*. Active	Low Active	Low Active	Mod*. Active	Low Active	Low Active	Low Active	Low Active	Mod*. Active	Low Active	Low Active
Coverage of energy target %	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Coverage of CHO target %	182%	182%	182%	182%	182%	182%	182%	182%	182%	160%	160%	160%	160%	160%	160%	160%	160%
CHO, % kcal	47%	47%	47%	47%	47%	47%	47%	47%	46%	46%	46%	46%	46%	46%	46%	46%	46%
Total dietary fiber, % adequate intake	183%	183%	183%	139%	183%	183%	165%	165%	165%	194%	163%	163%	124%	310%	163%	163%	163%
Protein, % kcal	19%	19%	19%	19%	19%	19%	19%	19%	19%	20%	20%	20%	20%	20%	20%	20%	20%
Protein, % adequate intake	300%	270%	237%	145%	259%	234%	218%	211%	206%	321%	289%	261%	150%	146%	281%	249%	225%
Fat, % kcal	34%	34%	34%	34%	34%	34%	34%	34%	34%	33%	33%	33%	33%	33%	33%	33%	33%
Linoleic acid (C18:2,n-6), % kcal	127%	127%	127%	127%	127%	127%	127%	127%	127%	131%	131%	131%	131%	131%	131%	131%	131%
Alpha-linolenic acid (C18:3,n-3), kcal	180%	180%	180%	180%	180%	180%	180%	180%	180%	189%	189%	189%	189%	189%	189%	189%	189%
Calcium, % adequate intake	112%	112%	112%	135%	112%	112%	112%	112%	112%	156%	109%	109%	132%	132%	109%	109%	109%
İron; % adequate intake	161%	161%	161%	161%	136%	136%	136%	136%	136%	150%	150%	150%	150%	150%	150%	127%	127%
Magnesium, % adequate intake	142%	142%	142%	122%	171%	171%	171%	171%	171%	132%	132%	132%	113%	113%	159%	159%	159%
Phosphorus, % adequate intake	294%	294%	294%	342%	294%	294%	294%	294%	294%	407%	280%	280%	326%	326%	280%	280%	280%
Potassium , % adequate intake3	85%	85%	85%	82%	85%	85%	82%	82%	82%	78%	78%	78%	74%	74%	78%	78%	78%
Sodium , % tolerable upper intake level[2]	70%	70%	70%	67%	70%	70%	67%	67%	67%	65%	65%	65%	62%	62%	65%	65%	65%
Zinc , % adequate intake	131%	131%	131%	86-150%	131%	131%	131%	118%	118%	181%	126%	126%	83-143%	83-143%	126%	126%	126%
Copper , % adequate intake	163%	163%	163%	133%	193%	193%	193%	193%	193%	149%	149%	149%	121%	121%	176%	176%	176%
Vitamin A, % adequate intake	270%	270%	270%	216%	270%	270%	270%	249%	249%	275%	183%	183%	147%	147%	183%	183%	183%
Vitamin D, % adequate intake	12%	12%	12%	12%	12%	12%	12%	12%	12%	12%	12%	12%	12%	9%	12%	12%	12%
Vitamin E, % adequate intake	101%	101%	101%	101%	120%	120%	120%	120%	120%	90%	90%	90%	90%	90%	106%	106%	106%
Vitamin K, % adequate intake	405%	405%	405%	202%	405%	405%	324%	324%	324%	372%	372%	372%	186%	186%	372%	372%	372%
Vitamin C , % adequate intake	228%	228%	228%	145%	228%	228%	228%	177%	177%	293%	188%	188%	120%	120%	188%	188%	188%
Thiamine, % adequate intake	150%	150%	150%	113%	150%	150%	135%	135%	135%	139%	139%	139%	104%	104%	139%	139%	139%
Riboflavin, % adequate intake	270%	270%	270%	187%	270%	270%	243%	243%	243%	260%	260%	260%	180%	180%	260%	260%	260%
Vitamin B_6, % adequate intake	194%	194%	194%	114%	194%	194%	162%	162%	162%	177%	177%	177%	104%	104%	177%	177%	177%
Vitamin B_{12}, % adequate intake	167%	167%	167%	146%	167%	167%	167%	146%	146%	234%	167%	167%	146%	146%	167%	167%	167%
Folate, % adequate intake	142%	142%	142%	116%	142%	142%	142%	116%	116%	173%	128%	128%	105%	105%	128%	128%	128%
Niacin, % adequate intake	149%	149%	149%	149%	149%	149%	149%	149%	149%	149%	158%	158%	158%	158%	158%	158%	158%

** Moderately*

[1] Dietary patterns provide adequate amount (almost 100%, 100% or more than 100%) of nutrients other than Vitamin D. Patterns do not provide adequate amount of Vitamin D as foods contain quite small amounts of Vitamin D. Patterns provide only 6-25% of the adequate intake amounts determined for Vitamin D.

[2] Food-based sodium content of dietary patterns is below the tolerable intake amount.

[3] Coverage ratios of dietary patterns for potassium in adequate amount decrease as the energy content of the diet decreases. While the patterns between 2000-3200 kcal cover 85-100% of the adequate intake, the coverage ratio decreases to 70% in lower energy levels.

[4] Since it is recommended for children at the age of 10 years or more to be moderately active, the adequacy of the dietary patterns for >10 age group to cover energy and nutrient targets is determined according to both low active and moderately active energy expenditure and adquacy in other age groups was determined according to low active energy expenditure (excluding 3200 kcal). Since 3200 kcal is matched with energy requirement of boys at the age of 17-18 years in active category, 3200 kcal dietary pattern was compared with the nutrient targets of this group.

Appendix 3.4.3. (Continued) Energy and nutrients adequacy of dietary patterns according to target levels of requirements[1,4]

Energy Level	1800 kcal						1600 kcal								
Gender; Age (year)/ Activity Level	F;14	F;19-24	F;25-39	F;40-50	F;51-64	F;65-70	M;8	M;9	M;10	M;10	M;11	F;40-50	F;51-64	F;65-70	F;>70
	Low Active	Low Active	Low Active	Mod*. Active	Mod*. Active	Mod*. Active	Low Active	Low Active	Low Active	Low Active	Low Active	Low Active	Low Active	Low Active	Mod*. Active
Coverage of energy target %	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Coverage of CHO target %	160%	160%	160%	160%	160%	160%	142%	142%	142%	142%	142%	142%	142%	142%	142%
CHO, % kcal	46%	46%	46%	46%	46%	46%	46%	46%	46%	46%	46%	46%	46%	46%	46%
Total dietary fiber, % adequate intake	148%	124%	124%	124%	124%	124%	187%	187%	187%	157%	157%	119%	119%	119%	119%
Protein, % kcal	20%	20%	20%	20%	20%	20%	21%	21%	21%	21%	21%	21%	21%	21%	21%
Protein, % adequate intake	210%	165%	165%	165%	144%	151%	364%	329%	300%	294%	262%	154%	135%	141%	147%
Fat, % kcal	33%	33%	33%	33%	33%	33%	33%	33%	33%	33%	33%	33%	33%	33%	33%
Linoleic acid (C18:2,n-6), % kcal	131%	131%	131%	131%	131%	131%	138%	138%	138%	138%	138%	138%	138%	138%	138%
Alpha-linolenic acid (C18:3,n-3), kcal	189%	189%	189%	189%	189%	189%	201%	201%	201%	201%	201%	201%	201%	201%	201%
Calcium, % adequate intake	109%	125%	132%	132%	132%	132%	138%	138%	138%	138%	104%	125%	125%	125%	125%
İron; % adequate intake	127%	103-150%	103-150%	103-150%	103-150%	103-150%	144%	144%	144%	144%	144%	99-144%	99-144%	99-144%	99-144%
Magnesium, % adequate intake	159%	132%	132%	132%	132%	132%	161%	161%	123%	148%	148%	123%	123%	123%	123%
Phosphorus, % adequate intake	280%	326%	326%	326%	326%	326%	371%	371%	371%	371%	255%	297%	297%	297%	297%
Potassium , % adequate intake[3]	74%	74%	74%	74%	74%	74%	86%	73%	73%	73%	73%	70%	70%	70%	70%
Sodium , % tolerable upper intake level[2]	62%	62%	62%	62%	62%	62%	66%	57%	57%	57%	57%	55%	55%	55%	55%
Zinc , % adequate intake	126%	106-179%	106-179%	106-179%	106-179%	106-179%	170%	170%	170%	170%	118%	99-168%	99-168%	99-168%	99-168%
Copper , % adequate intake	176%	149%	149%	149%	149%	149%	185%	185%	142%	168%	168%	142%	142%	142%	142%
Vitamin A, % adequate intake	183%	169%	169%	169%	169%	169%	256%	256%	256%	256%	171%	157%	157%	157%	157%
Vitamin D, % adequate intake	12%	12%	12%	12%	12%	12%	12%	11%	11%	11%	11%	11%	11%	11%	9%
Vitamin E, % adequate intake	106%	106%	106%	106%	106%	106%	120%	120%	83%	98%	98%	98%	98%	98%	98%
Vitamin K, % adequate intake	297%	248%	248%	248%	248%	248%	391%	359%	359%	359%	359%	239%	239%	239%	239%
Vitamin C , % adequate intake	188%	139%	139%	139%	139%	139%	291%	291%	291%	291%	187%	138%	138%	138%	138%
Thiamine, % adequate intake	125%	114%	114%	114%	114%	114%	195%	130%	130%	130%	130%	106%	106%	106%	106%
Riboflavin, % adequate intake	234%	213%	213%	213%	213%	213%	350%	233%	233%	233%	233%	191%	191%	191%	191%
Vitamin B_6, % adequate intake	148%	136%	136%	136%	118%	118%	278%	167%	167%	167%	167%	128%	111%	111%	111%
Vitamin B_{12}, % adequate intake	167%	146%	146%	146%	146%	146%	215%	215%	215%	215%	153%	134%	134%	134%	134%
Folate, % adequate intake	128%	105%	105%	105%	105%	105%	165%	165%	165%	165%	122%	100%	100%	100%	100%
Niacin, % adequate intake	158%	158%	158%	158%	158%	168%	168%	168%	168%	168%	168%	168%	168%	168%	158%

** Moderately*

1 Dietary patterns provide adequate amount (almost 100%, 100% or more than 100%) of nutrients other than Vitamin D. Patterns do not provide adequate amount of Vitamin D as foods contain quite small amounts of Vitamin D. Patterns provide only 6-25% of the adequate intake amounts determined for Vitamin D.

2 Food-based sodium content of dietary patterns is below the tolerable intake amount.

3 Coverage ratios of dietary patterns for potassium in adequate amount decrease as the energy content of the diet decreases. While the patterns between 2000-3200 kcal cover 85-100% of the adequate intake, the coverage ratio decreases to 70% in lower energy levels.

4Since it is recommended for children at the age of 10 years or more to be moderately active, the adequacy of the dietary patterns for >10 age group to cover energy and nutrient targets is determined according to both low active and moderately active energy expenditure and adquacy in other age groups was determined according to low active energy expenditure (excluding 3200 kcal). Since 3200 kcal is matched with energy requirement of boys at the age of 17-18 years in active category, 3200 kcal dietary pattern was compared with the nutrient targets of this group.

Appendix 3.4.3. (Continued) Energy and nutrients adequacy of dietary patterns according to target levels of requirements[1,4]

Energy Level	1400 kcal						1200 kcal							1000 kcal	
Gender; Age (year)/ Activity Level	M;6	M;7	F;7	F;8	F;9	K;>70	M;3	M;4	M;5	F;4	F;5	F;6	M;2	F;2	F;3
	Low Active	Low Active	Low Active	Low Active	Low Active	Low Active	Low Active	Low Active	Low Active	Low Active	Low Active	Low Active	Low Active	Low Active	Low Active
Coverage of energy target %	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Coverage of CHO target %	124%	124%	124%	124%	124%	124%	109%	109%	109%	109%	109%	109%	93%	93%	93%
CHO, % kcal	46%	46%	46%	46%	46%	47%	47%	47%	47%	47%	47%	48%	48%	48%	48%
Total dietary fiber, % adequate intake	175%	153%	153%	153%	153%	98%	172%	123%	123%	123%	123%	108%	167%	167%	119%
Protein, % kcal	22%	22%	22%	22%	22%	22%	20%	20%	20%	20%	20%	20%	19%	19%	19%
Protein, % adequate intake	436%	382%	389%	345%	307%	137%	432%	398%	357%	404%	360%	310%	385%	387%	363%
Fat, % kcal	32%	32%	32%	32%	32%	32%	33%	33%	33%	33%	33%	33%	33%	33%	33%
Linoleic acid (C18:2,n-6), % kcal	145%	145%	145%	145%	145%	145%	115%	115%	115%	115%	115%	115%	115%	115%	115%
Alpha-linolenic acid (C18:3,n-3), kcal	212%	212%	212%	212%	212%	212%	173%	173%	173%	173%	173%	173%	161%	161%	161%
Calcium, % adequate intake	130%	130%	130%	130%	130%	110%	206%	116%	116%	116%	116%	116%	170%	170%	170%
Iron; % adequate intake	193%	123%	123%	123%	123%	84-123%	130%	130%	130%	130%	130%	130%	121%	121%	121%
Magnesium, % adequate intake	140%	140%	140%	140%	140%	108%	106%	106%	106%	106%	106%	106%	129%	129%	95%
Phosphorus, % adequate intake	343%	343%	343%	343%	343%	274%	490%	278%	278%	278%	278%	278%	414%	414%	414%
Potassium , % adequate intake[3]	78%	78%	78%	78%	78%	63%	78%	61%	61%	61%	61%	61%	69%	69%	69%
Sodium , % tolerable upper intake level[2]	60%	60%	60%	60%	51%	49%	64%	51%	51%	51%	51%	51%	59%	59%	59%
Zinc , % adequate intake	211%	156%	156%	156%	156%	91-154%	196%	153%	153%	153%	153%	153%	173%	173%	173%
Copper , % adequate intake	164%	164%	164%	164%	164%	126%	117%	117%	117%	117%	117%	117%	154%	154%	108%
Vitamin A, % adequate intake	323%	242%	242%	242%	242%	149%	303%	270%	270%	270%	270%	270%	298%	298%	298%
Vitamin D, % adequate intake	11%	11%	11%	11%	11%	8%	11%	11%	11%	11%	11%	11%	6%	6%	6%
Vitamin E, % adequate intake	99%	99%	99%	99%	99%	81%	78%	78%	78%	78%	78%	78%	104%	104%	89%
Vitamin K, % adequate intake	338%	338%	338%	338%	310%	207%	499%	272%	272%	272%	272%	272%	314%	314%	314%
Vitamin C , % adequate intake	396%	264%	264%	264%	264%	125%	430%	287%	287%	287%	287%	287%	416%	416%	416%
Thiamine, % adequate intake	175%	175%	175%	175%	117%	95%	162%	135%	135%	135%	135%	135%	144%	144%	144%
Riboflavin, % adequate intake	333%	333%	333%	333%	222%	182%	342%	285%	285%	285%	285%	285%	286%	286%	286%
Vitamin B_6, % adequate intake	248%	248%	248%	248%	149%	99%	224%	187%	187%	187%	187%	187%	194%	194%	194%
Vitamin B_{12}, % adequate intake	358%	215%	215%	215%	215%	134%	293%	293%	293%	293%	293%	293%	227%	227%	227%
Folate, % adequate intake	196%	137%	137%	137%	137%	83%	172%	148%	148%	148%	148%	148%	152%	152%	152%
Niacin, % adequate intake	160%	160%	160%	160%	160%	160%	137%	137%	137%	137%	137%	137%	134%	134%	134%

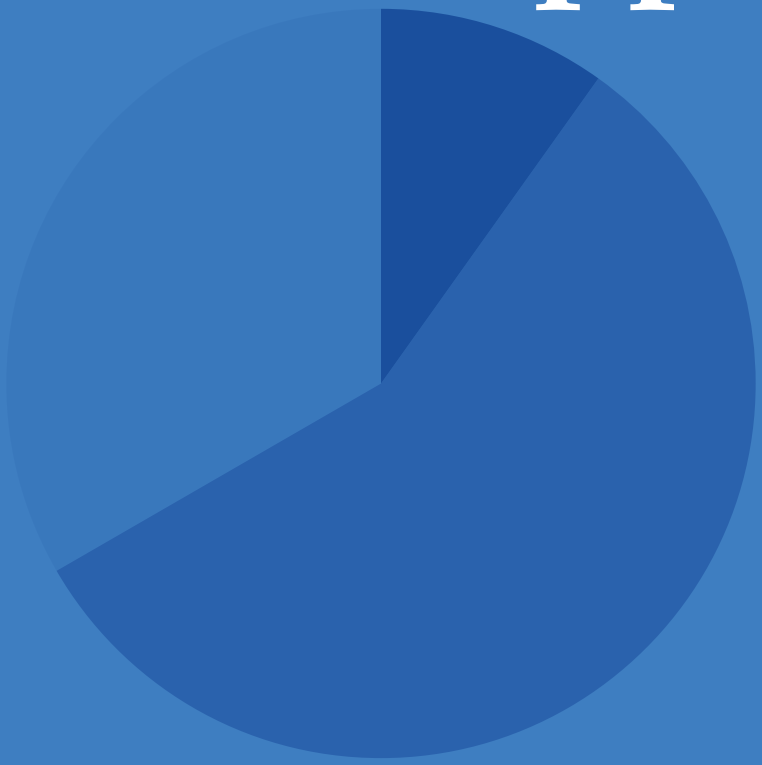
[1] Dietary patterns provide adequate amount (almost 100%, 100% or more than 100%) of nutrients other than Vitamin D. Patterns do not provide adequate amount of Vitamin D as foods contain quite small amounts of Vitamin D. Patterns provide only 6-25% of the adequate intake amounts determined for Vitamin D.

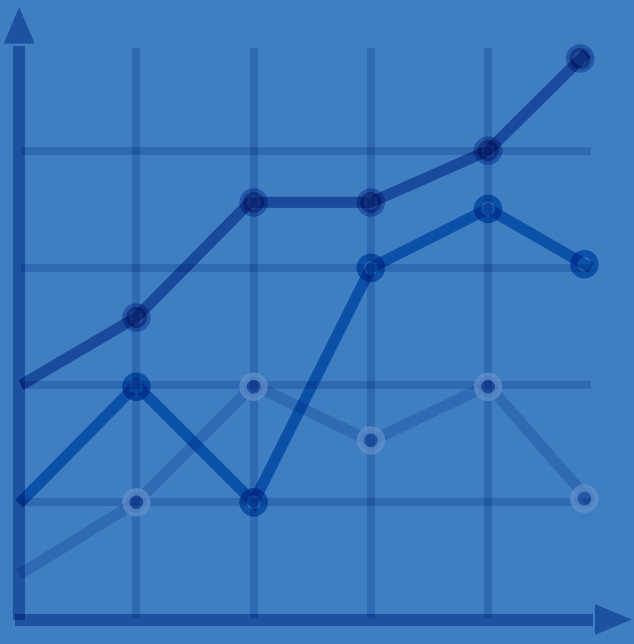
[2] Food-based sodium content of dietary patterns is below the tolerable intake amount.

[3] Coverage ratios of dietary patterns for potassium in adequate amount decrease as the energy content of the diet decreases. While the patterns between 2000-3200 kcal cover 85-100% of the adequate intake, the coverage ratio decreases to 70% in lower energy levels.

[4] Since it is recommended for children at the age of 10 years or more to be moderately active, the adequacy of the dietary patterns for >10 age group to cover energy and nutrient targets is determined according to both low active and moderately active energy expenditure and adquacy in other age groups was determined according to low active energy expenditure (excluding 3200 kcal). Since 3200 kcal is matched with energy requirement of boys at the age of 17-18 years in active category, 3200 kcal dietary pattern was compared with the nutrient targets of this group.

Appendix 4

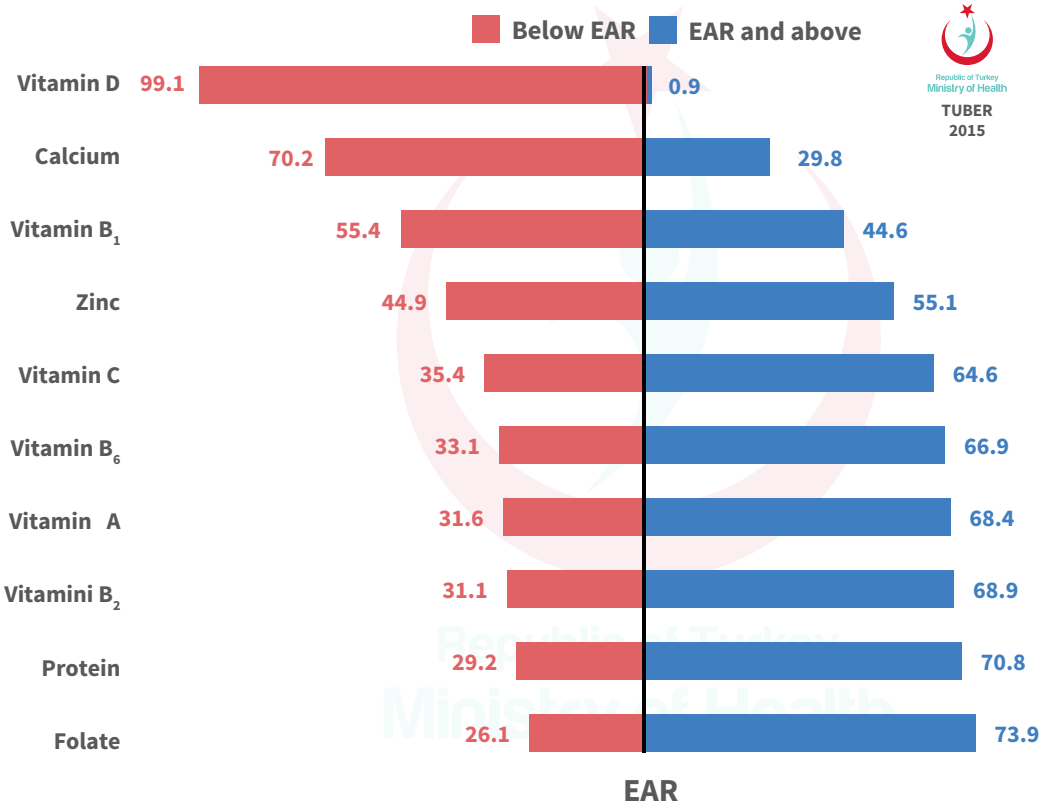




TNHS-2010 Based Analyses : Current Nutrient Intakes and Food Consumption Patterns of Turkey Population

Appendix 4. TNHS-2010 Based Analyses : Current Nutrient Intakes from Foods and Beverages and Food Consumption Patterns of Turkey Population

Appendix 4. 1. Underconsumed nutrients relative to Estimated Average Requirements (EAR/AR)[1]



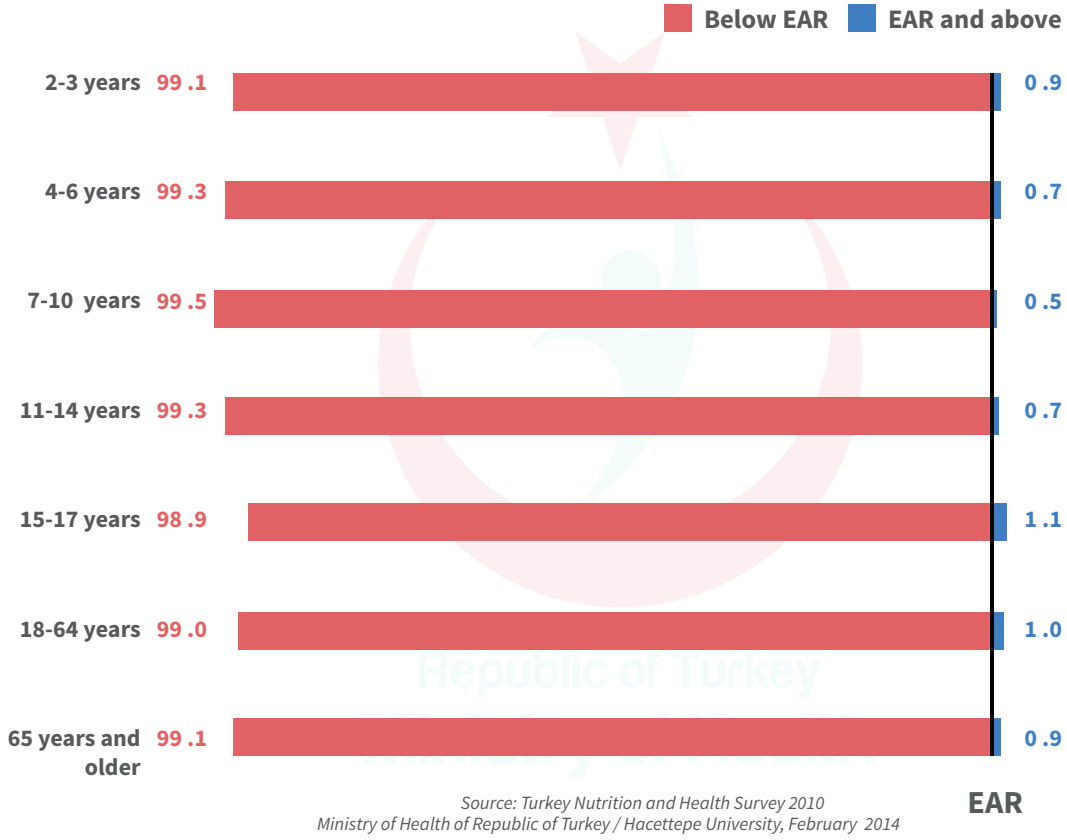
Source: Turkey Nutrition and Health Survey 2010
Ministry of Health of Republic of Turkey / Hacettepe University, February 2014

[1] *Estimated Average Requirements (EAR/AR); for explanations see Chapter 10: Table 10.1.*

Appendix 4.1.1. Percentage of individuals with Nutrient Intakes below and equal or above the Estimated Average Requirements (EAR/AR) (%)

Appendix 4.1.1. demonstrates the individuals in the population who consumed vitamins, minerals and protein below, within and above EAR values. Separate evaluations of nutrients are examined in Appendix 4.1.2. - Appendix 4.1.14. Vitamin D is the first place among the under-consumed nutrients. This indicates that foods are not sources for vitamin D (Appendix 4.1.2).

VITAMIN D

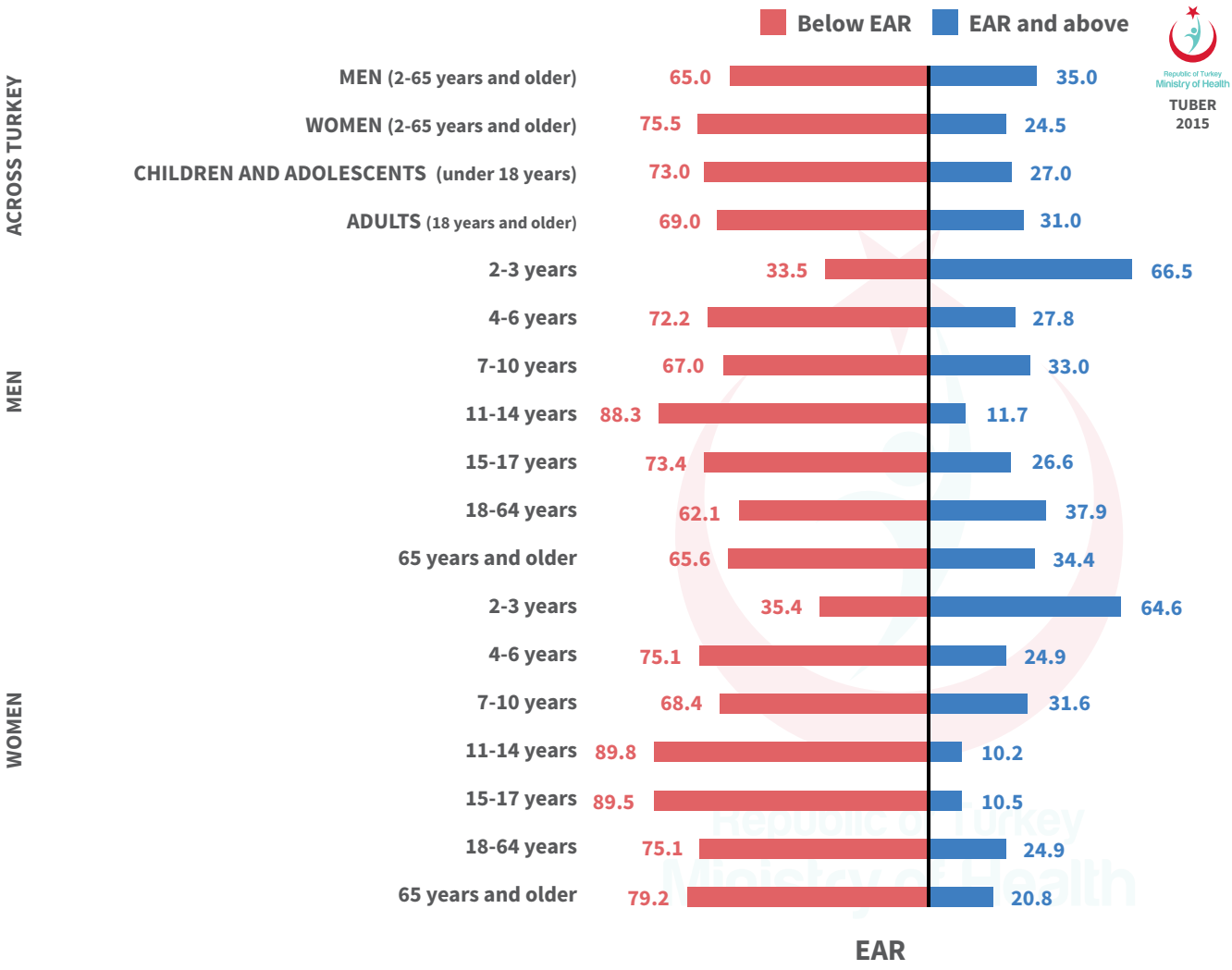


Source: Turkey Nutrition and Health Survey 2010
Ministry of Health of Republic of Turkey / Hacettepe University, February 2014

Appendix 4.1.2. Percentage of individuals with vitamin D intake below and equal or above the Estimated Average Requirement (EAR/AR) by age groups(%)

The best source of vitamin D is sun. Vitamin D is not naturally found in sufficient amounts in foods. There is no legal regulation in Turkey regarding addition of vitamin D to foods. Therefore, vitamin D is the nutrient with the largest consumption deficit in all age groups across Turkey as seen in Appendix 4.1.1. and Appendix 4.1.2.

CALCIUM

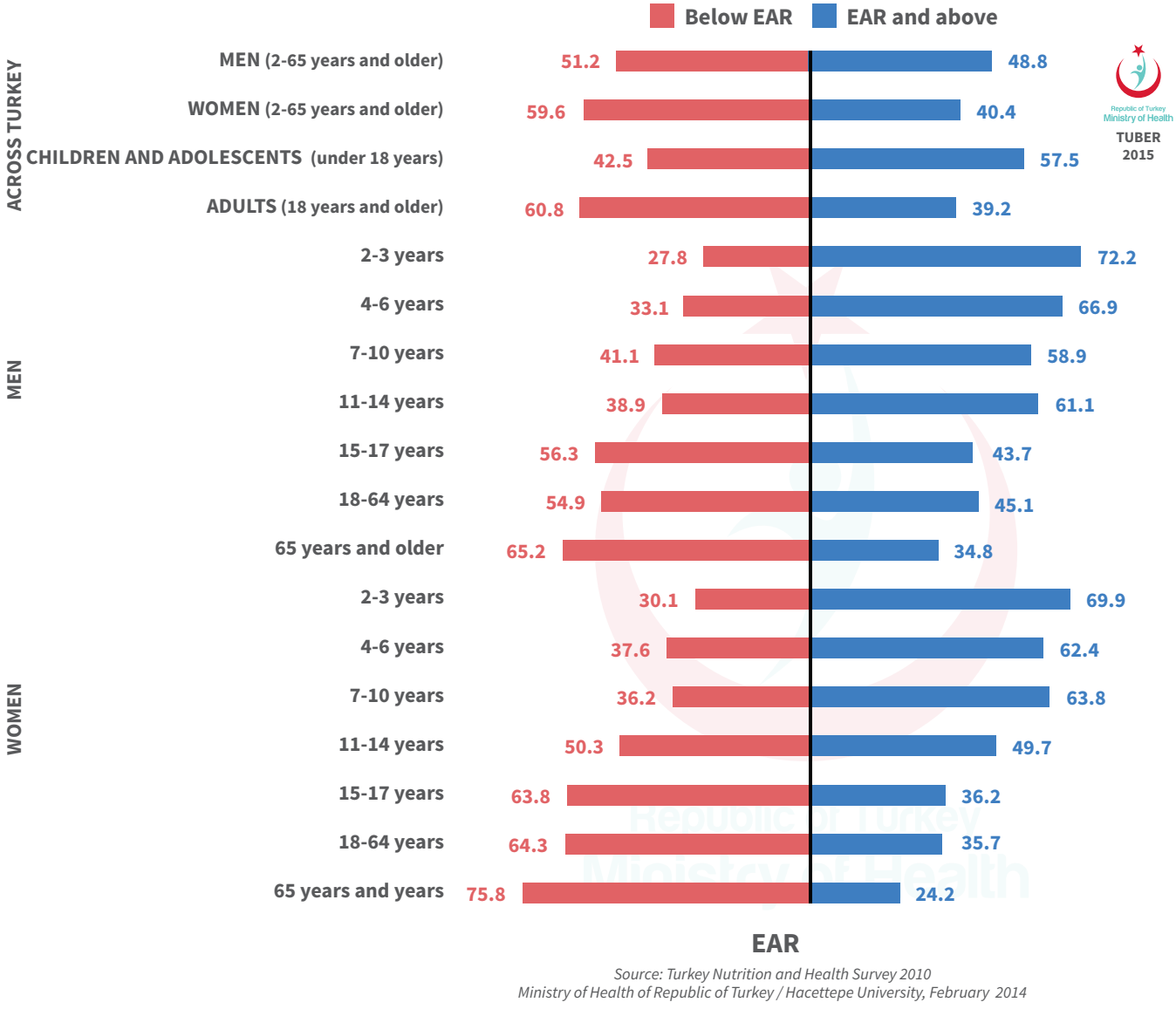


Source: Turkey Nutrition and Health Survey 2010
Ministry of Health of Republic of Turkey / Hacettepe University, February 2014

Appendix 4.1.3. Percentage of individuals with calcium intake below and equal or above the Estimated Average Requirement (EAR/AR) by gender and age groups(%).

The frequency of women who consumed calcium insufficiently is more than that of men. The frequency of individuals who consumed calcium insufficiently is higher in girls and boys at the age of 11-14 years and girls at the age of 15-17 years than that in other age groups.

VITAMIN B_1

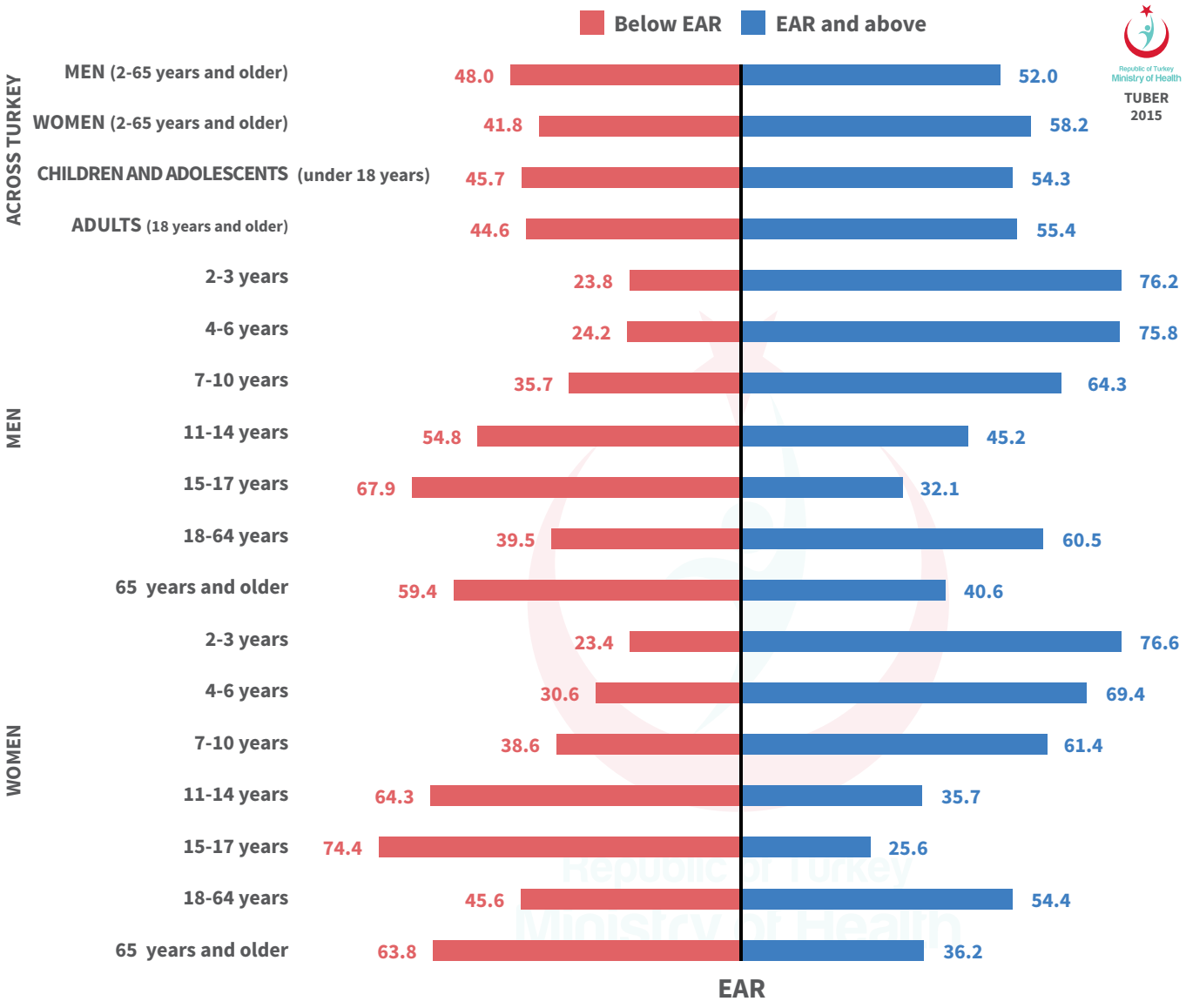


Source: Turkey Nutrition and Health Survey 2010
Ministry of Health of Republic of Turkey / Hacettepe University, February 2014

Appendix 4.1.4. Percentage of individuals with vitamin B_1 intake below and equal or above the Estimated Average Requirement (EAR/AR) by gender and age groups(%).

The frequency of adults who consumed vitamin B_1 below EAR values is also high. The frequency of insufficient intake is observed to increase in advancing ages in both sexes.

ZINC



Source: Turkey Nutrition and Health Study 2010
Ministry of Health of Republic of Turkey / Hacettepe University, February 2014

Appendix 4.1.5. Percentage of individuals with zinc intake below and equal or above the Estimated Average Requirement (EAR/AR) according to gender and age groups(%).

The groups in which the frequency of the insufficient consumption of zinc is the highest are boys and girls at the age of 15-17 years. Also, it is observed that the frequency of the insufficient intake is high in men and women above the age of 65 years.

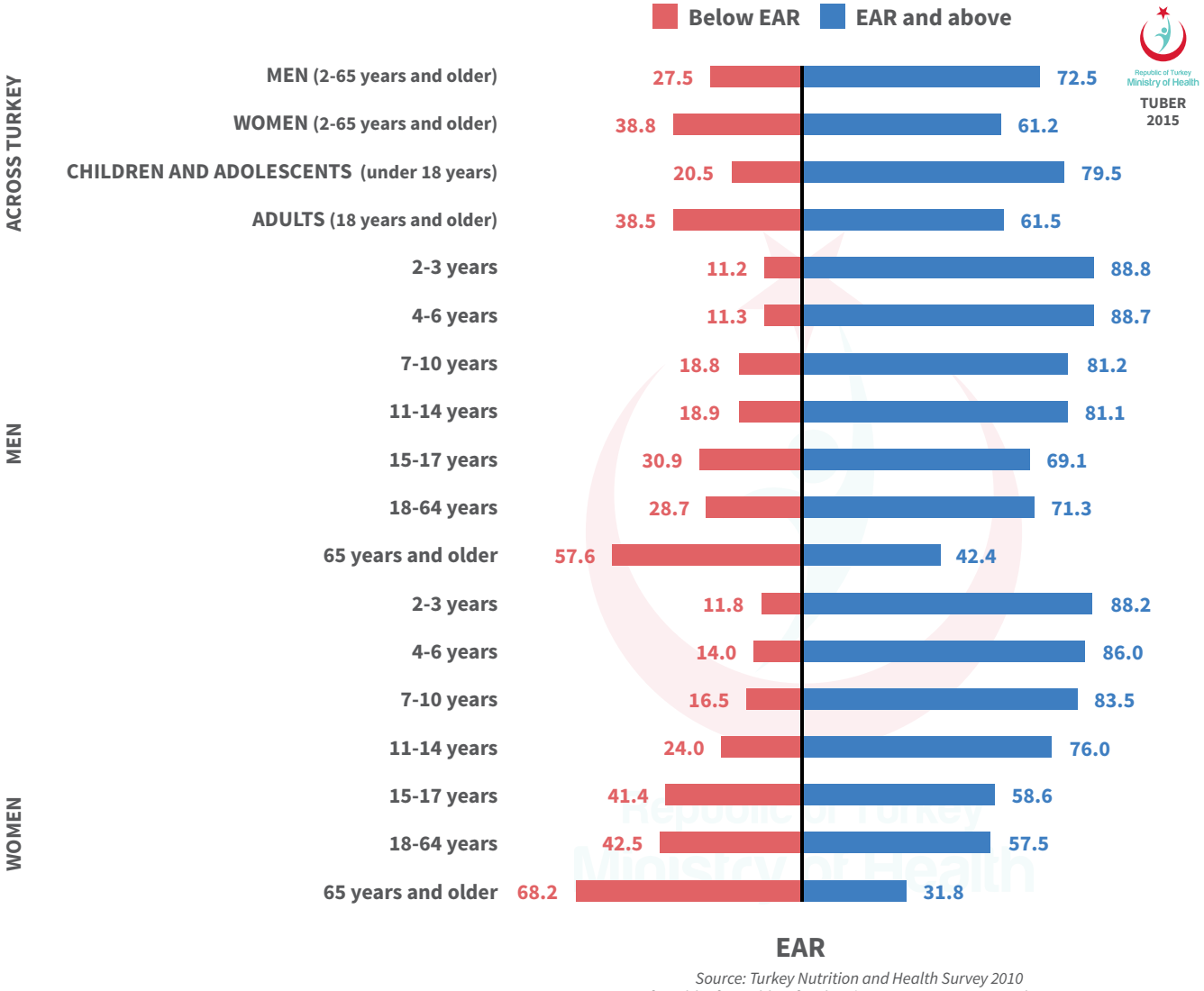
VITAMIN C

Source: Turkey Nutrition and Health Survey 2010
Ministry of Health of Republic of Turkey / Hacettepe University, February 2014

Appendix 4.1.6. Percentage of individuals with vitamin C intake below and equal or above the Estimated Average Requirement (EAR/AR) by gender and age groups(%).

The frequency of individuals who consumed vitamin C insufficiently in the population is the highest in boys and girls at the age of 15-17 years.

VITAMIN B_6

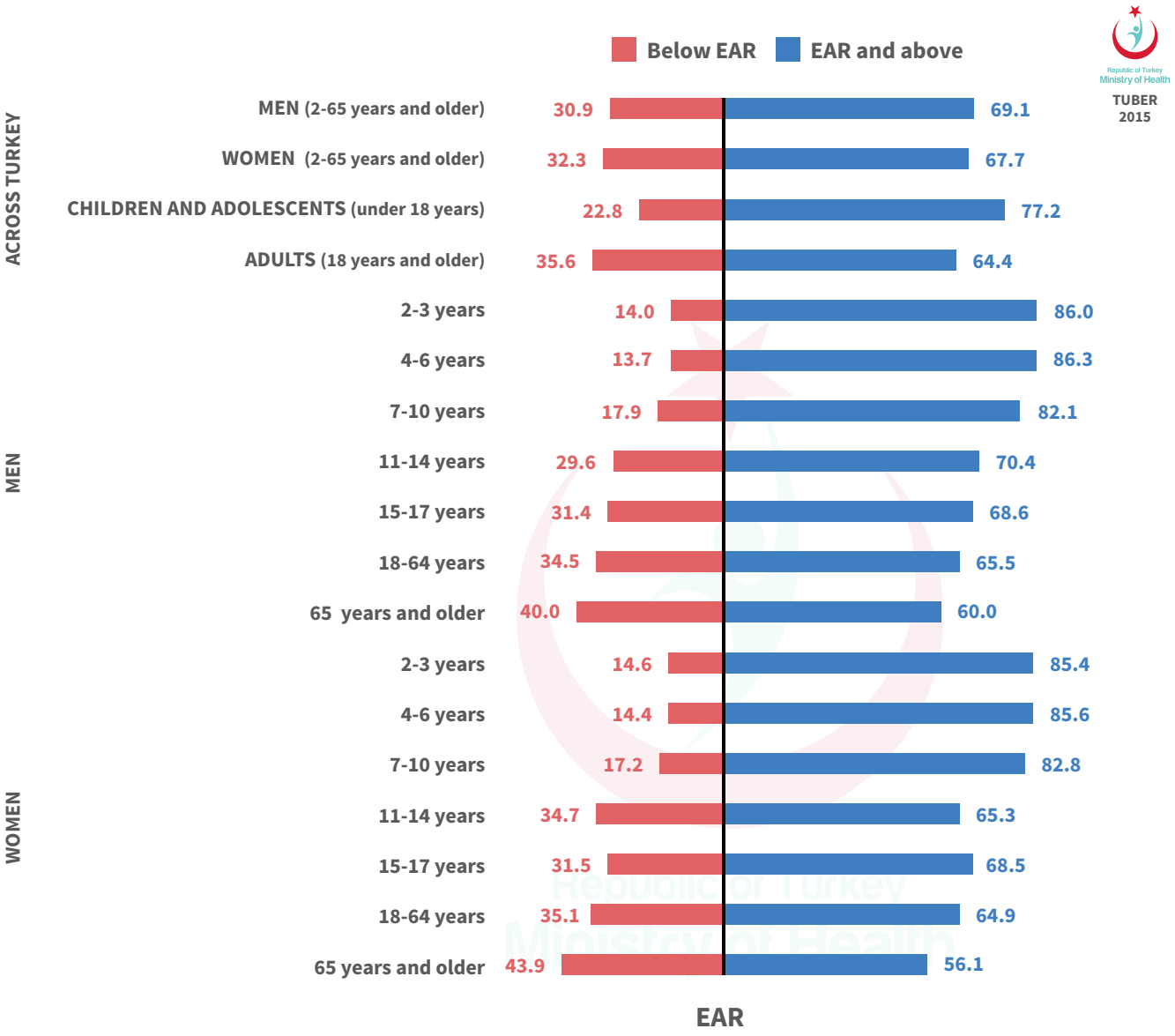


Source: Turkey Nutrition and Health Survey 2010
Ministry of Health of Republic of Turkey / Hacettepe University, February 2014

Appendix 4.1.7. Percentage of individuals with vitamin B_6 intake below and equal or above the Estimated Average Requirement (EAR/AR) by gender and age groups(%).

The frequency of individuals who consumed vitamin B_6 insufficiently is much higher in women and men above the age of 65 years than that in other age groups.

VITAMIN A

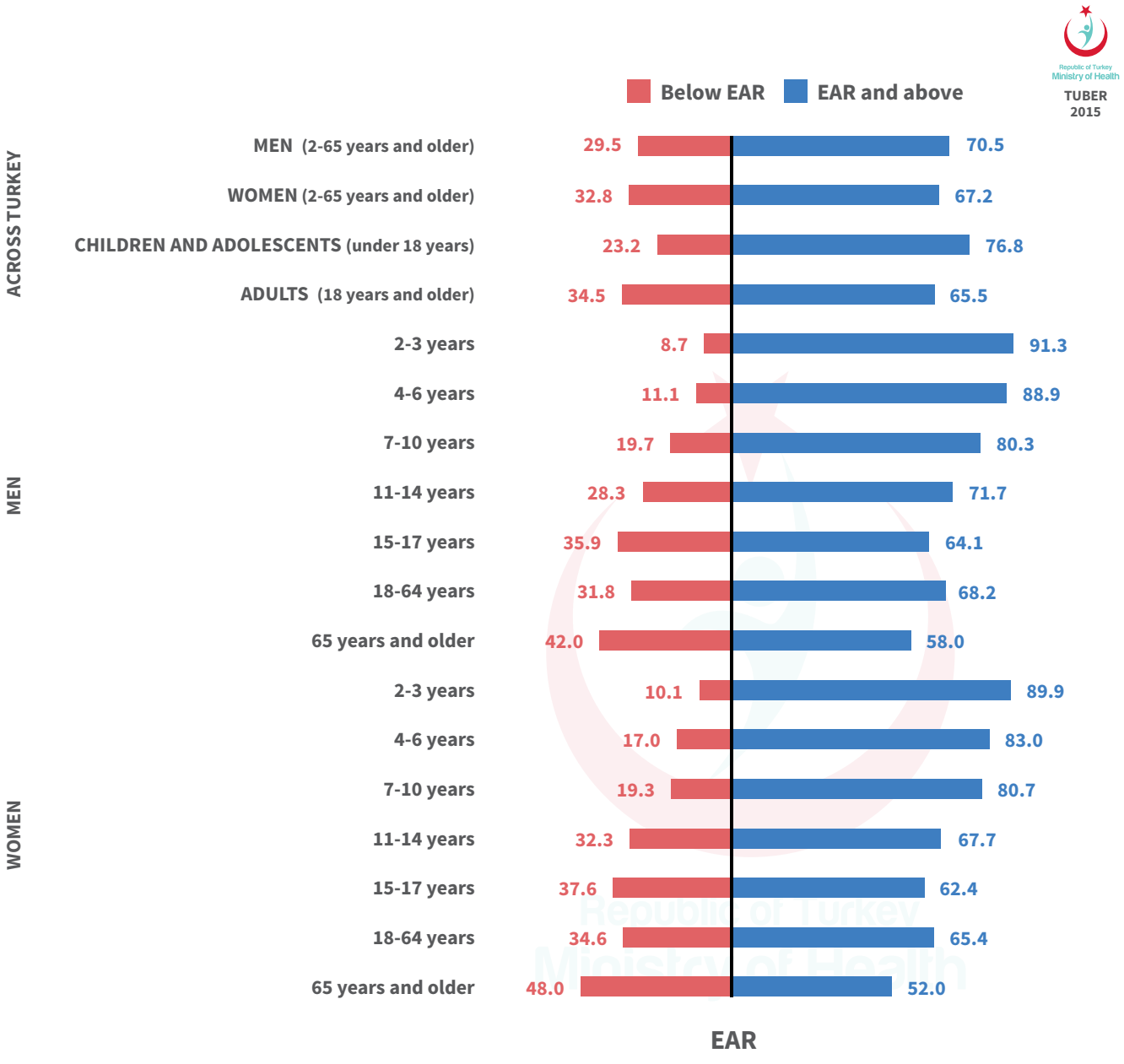


Source: Turkey Nutrition and Health Survey 2010
Ministry of Health of Republic of Turkey / Hacettepe University, February 2014

Appendix 4.1.8. Percentage of individuals with vitamin A intake below and equal or above the Estimated Average Requirement (EAR/AR) by gender and age groups(%).

The frequency of individuals who consumed vitamin A insufficiently is higher generally in adults. The frequency of insufficient intake is observed to increase in older ages.

VITAMIN B_2

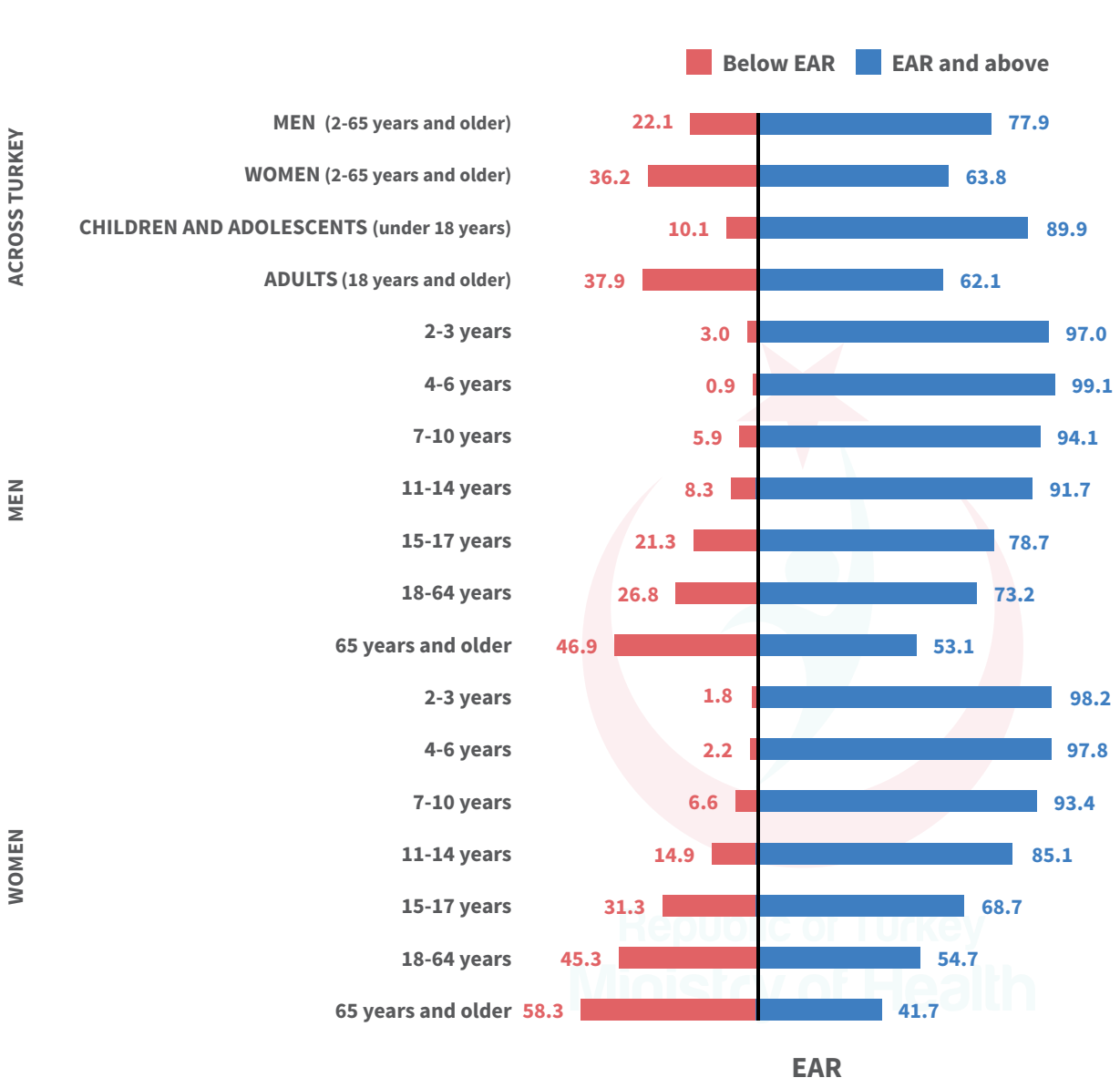


Source: Turkey Nutrition and Health Survey 2010
Ministry of Health of Republic of Turkey / Hacettepe University, February 2014

Appendix 4.1.9. Percentage of individuals with vitamin B_2 intake below and equal or above the Estimated Average Requirement (EAR/AR) by gender and age groups(%).

The frequency of individuals who consumed vitamin B_2 under EAR value is higher in adults and especially men and women above the age of 65 years.

PROTEIN INTAKE

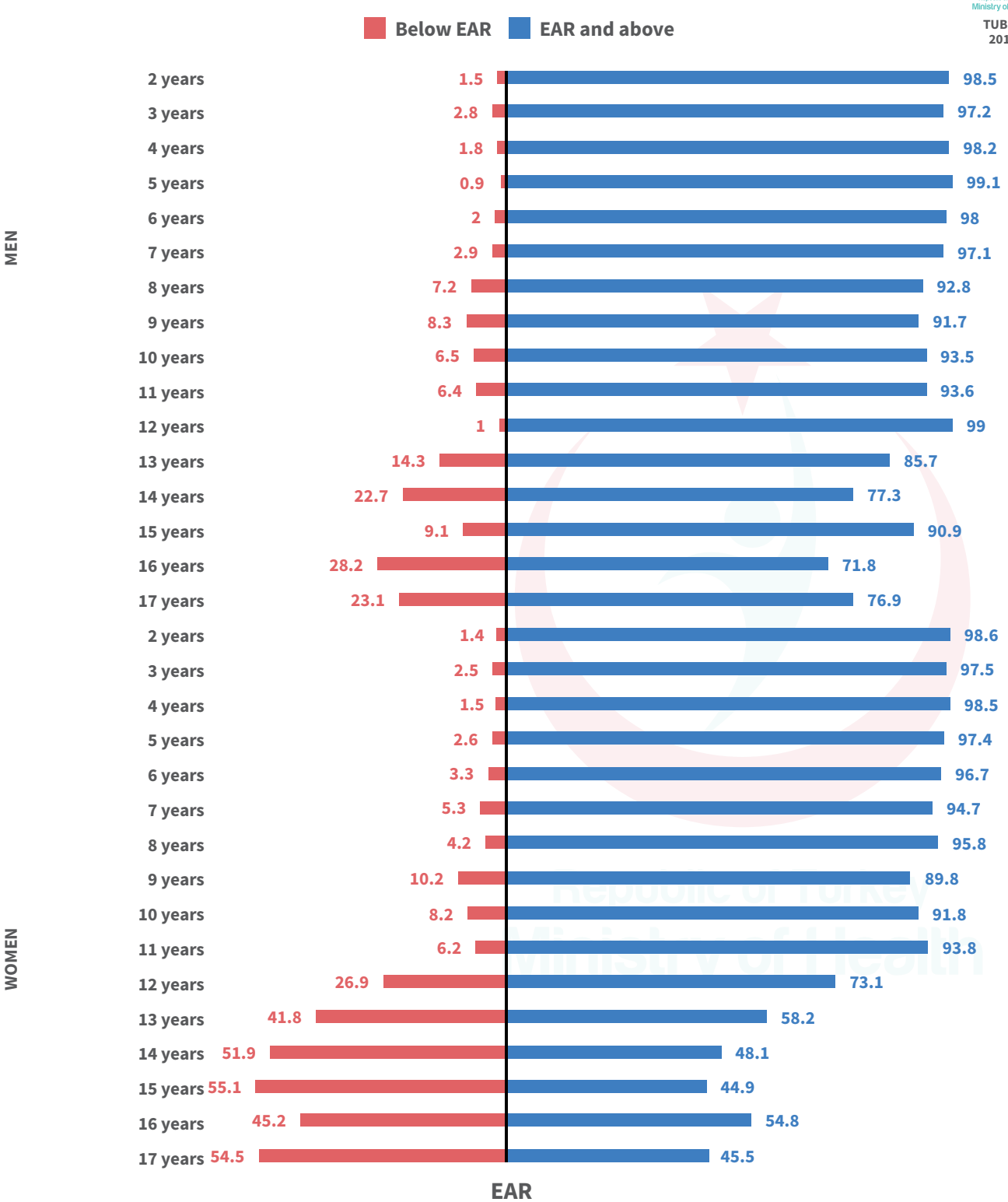


Source: Turkey Nutrition and Health Survey 2010
Ministry of Health of Republic of Turkey / Hacettepe University, February 2014

Appendix 4.1.10. Percentage of individuals with protein intake below and equal or above the Estimated Average Requirement (EAR/AR) by gender and age groups(%).

Protein intake of the individuals in the population based on age and sex has been compared with the EAR values anticipated by EFSA NDA Panel 2012 (4). The frequency of individuals in the population who consumed protein below EAR values was found to be higher in women compared to men and it was observed to increase with older age.

PROTEIN INTAKE IN CHILDREN AND ADOLESCENTS

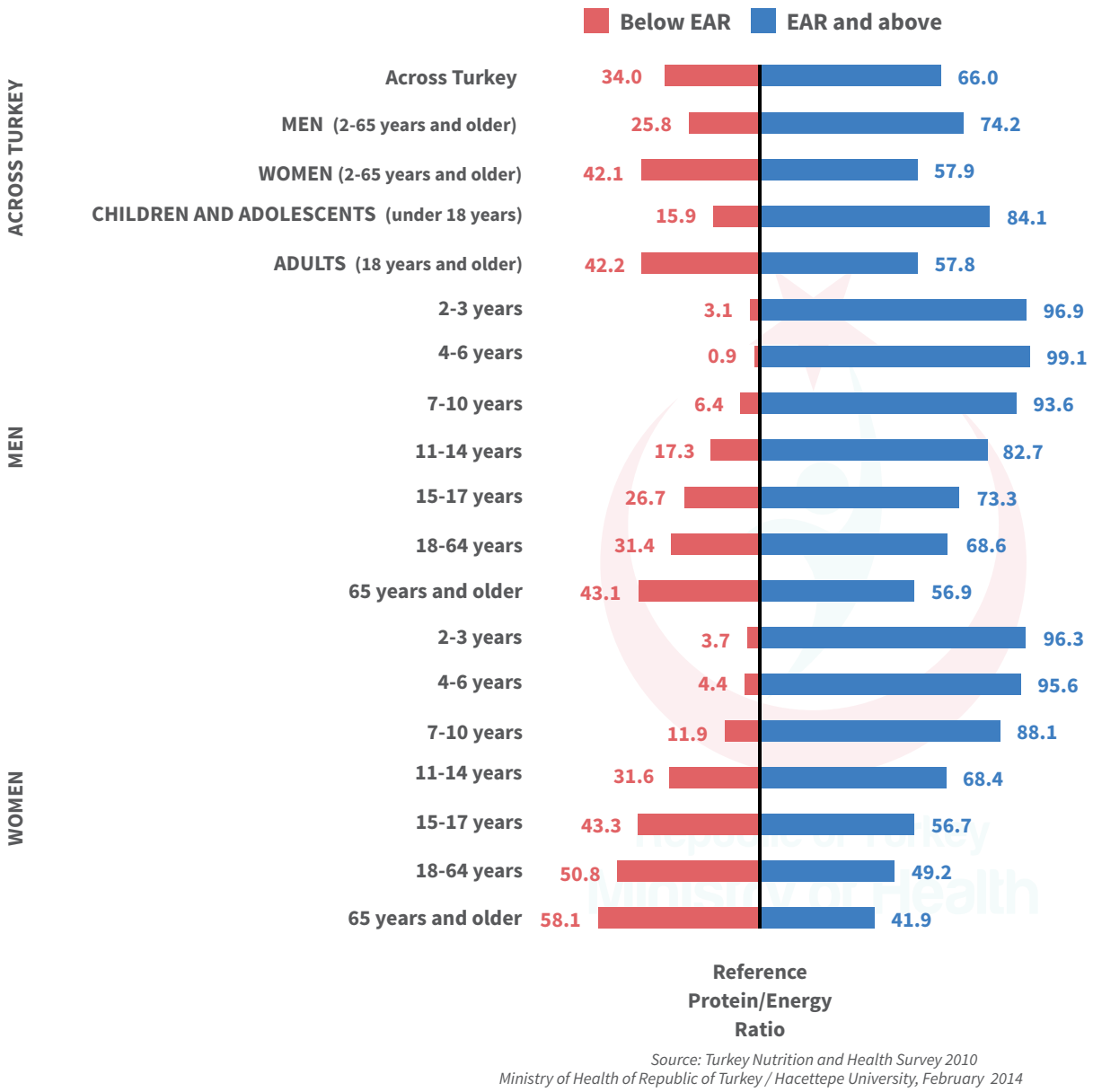


Source: Turkey Nutrition and Health Survey 2010
Ministry of Health of Republic of Turkey / Hacettepe University, February 2014

Appendix 4.1.11. Percentage of children and adolescents with protein intake below and equal or above the Estimated Average Requirement (EAR/AR) by gender and age groups(%).

Protein intake of children and adolescents based on age and sex has been compared with the EAR values (g/day) anticipated by EFSA NDA Panel 2012 (4). The frequency of the individuals who consumed protein below EAR value has been found to be higher in girls at the age of 12 years or above.

PROTEIN/ENERGY RATIO (%)

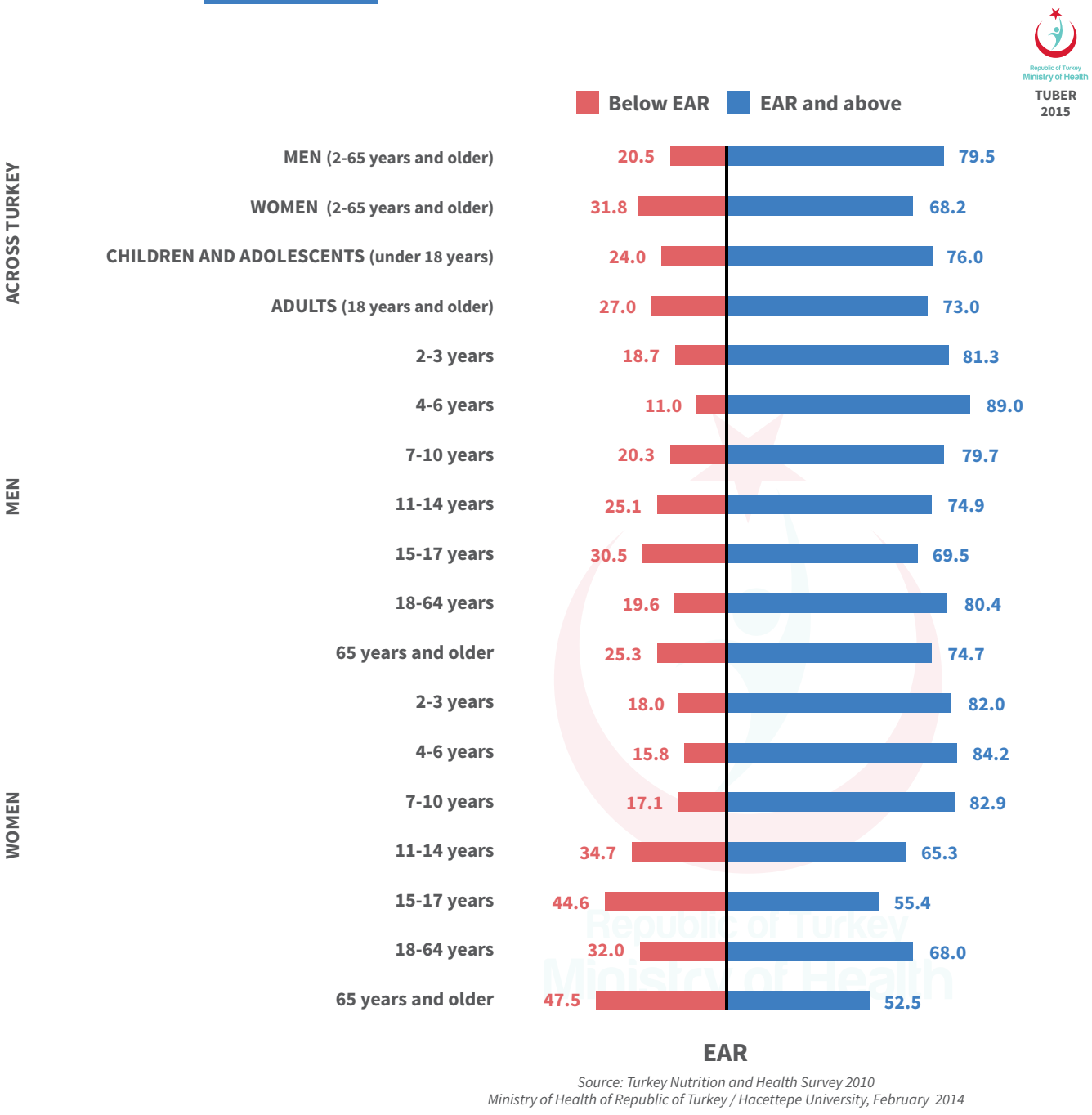


Source: Turkey Nutrition and Health Survey 2010
Ministry of Health of Republic of Turkey / Hacettepe University, February 2014

Appendix 4.1.12. Percentage of individuals with protein/energy ratio(%) below and equal or above the reference protein/energy ratio(%) by gender and age groups(%).

"Reference protein/energy ratio" (Appendix 1.2.1.) has been compared with the protein-energy ratio of the diet of the population. The frequency of the individuals in a diet with protein/energy level below reference values was found to be higher in adults than in children and adolescents and higher in women than in men. The frequency of the individuals with consumption below reference value was observed to be higher in advancing ages in both sexes.

FOLATE



Source: Turkey Nutrition and Health Survey 2010
Ministry of Health of Republic of Turkey / Hacettepe University, February 2014

Appendix 4.1.13. Percentage of individuals with folate intake below and equal or above the Estimated Average Requirement (EAR/AR) by gender and age groups(%).

The frequency of the individuals who consumed folate under EAR is the highest in women at the age of 15-17 years and above 65 years.

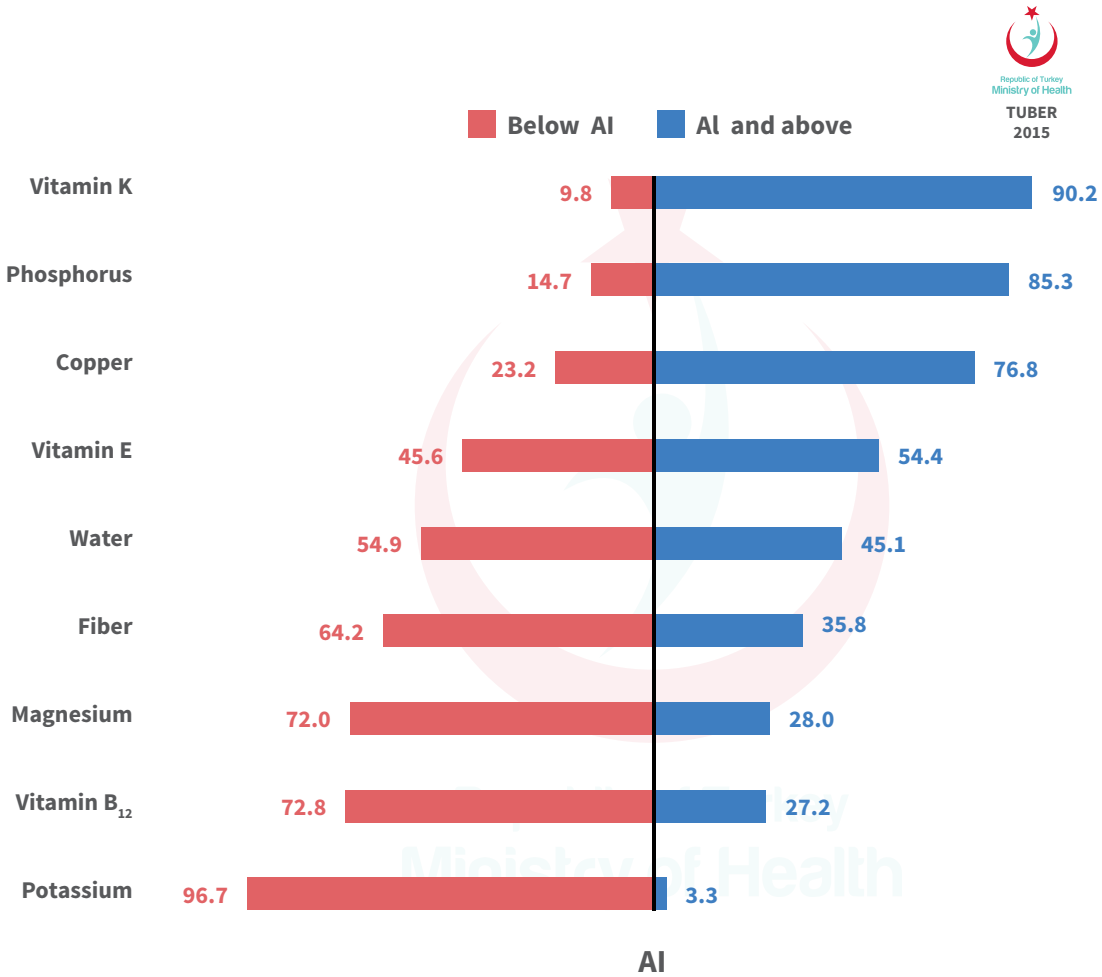
FOLATE IN WOMEN IN REPRODUCTIVE AGE GROUP

Source: Turkey Nutrition and Health Survey 2010
Ministry of Health of Republic of Turkey / Hacettepe University, February 2014

Appendix 4.1.14. Percentage of women in reproductive age with folate intake below and equal or above the Estimated Average Requirement (EAR/AR) according to age groups(%).

The frequency of women in reproductive age group (between 15-49 years) who consumed folate below EAR values is high.

Appendix 4. 2. Nutrient intakes relative to Adequate Intakes(AI) and Iron Intake relative to Recommmended Dietary Allowance (RDA/PRI)



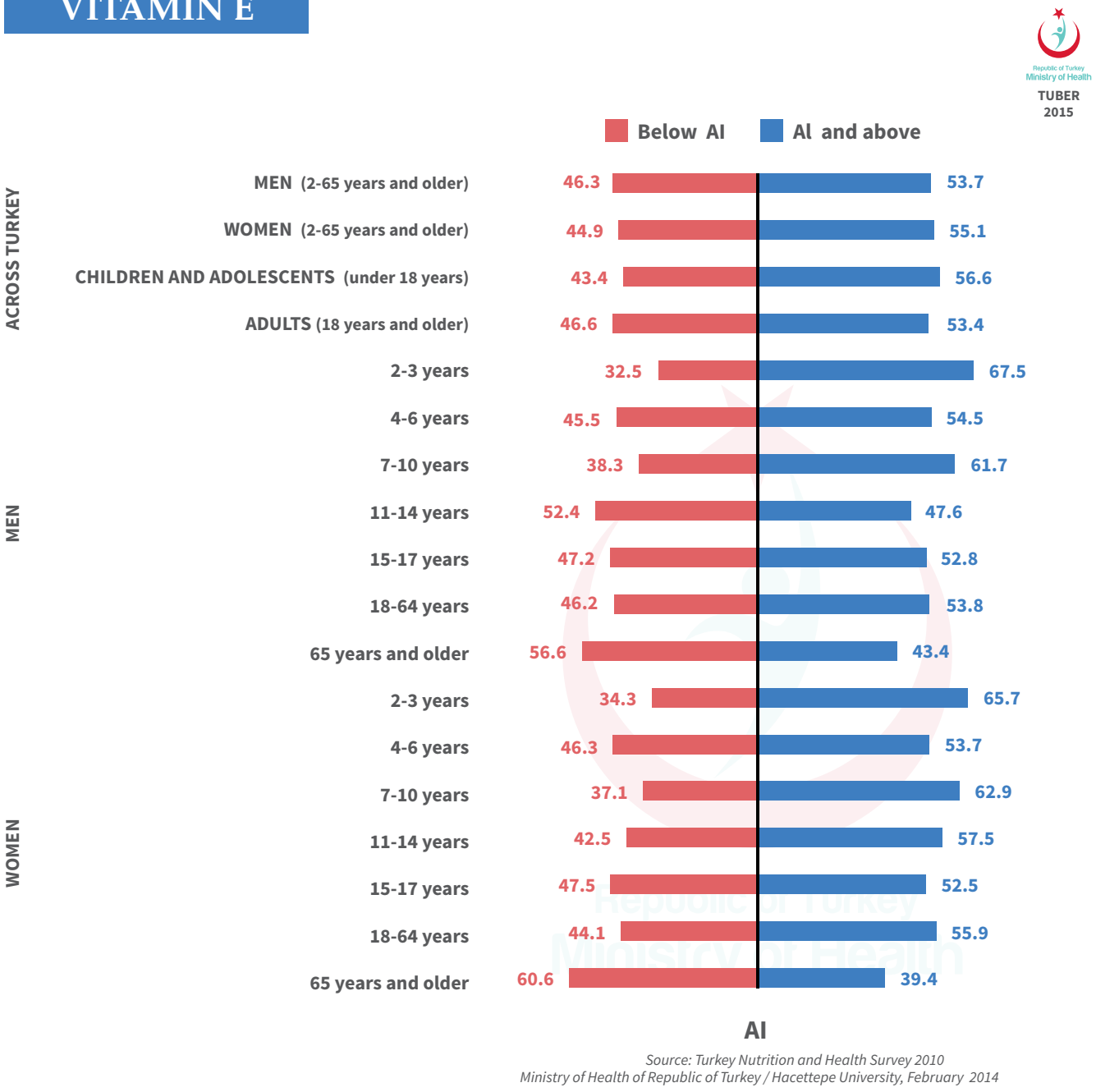
Source: Turkey Nutrition and Health Survey 2010
Ministry of Health of Republic of Turkey / Hacettepe University, February 2014

[1] *Adequate intake (AI) ; for explanations see Chapter 10: Table 10.1*

Appendix 4.2.1. Percentage of individuals with nutrient intakes below and equal or above the Adequate Intakes (AI) (%).

The frequency of individuals in the population who consumed nutrients within and above AI amounts is very low for potassium and below 50% for water, fiber, magnesium, and vitamin B_{12}.

VITAMIN E

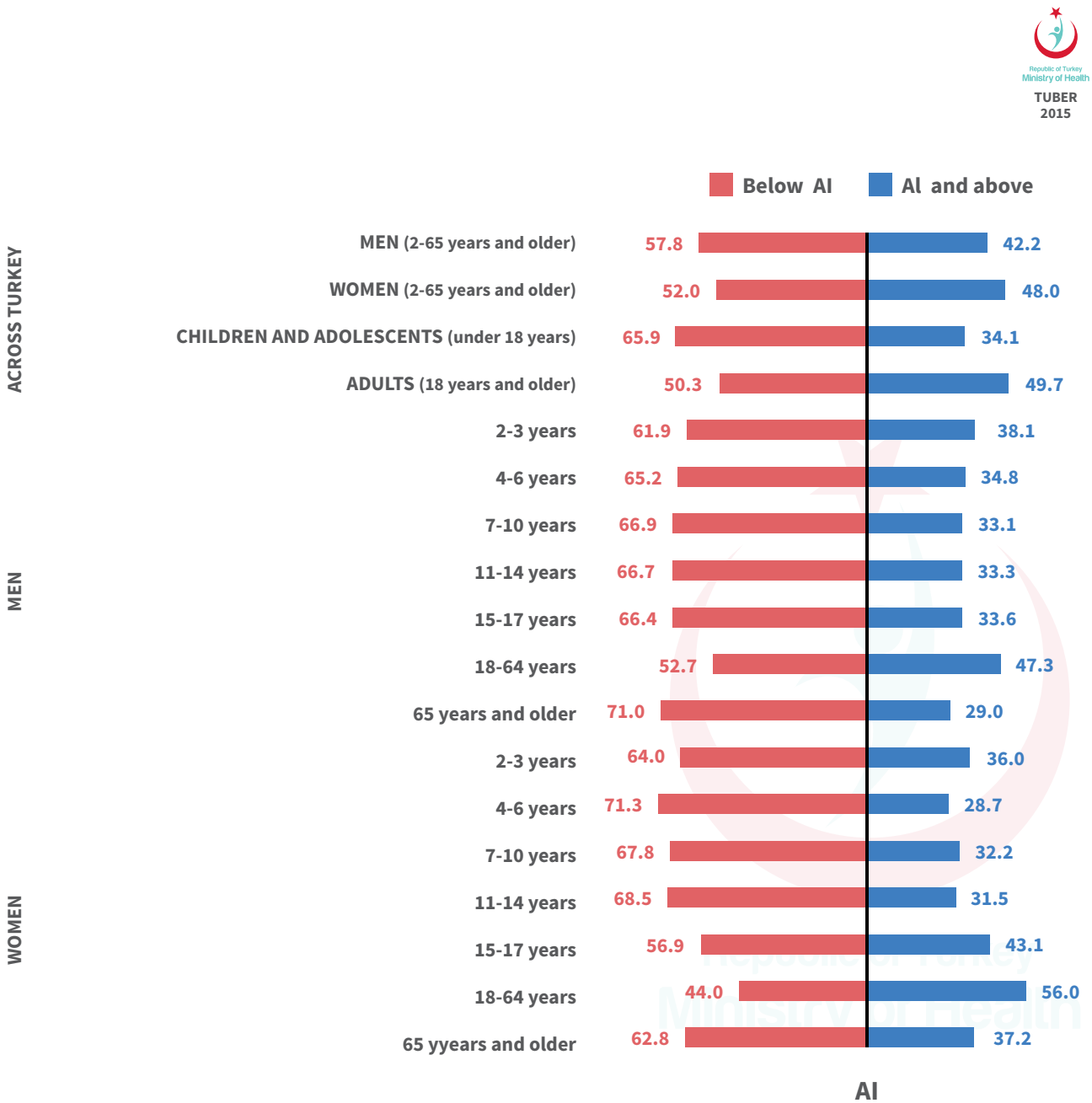


Source: Turkey Nutrition and Health Survey 2010
Ministry of Health of Republic of Turkey / Hacettepe University, February 2014

Appendix 4.2.2. Percentage of individuals with vitamin E intake below and equal or above the Adequate Intake (AI) by gender and age groups (%).

The frequency of men and women older than 65 years old who consumed vitamin E more than AI is lower than in other age groups.

WATER

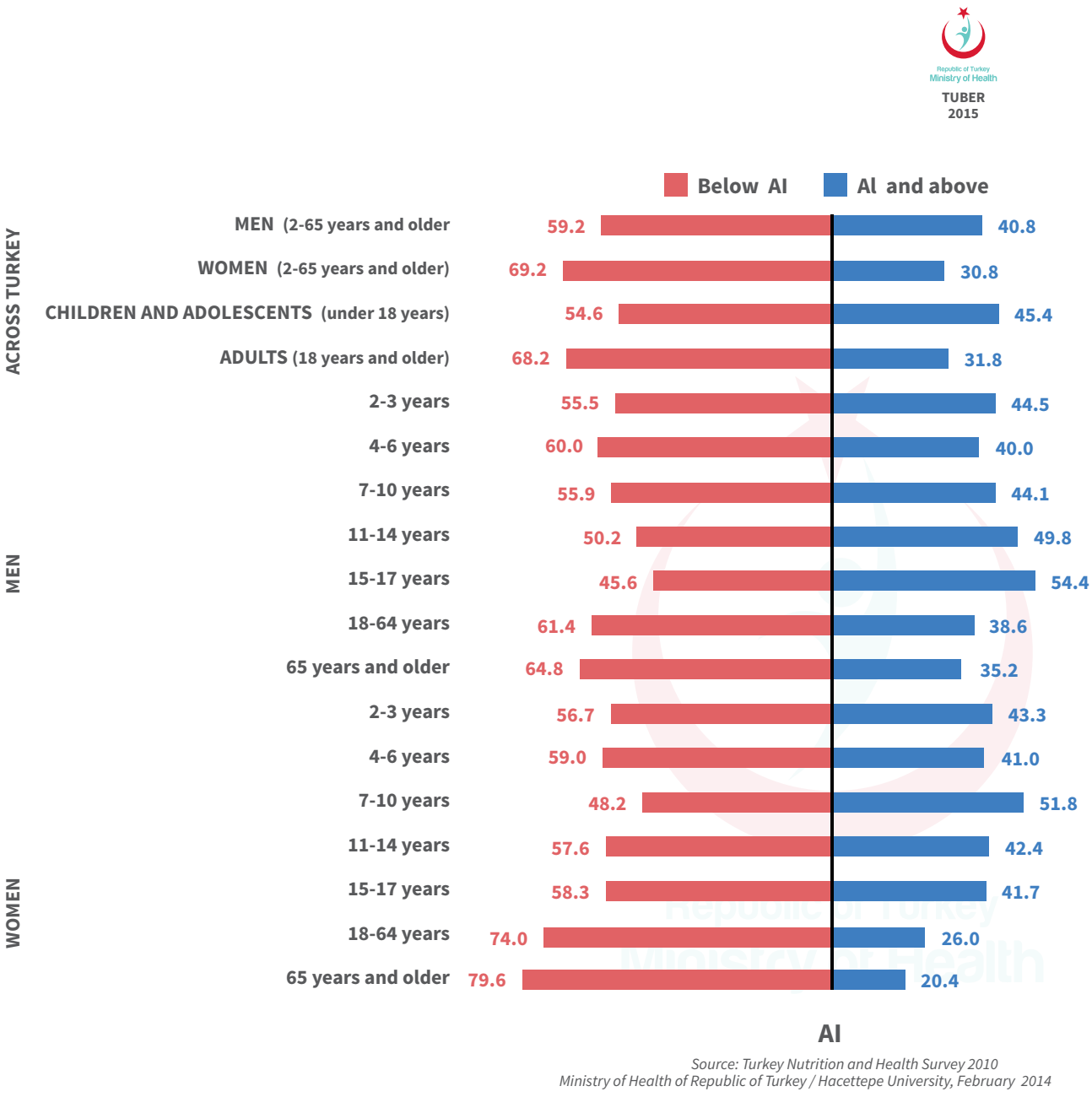


Source: Turkey Nutrition and Health Survey 2010
Ministry of Health of Republic of Turkey / Hacettepe University, February 2014

Appendix 4.2.3. Percentage of individuals with water intake below and equal or above the Adequate Intake (AI) by gender and age groups (%).

The frequency of individuals in the population who consumed water within and above AI amounts is 56% in women of 18-64 age group and is higher than in other age groups. Half of the men in the same age group and 43% of the girls in 15-17 age group consume water in sufficient amounts. The frequency of individuals who consumed water above AI amounts is lower in all other age groups and differs between 30-38%.

FIBER

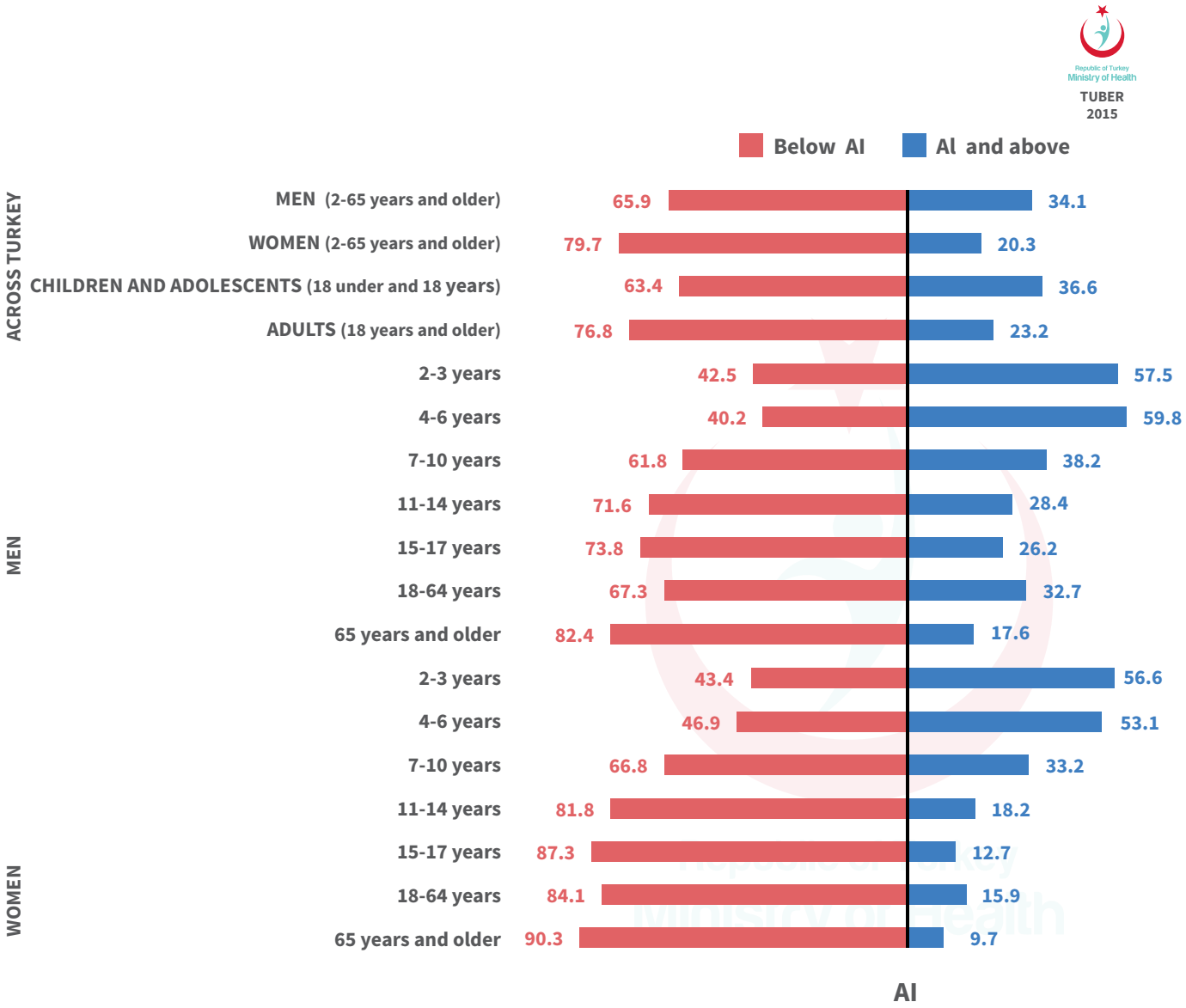


Source: Turkey Nutrition and Health Survey 2010
Ministry of Health of Republic of Turkey / Hacettepe University, February 2014

Appendix 4.2.4. Percentage of individuals with fiber intake below and equal or above the Adequate Intake (AI) by gender and age groups (%).

The frequency of individuals in the population who consumed fiber within and above AI amounts is lower in adult men and women than in children and adolescents. Only (about) ¼ of the women at the age of 18-64 years and only (about) 1/5 of women at the age of 65 years or more consume fiber at recommended amounts. Men who consumed adequate amount of fiber constitutes only ⅓ of the individuals examined. The frequency of individuals of both sexes who consumed fiber in adequate amounts is lower compared to young adults.

VITAMIN B_{12}

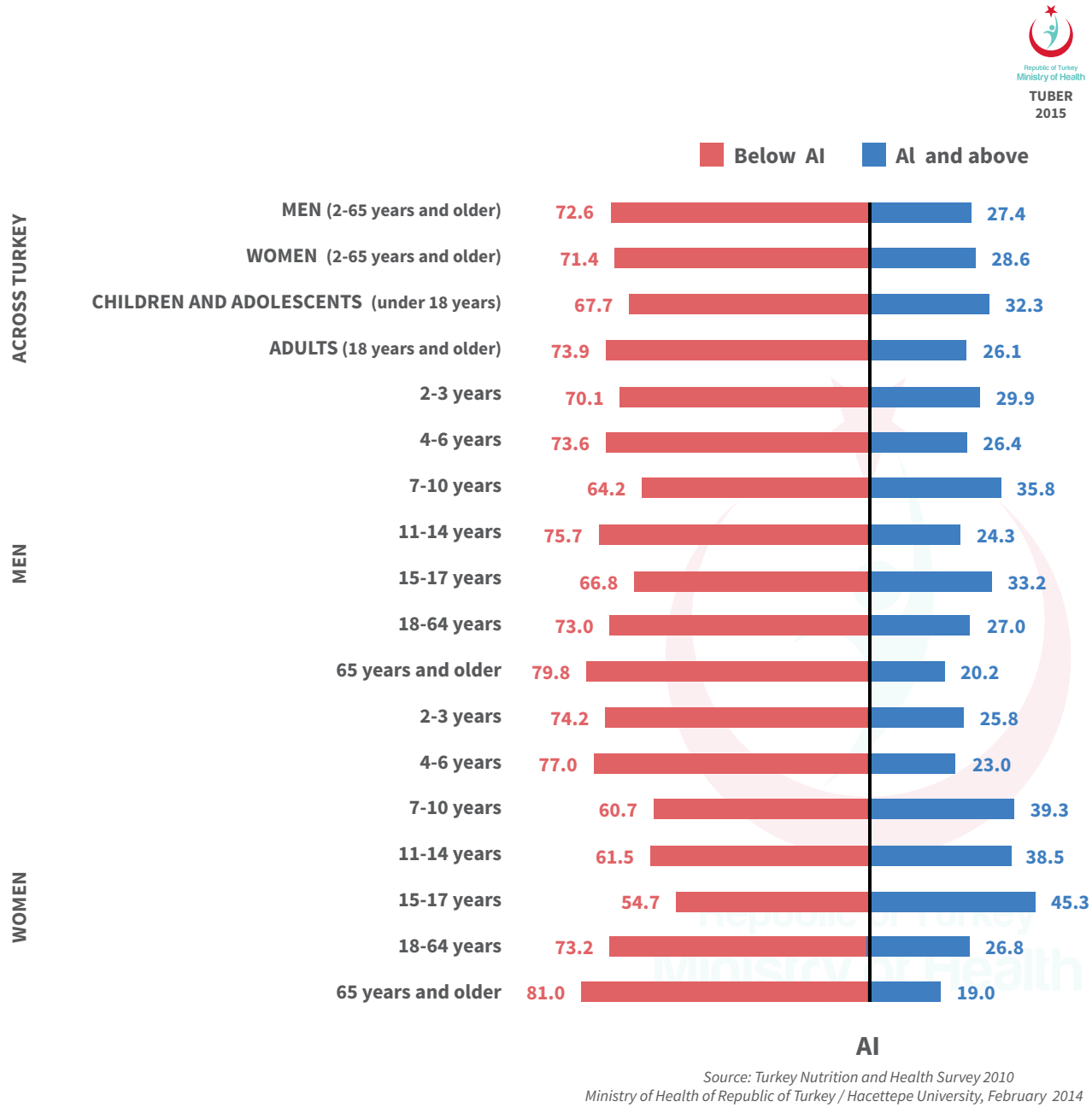


Source: Turkey Nutrition and Health Survey 2010
Ministry of Health of Republic of Turkey / Hacettepe University, February 2014

Appendix 4.2.5. Percentage of individuals with vitamin B_{12} intake below and equal or above the Adequate Intake (AI) by gender and age groups (%).

The frequency of individuals who consumed vitamin B_{12} within and above AI amounts is lower in women than in men. It is noticed that adequate intake in men and women in advancing ages is lower than in young and middle aged men and women. One of every 5 men at the age of 65 years or more and only one of every 10 women at the age of 65 years or more consume vitamin B_{12} within or above recommended amounts.

MAGNESIUM



Source: Turkey Nutrition and Health Survey 2010
Ministry of Health of Republic of Turkey / Hacettepe University, February 2014

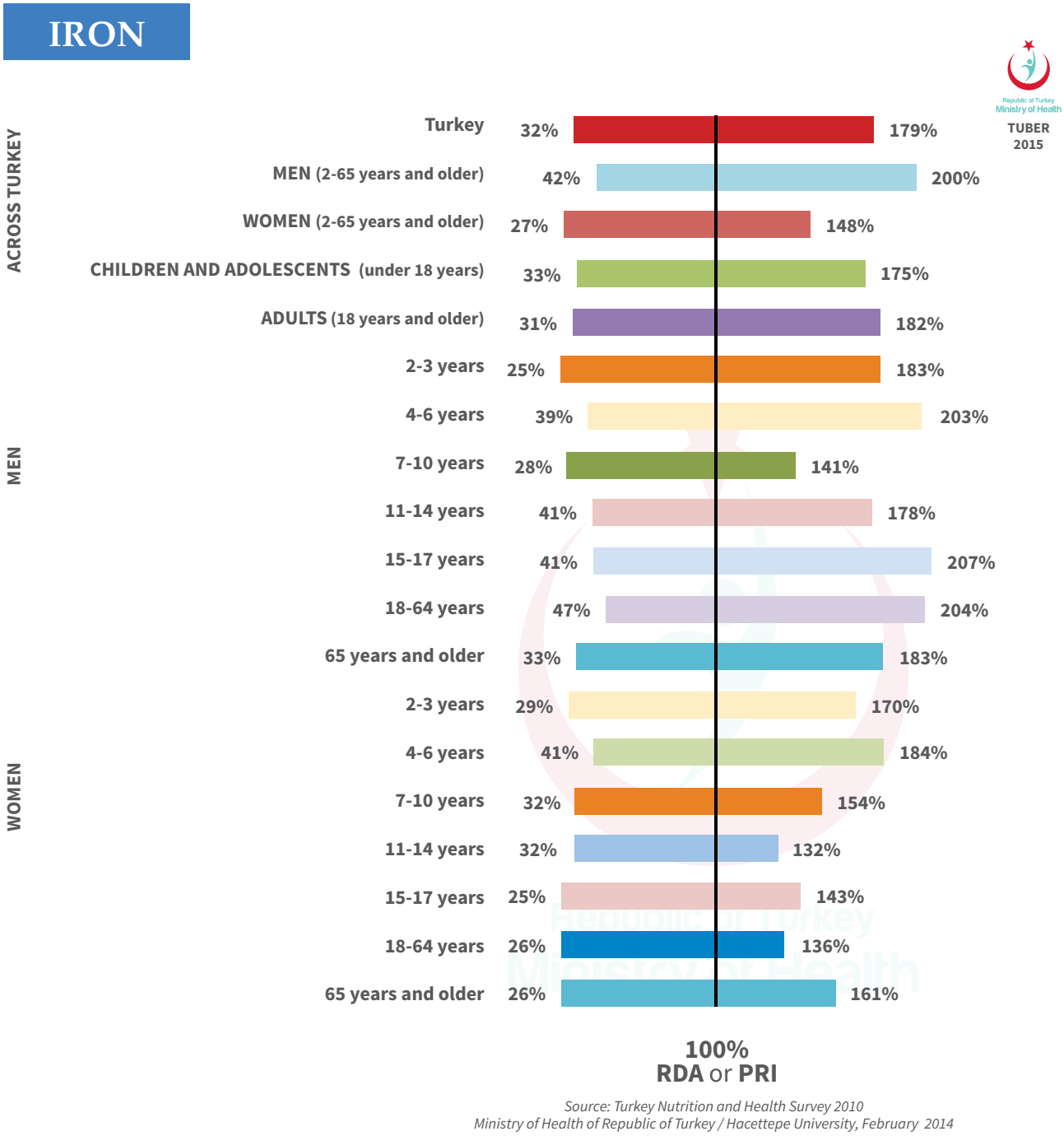
Appendix 4.2.6. Percentage of individuals with magnesium intake below and equal or above the Adequate Intake (AI) by gender and age groups (%).

POTASSIUM

Source: Turkey Nutrition and Health Survey 2010
Ministry of Health of Republic of Turkey / Hacettepe University, February 2014

Appendix 4.2.7. Percentage of individuals with potassium intake below and equal or above the Adequate Intake (AI) by gender and age groups (%).

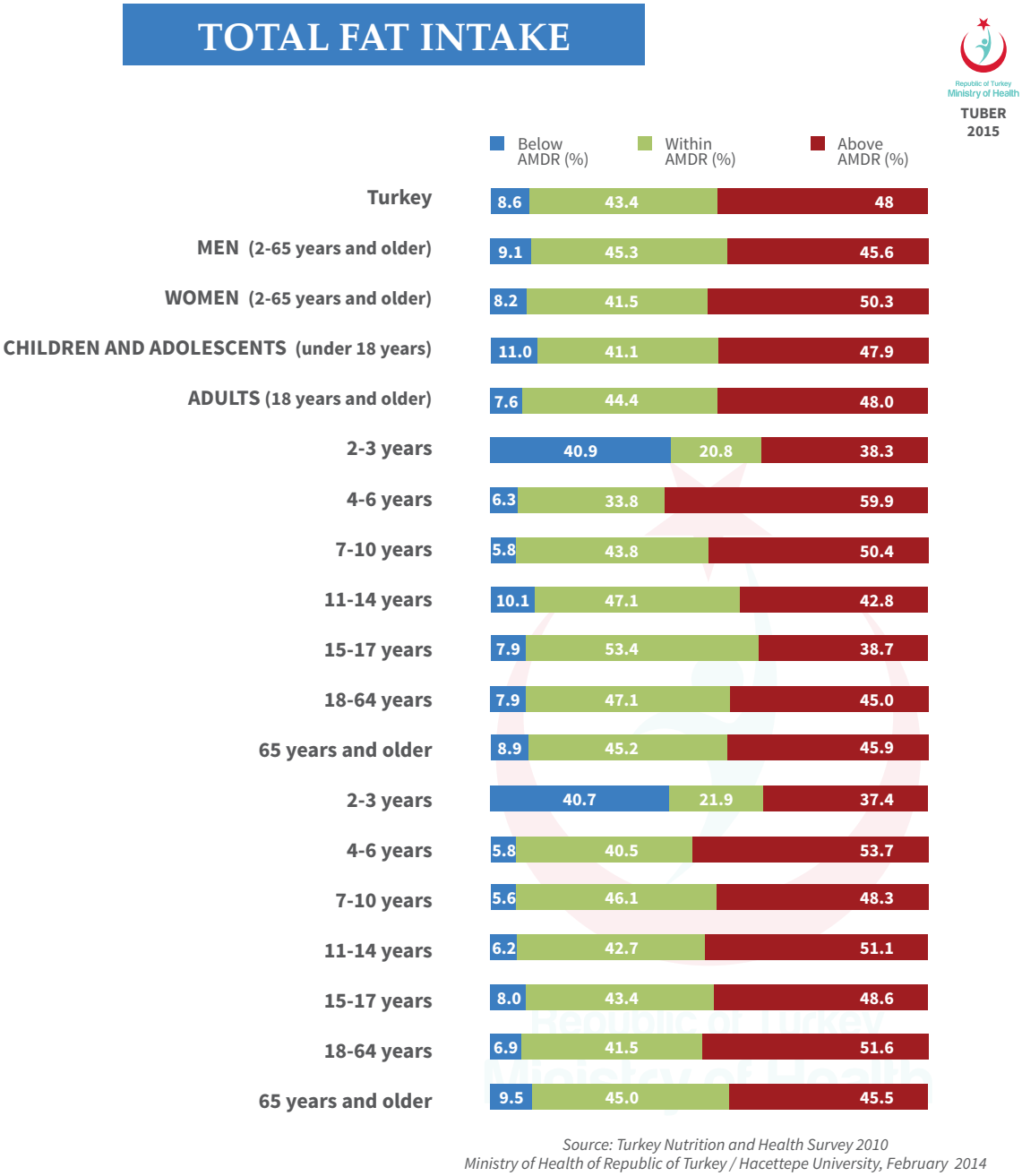
The frequency of individuals who consumed potassium within or above AI amounts is quite low across Turkey.



Appendix 4.2.8. Iron intake as a percentage of recommended dietary allowance by gender and age groups (%).

The iron in the diet of the population meets minimum 33% (5th percentile) and maximum 179% (95th percentile) of RDA/PRI. Minimum and maximum percentages of RDA/PRI coverage ratio are 27% and 148% in women, lower than the iron coverage ratios of 42% and 20% in men's diet.

Appendix 4. 3. Evaluation of macronutrient intakes



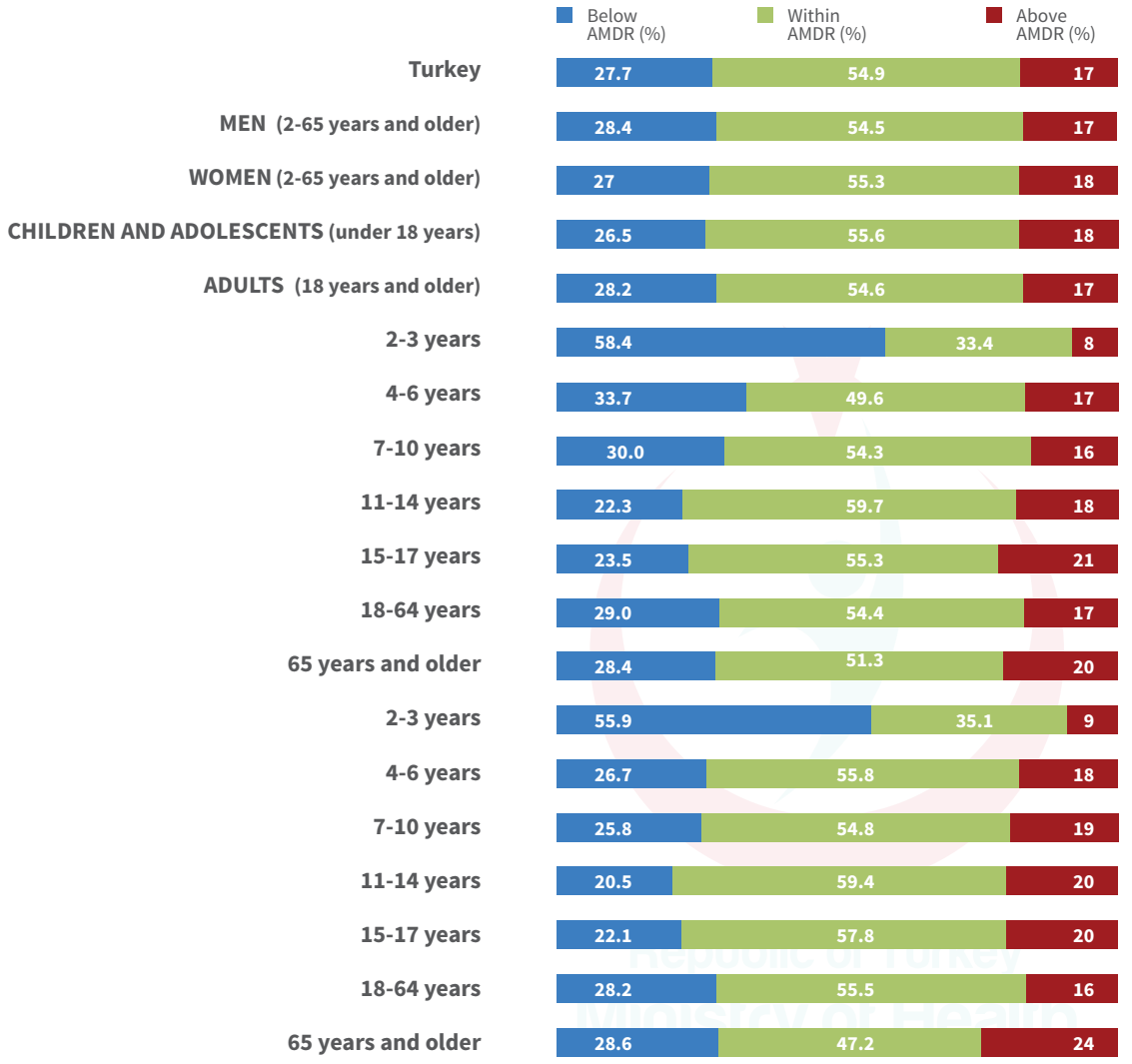
Source: Turkey Nutrition and Health Survey 2010
Ministry of Health of Republic of Turkey / Hacettepe University, February 2014

[1] Reference Intake Range (RI/AMDR); See Chapter 10: Table 10.1 for explanatations.

Appendix 4.3.1. Percentage of individuals with total fat intake below, within and above Recommended Intake ranges for macronutrients (RI/AMDR) by gender and age groups (%).

The frequency of individuals in the population with total fat intake above AMDR is high in all age groups and found to be 48% across Turkey.

TOTAL CARBOHYDRATE INTAKE

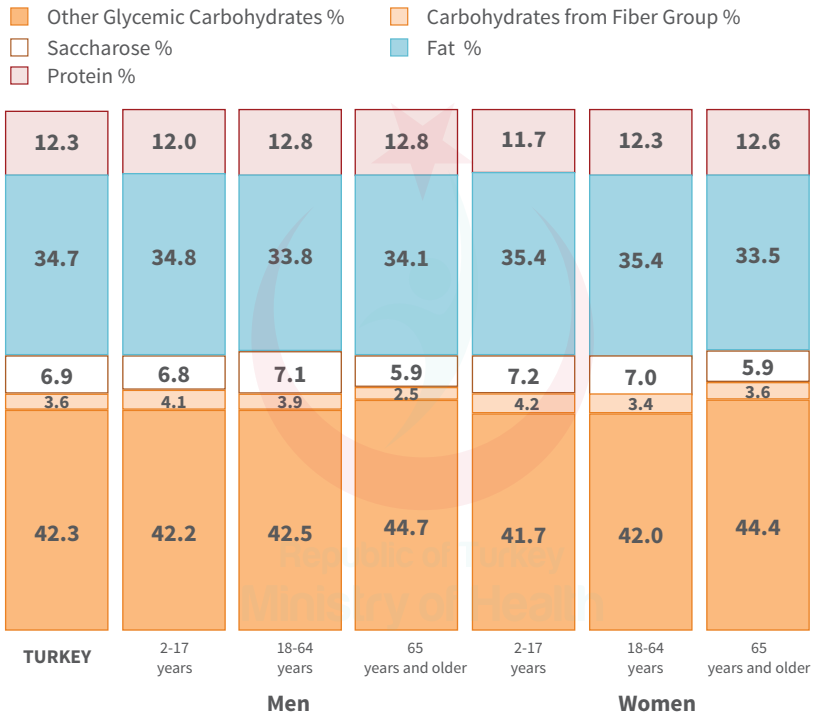


Source: Turkey Nutrition and Health Survey 2010
Ministry of Health of Republic of Turkey / Hacettepe University, February 2014

Appendix 4.3.2. Percentage of individuals with total carbohydrate intake below , within and above Recommended Intake ranges for macronutrients (RI/AMDR) by gender and age groups (%).

Total carbohydrate intake amount of the population is mostly within AMDR. The frequency is 55% across Turkey.

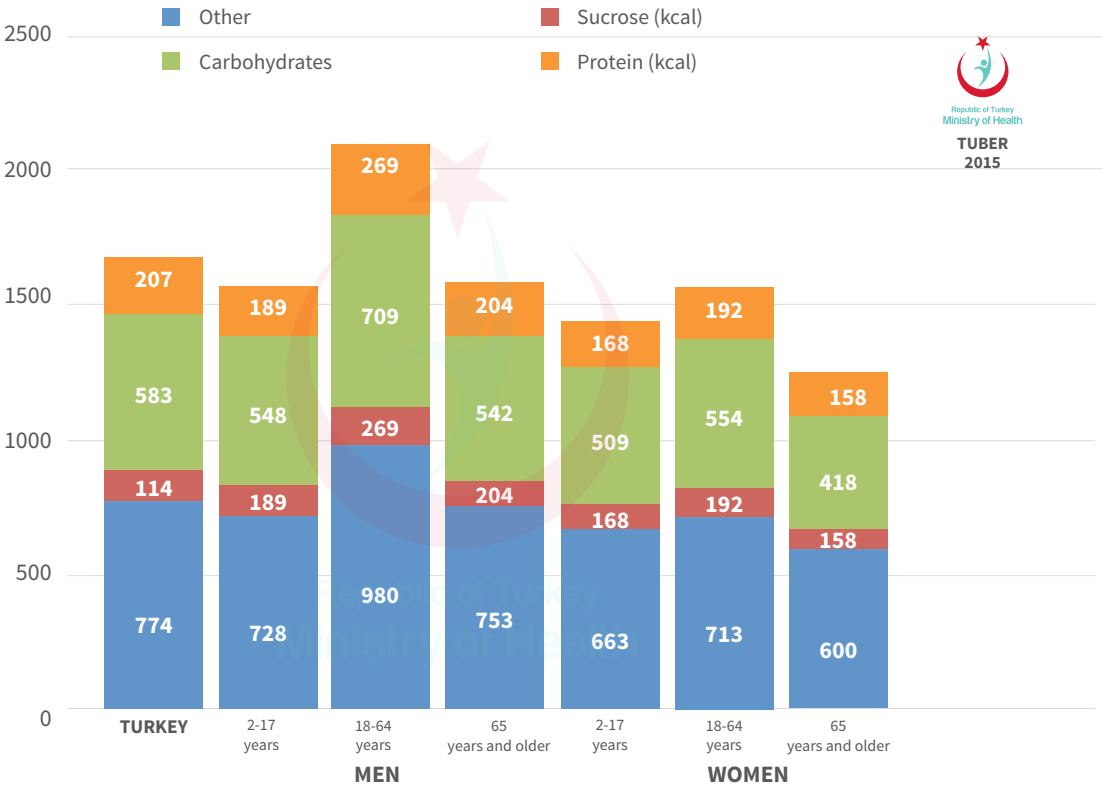
CONTRIBUTION OF MACRONUTRIENTS TO ENERGY INTAKE (%)



Source: Turkey Nutrition and Health Survey 2010
Ministry of Health of Republic of Turkey / Hacettepe University, February 2014

Appendix 4.3.3. Relative contribution of macronutrients to energy intake (%) by gender and age groups

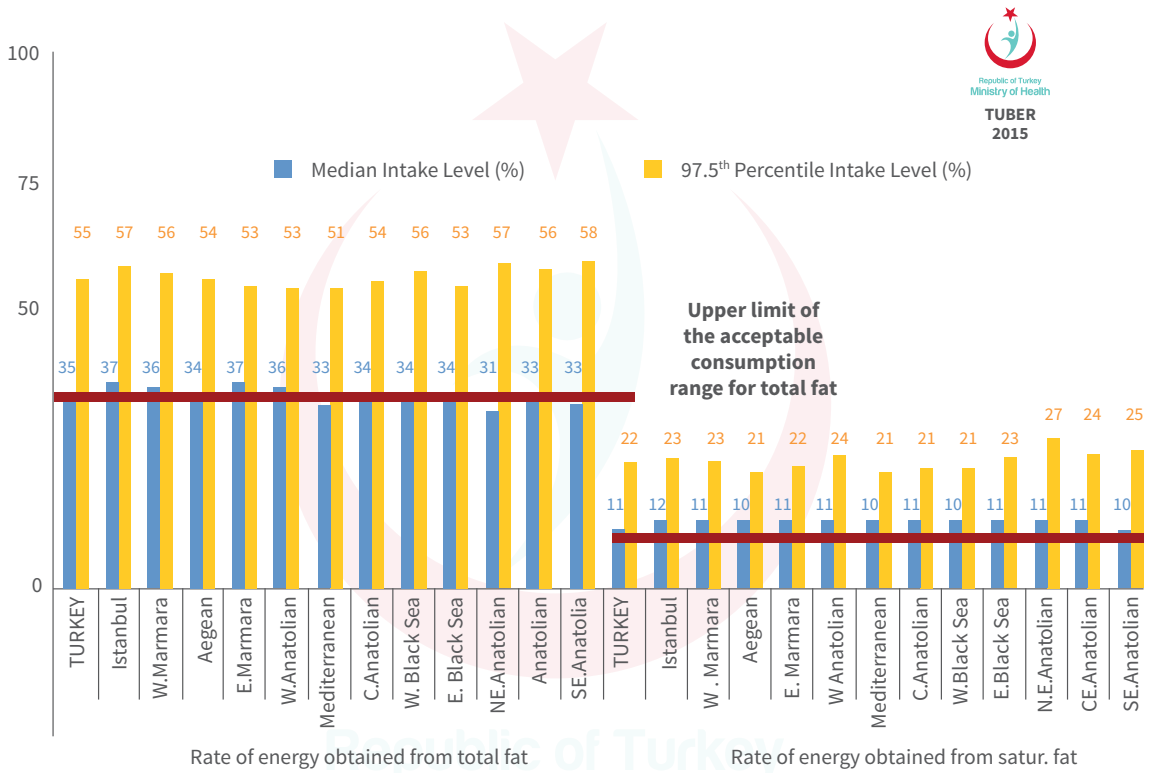
SHARE OF MACRONUTRIENTS IN THE TOTAL DAILY ENERGY INTAKE (kcal)



Appendix 4.3.4.Share of of sucrose, carbohydrates other than sucrose, protein, and fat in the total energy intake in the average diet in Turkey (kcal)

Appendix 4.3.4. Relative contribution of macronutrients to energy intake (kcal) by gender and age groups

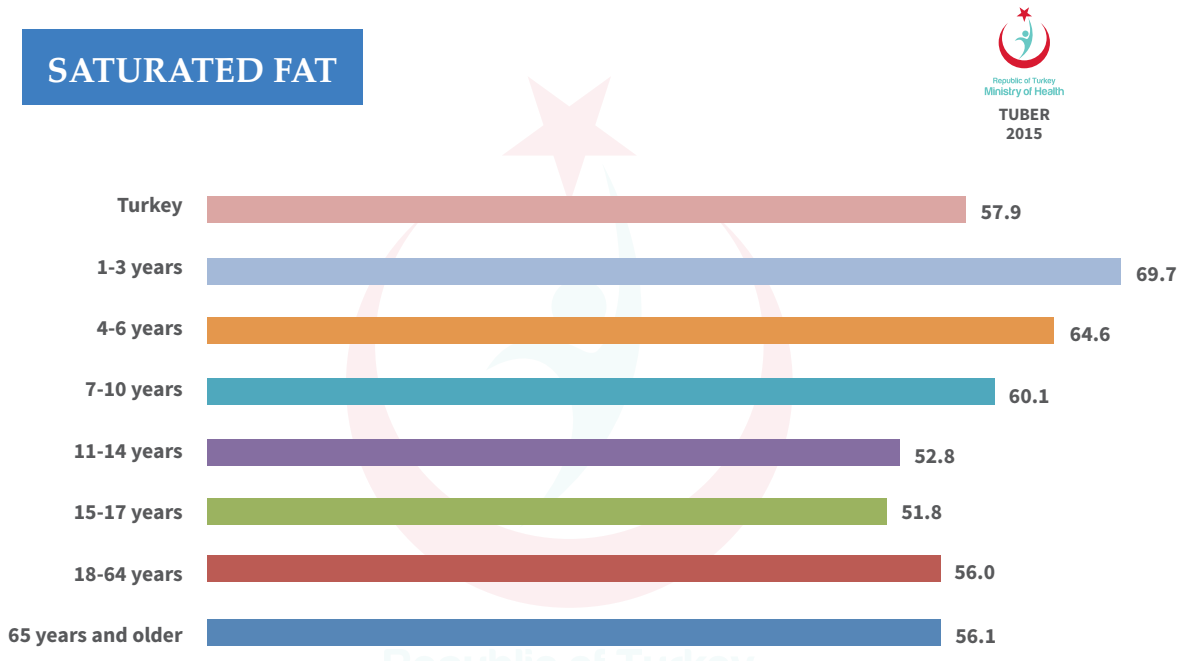
CONTRIBUTION OF TOTAL FAT AND SATURATED FAT TO DAILY ENERGY INTAKE (%)



Source: Turkey Nutrition and Health Survey 2010
Ministry of Health of Republic of Turkey / Hacettepe University, February 2014

Appendix 4.3.5. Relative contribution of total fat and saturated fat intake to total energy intake (kcal) by geographical regions(NUTS I)

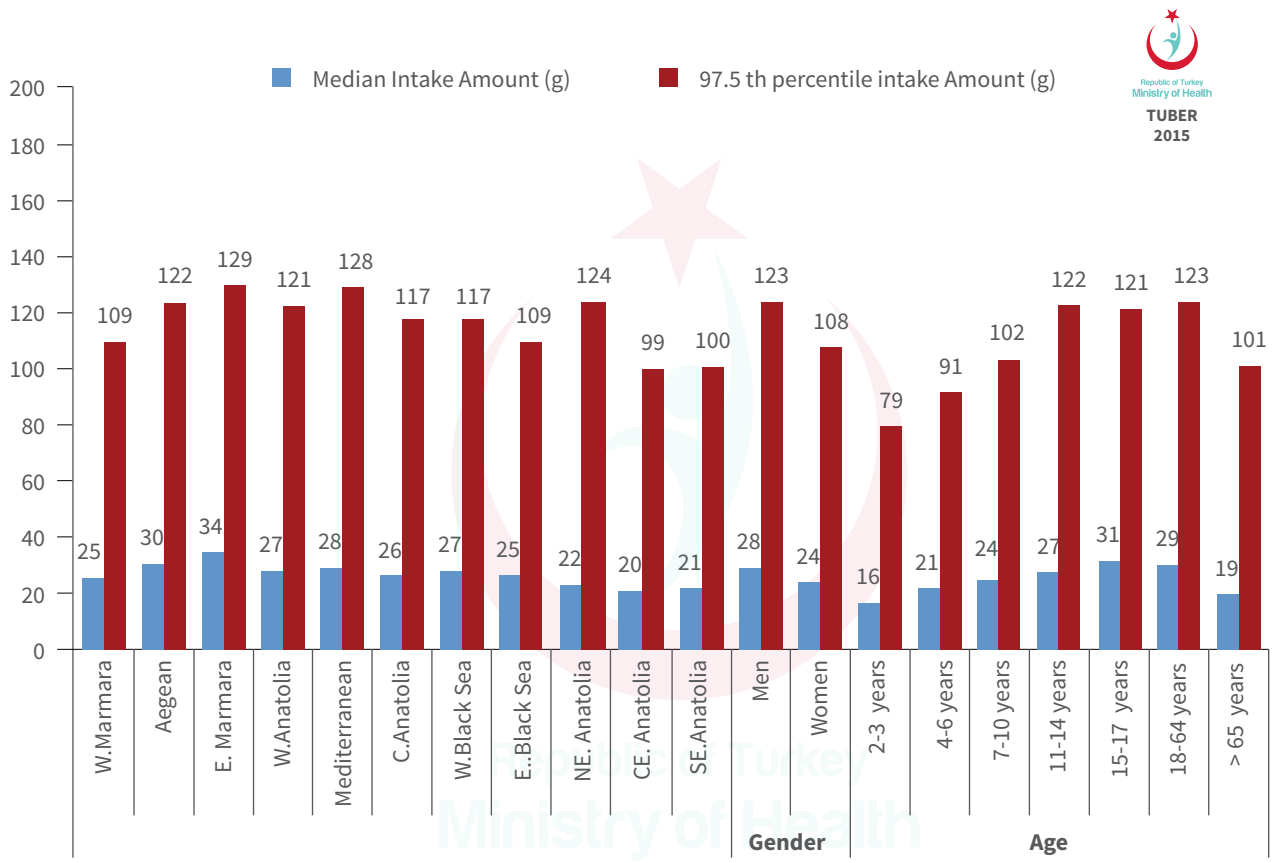
SATURATED FAT



Source: Turkey Nutrition and Health Survey 2010
Ministry of Health of Republic of Turkey / Hacettepe University, February 2014

Appendix 4.3.6. Percentage of individuals with saturated fat intake above 10% of total energy intake by gender and age groups (%).

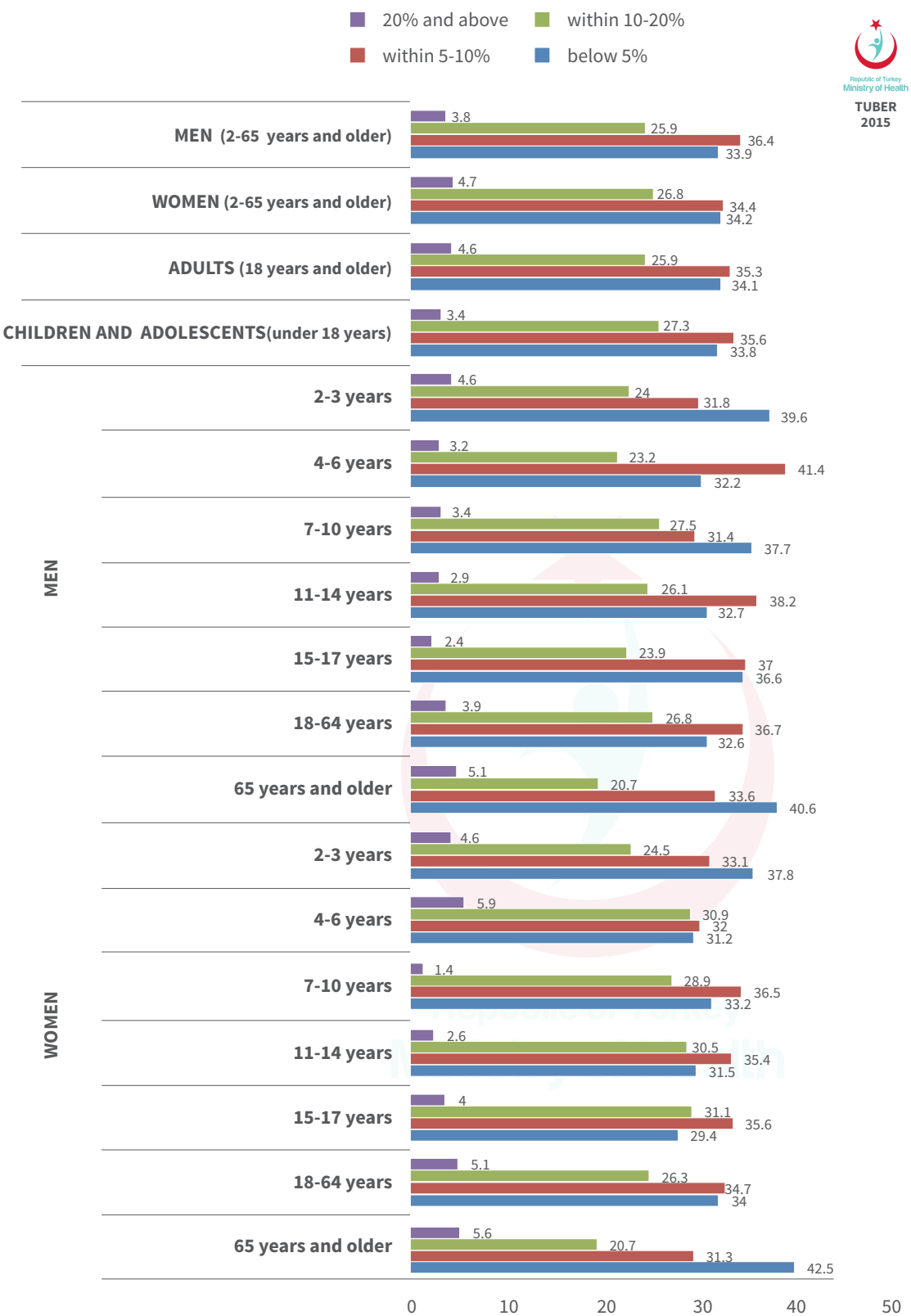
SUGAR CONSUMPTION



Source: Turkey Nutrition and Health Survey 2010
Ministry of Health of Republic of Turkey / Hacettepe University, February 2014

Appendix 4.3.7. Median and 97.5 percentile sugar consumption by gender and age groups and by geographical regions(NUTS I)

CONTRIBUTION OF SUGAR TO DAILY ENERGY INTAKE (%)

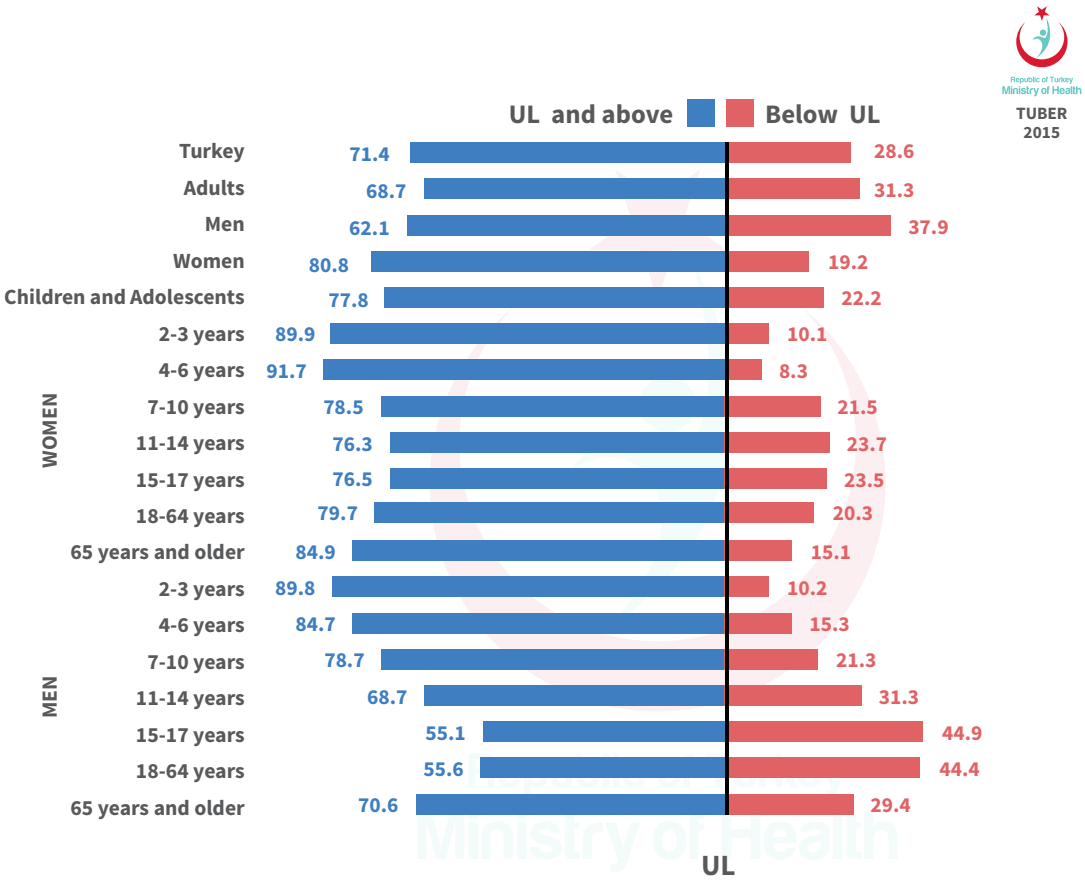


Source: Turkey Nutrition and Health Survey 2010
Ministry of Health of Republic of Turkey / Hacettepe University, February 2014

Appendix 4.3.8. Percentage of individuals according to relative contribution(%) of sugar to energy intake by gender and age groups (%)

Appendix 4.4. Overconsumed nutrients relative to Tolerable Upper Intake Level (UL)

SODIUM



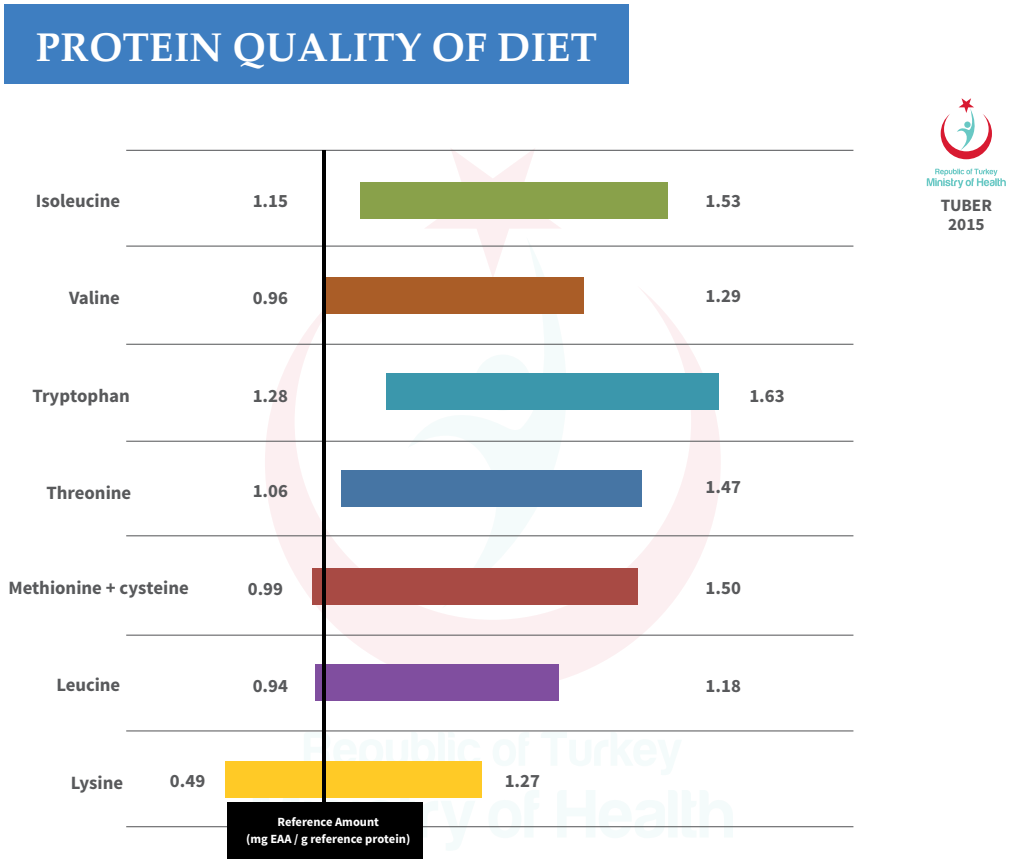
[1] *Tolerable Upper Intake Level (UL), See Chapter 10: Table 10.1 for explanations.*

Source: Turkey Nutrition and Health Survey 2010
Ministry of Health of Republic of Turkey / Hacettepe University, February 2014

Appendix 4.4.1. Percentage of individuals with sodium intake below and equal or above the Tolerable Upper Intake Level (UL) by gender and age groups (%).

When the sodium amount consumed with foods by 13707 individuals as indicated in the database of Turkey Nutrition and Health Survey (TNHS) 2010 is compared with the reference values given in Appendix 1.5.2, the frequency of the individuals who consumed sodium above UL values were found to be 30% across Turkey. This frequency is higher in men than in women. The highest frequency in individuals who consumed sodium above UL values is seen in men at the ages of 15-17 years and 18-64 years and the frequency rates are respectively 45% and 44%. This evaluation was performed without inclusion of sodium amount obtained from the salt put in meals. However, it includes the salt obtained from bread. According to TNHS 2010, the consumption of 95th percentile sodium across Turkey is 4023 mg and this amount, which can be considered as the maximum consumption, corresponds to about 10 g of salt intake.

Appendix 4. 5. Protein Quality of Dietary Pattern of Population



Source: Turkey Nutrition and Health Survey 2010
Ministry of Health of Republic of Turkey / Hacettepe University, February 2014

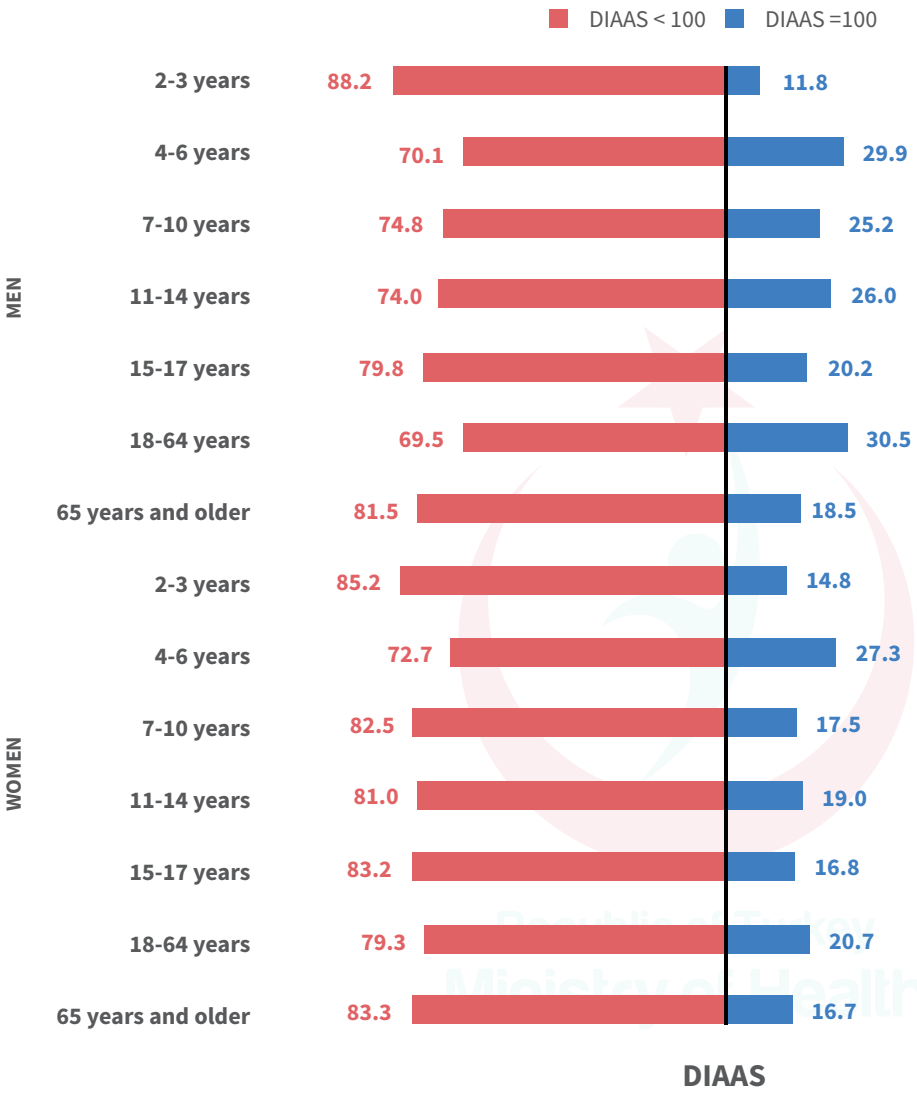
4.5.1. The ranges(5th - 95th percentiles) of digestible indispensible amino acid reference ratios of Dietary Pattern

- *DIAA = Digestible Indispensable Amino Acids*
- *DIAA / reference rate = Ratio of Digestible Indispensable Amino Acid Amounts in 1 g of mixed diet to İndispensable Amino Acid Amounts in 1 g of Reference Protein*
- *DIAAS %= Digestible Indispensable Amino Acid Score; Coverage ratio of indispensable amino acid with the lowest DIAAS / reference rate in mixed diet for indispensable amino acid amount in 1 g of reference protein*

Digestible indispensable amino acid pattern of 1 g of protein in the mixed diets of 13707 individuals participated in TNHS 2010 was compared with the indispensable amino acid requirements recommended for 1 g of protein based on age. Ratios of digestible indispensable amino acid amounts in 1 g of protein to indispensable amino acid amounts in reference pattern were calculated. 5th and 95th percentile values of the ratio of digestible indispensable amino acids (DIAA) to reference values were found to be more than 1.00 for isoleucine, tryptophan and threonine. This rate is 0.99-1.50 for methionine + cysteine, 0.96-1.29 for valine, 0.94-1.18 for leucine, 0.49-1.27 for lysine. Accordingly, the two indispensable amino acids with the lowest 5th and 95th percentile DIAA/reference rate were determined to be leucine and lysine. After that, median and average digestible lysine/reference or leucine/reference rates of an average mixed diet were determined and found to be 0.83 and 0.84 for lysine and 108.5 and 107.6 for leucine. Since the median and average value determined for leucine was higher compared to lysine and was above 1.00, the limited indispensable amino acid in an average mixed diet in Turkey was observed to be lysine. Digestible indispensable amino acid score of mixed diet was found to be 83. Median, 5th and 95th percentile digestible lysine amounts in 1 g of protein pattern of an average mixed diet were found to be respectively 39.8 mg/g of protein, 23.8 mg/g of protein and 61 mg/g of protein. The recommended amino acid scoring pattern for infants, children, adolescents and adults is shown in Appendix 4.5.2.

PROTEIN QUALITY

Republic of Turkey Ministry of Health
TUBER 2015

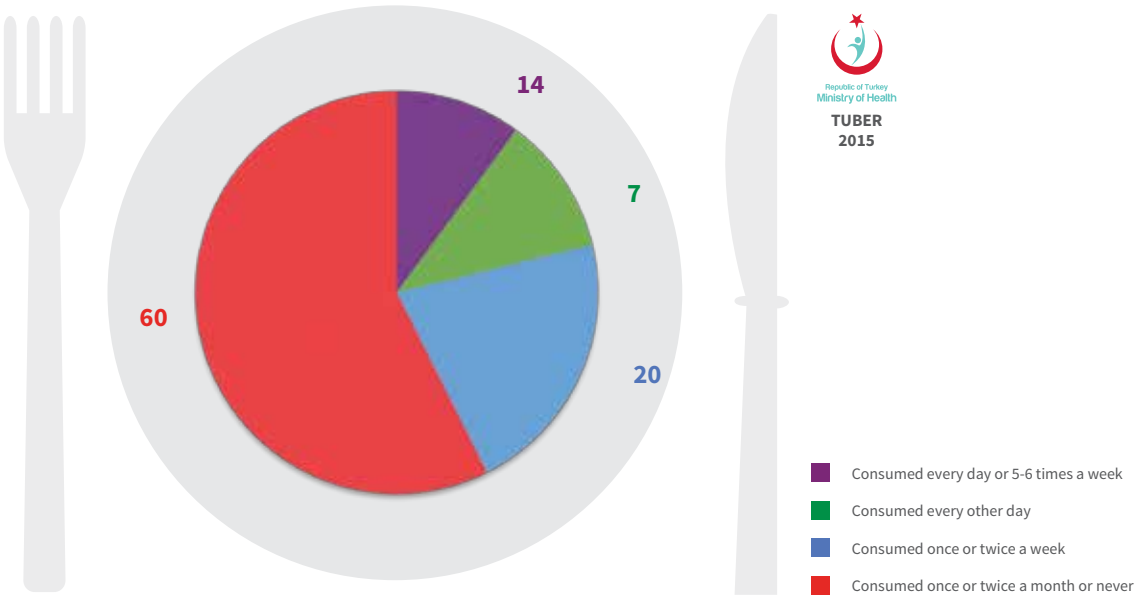


Source: Turkey Nutrition and Health Survey 2010
Ministry of Health of Republic of Turkey / Hacettepe University, February 2014

4.5.2.Percentage of individuals with dietary digestible amino acid score below and equal or above 100

Appendix 4. 6. Frequency of consumption of foods and beverages in Adults *

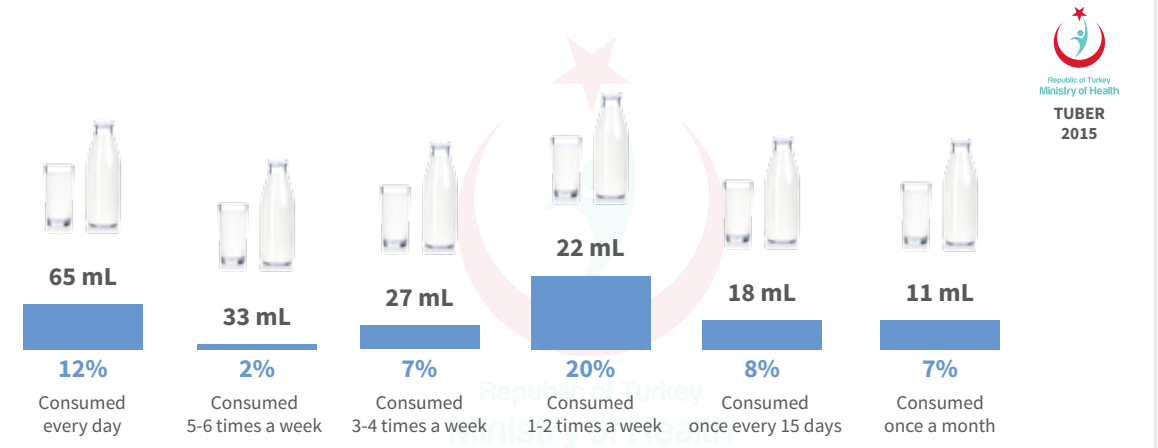
FREQUENCY OF MILK CONSUMPTION



Source: Turkey Nutrition and Health Study 2010
Ministry of Health of Republic of Turkey / Hacettepe University, February 2014

4.6.1. Percentage of adults with consumption of milk according to the response categories of food frequency.

It was determined in the study of TNHS 2010 that 59.5% of adults consumed milk quite rarely or never in the last month. The frequency of adults who consumed milk every day or 5-6 times a week is quite low at 13.8%.

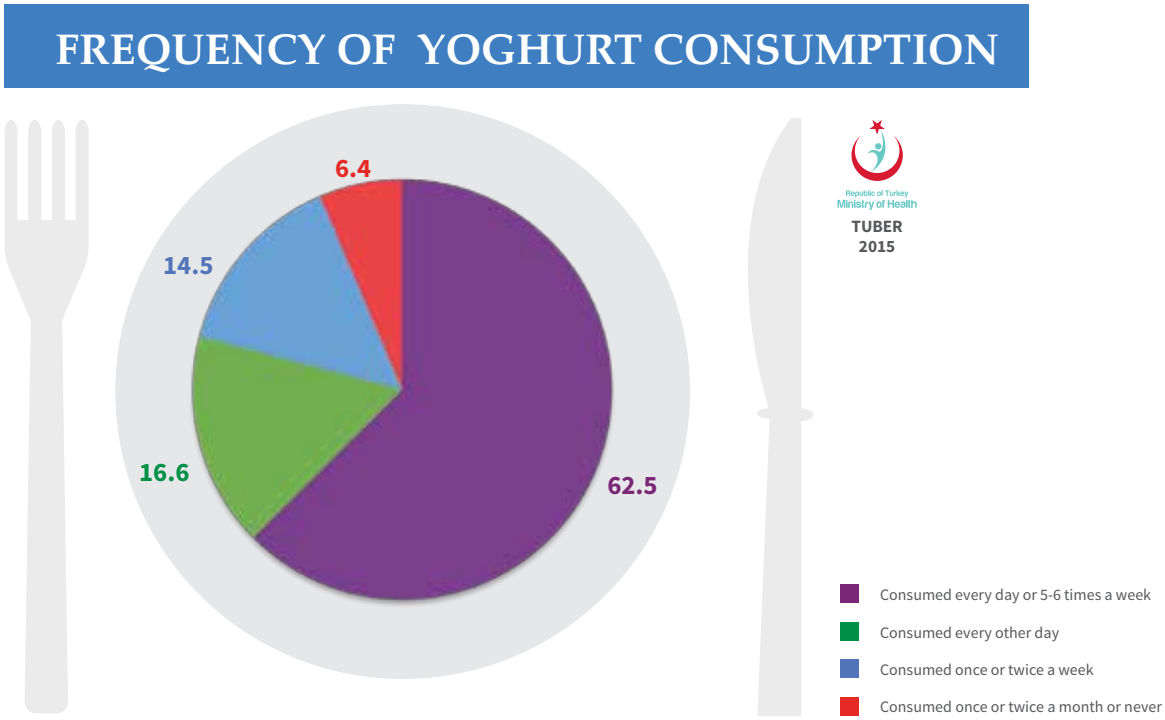


Source: Turkey Nutrition and Health Study 2010
Ministry of Health of Republic of Turkey / Hacettepe University, February 2014

4.6.2. Average consumption of milk (mL/day) from 24 hour recall according to the response categories of food frequency in adults.

Daily milk consumption amounts of the adults who consumed milk every day is 65 mL (about ¼ portion). Consumption amounts in other frequency groups are far less.

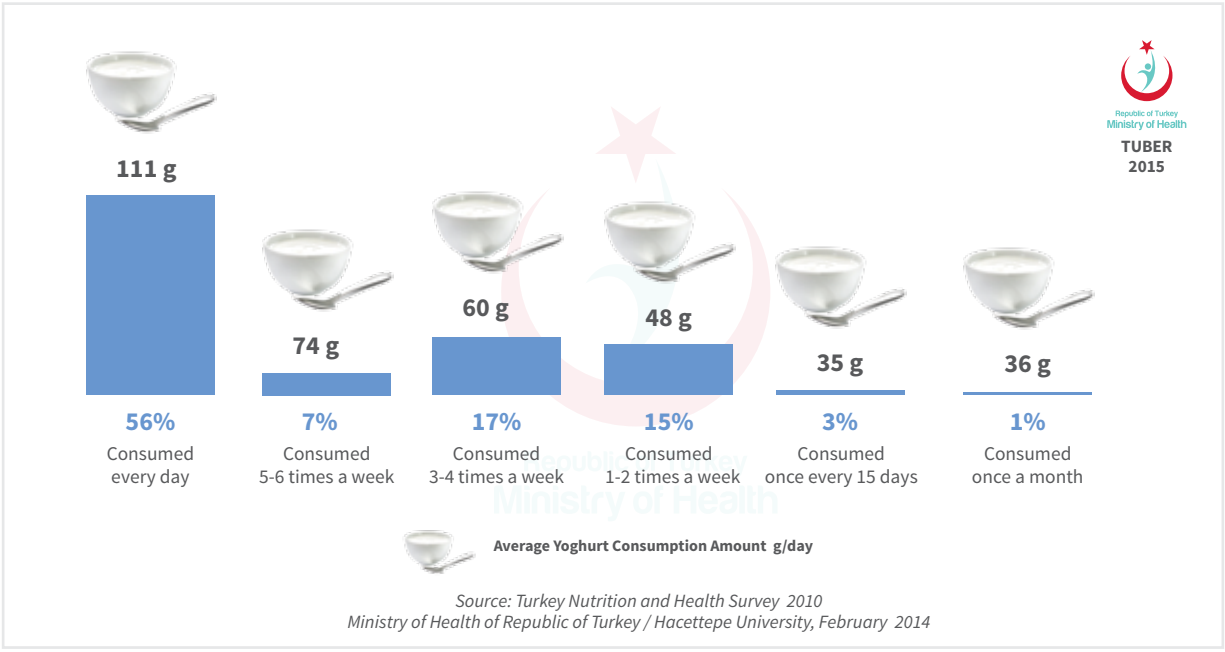
**To indicate the response categories of food frequency , combined 4-point food frequency scale in pie charts and 6 point food frequency scale in bar charts were used from 7 -point scale of food frequency questionnaire in TNHS 2010*



Source: Turkey Nutrition and Health Study 2010
Ministry of Health of Republic of Turkey / Hacettepe University, February 2014

4.6.3. Percentage of adults with consumption of yogurt according to the response categories of food frequency.

It was determined in the study of TNHS 2010 that 62.5% of adults consumed yoghurt every day or 5-6 times a week in the last month. Yoghurt is consumed more frequently than milk among adults.

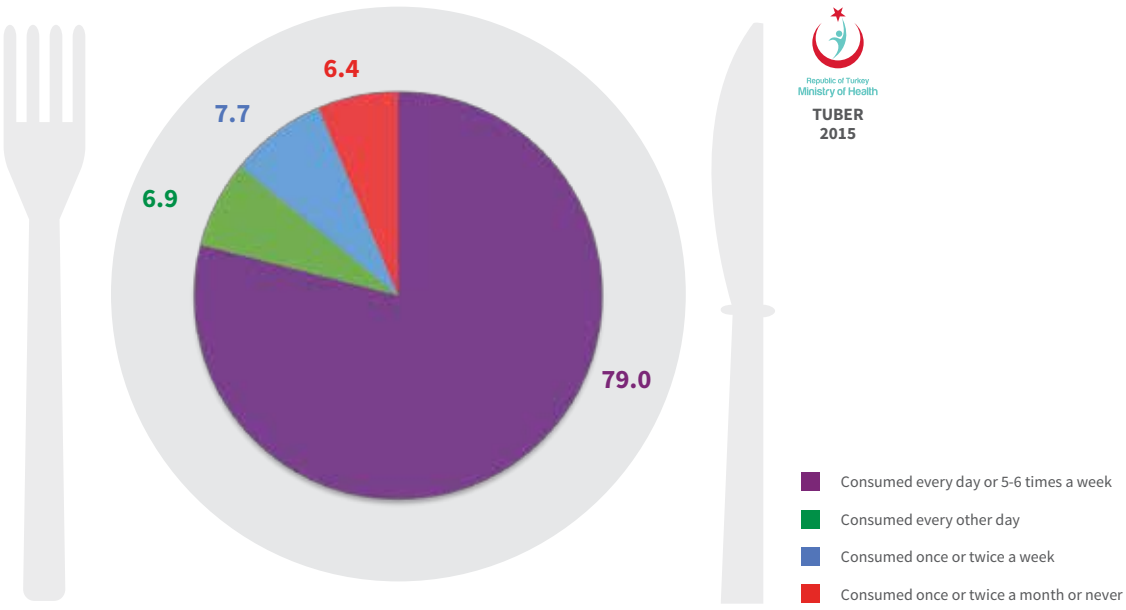


Source: Turkey Nutrition and Health Survey 2010
Ministry of Health of Republic of Turkey / Hacettepe University, February 2014

4.6.4. Average consumption of yogurt (g/day) from 24 hour recall according to the response categories of food frequency in adults.

It was determined that the adults who consumed yoghurt every day consumed approximately 111 g (about ½ bowl) of yoghurt each day and the adults who consumed yoghurt 5-6 times a week consumed 74 g of yoghurt each day.

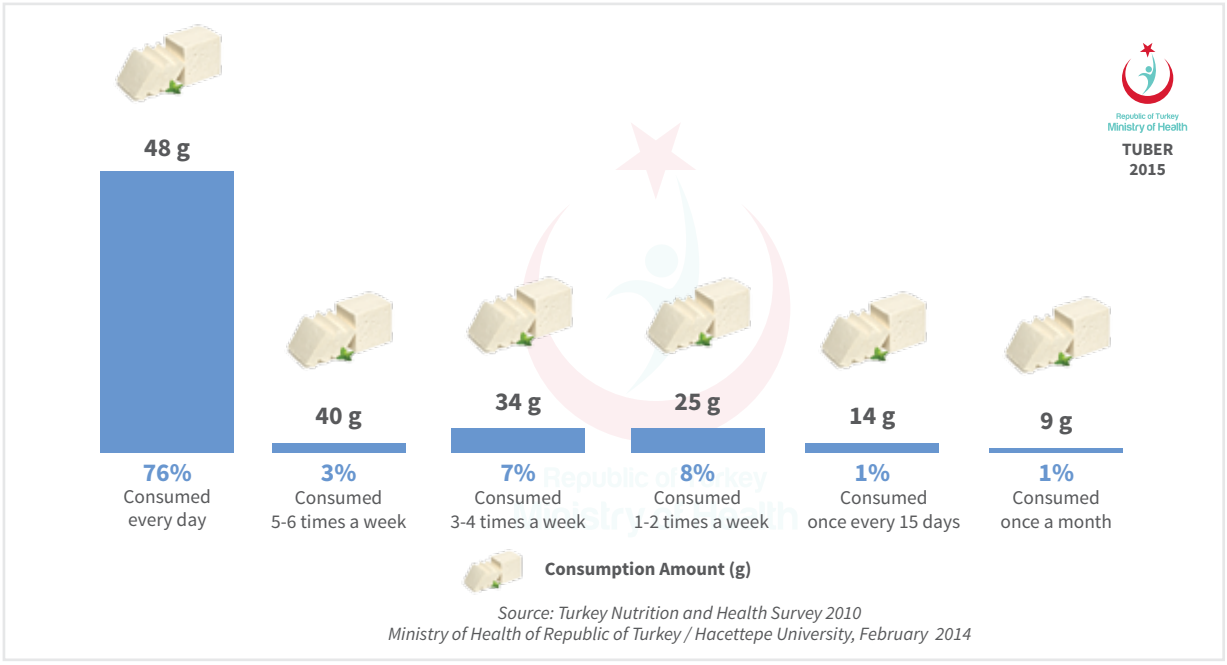
FREQUENCY OF CHEESE CONSUMPTION



Source: Turkey Nutrition and Health Study 2010
Ministry of Health of Republic of Turkey / Hacettepe University, February 2014

4.6.5. Percentage of adults with consumption of cheese according to the response categories of food frequency (%).

It was determined in the study of TNHS 2010 that 79% of adults consumed cheese every day or 5-6 times a week in the last month.

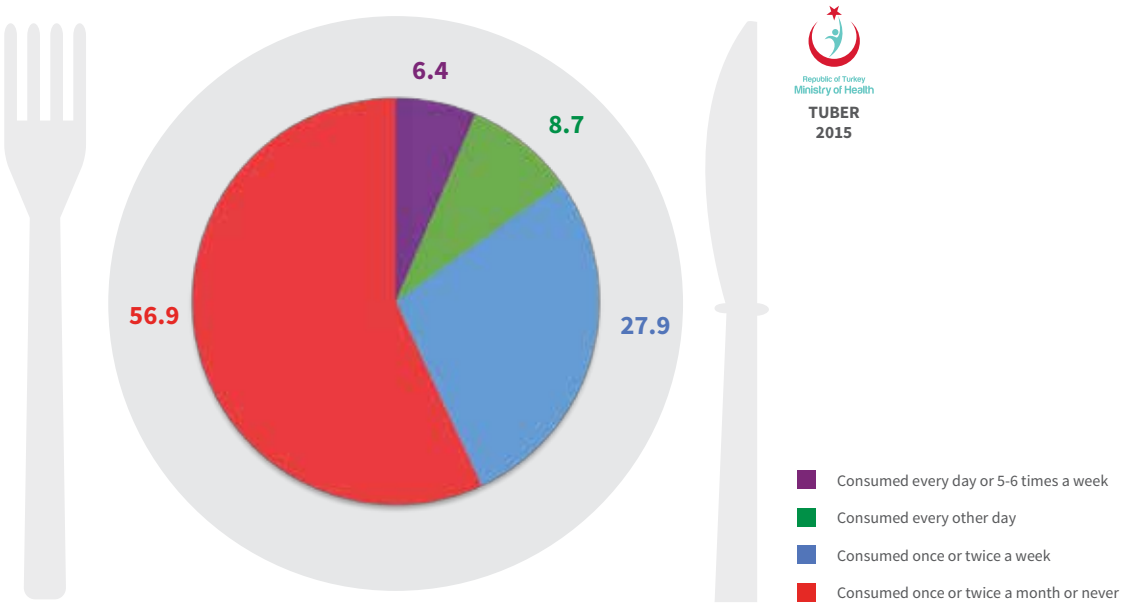


Source: Turkey Nutrition and Health Survey 2010
Ministry of Health of Republic of Turkey / Hacettepe University, February 2014

4.6.6. Average consumption of cheese (g/day) from 24 hour recall according to the response categories of food frequency in adults.

According to TNHS 2010, the adults who consumed cheese every day, 5-6 times a week or 3-4 times a week daily consume respectively 48 g (about ¾ portion), 40 g (about ⅔ portion), and 34 g (about ½ portion) on average. According to these data, cheese is considered as an important alternative to yoghurt-milk contributing to intake of calcium and high quality protein in adults with low intake of yoghurt-milk. However, individuals must be careful about the salt content of cheese.

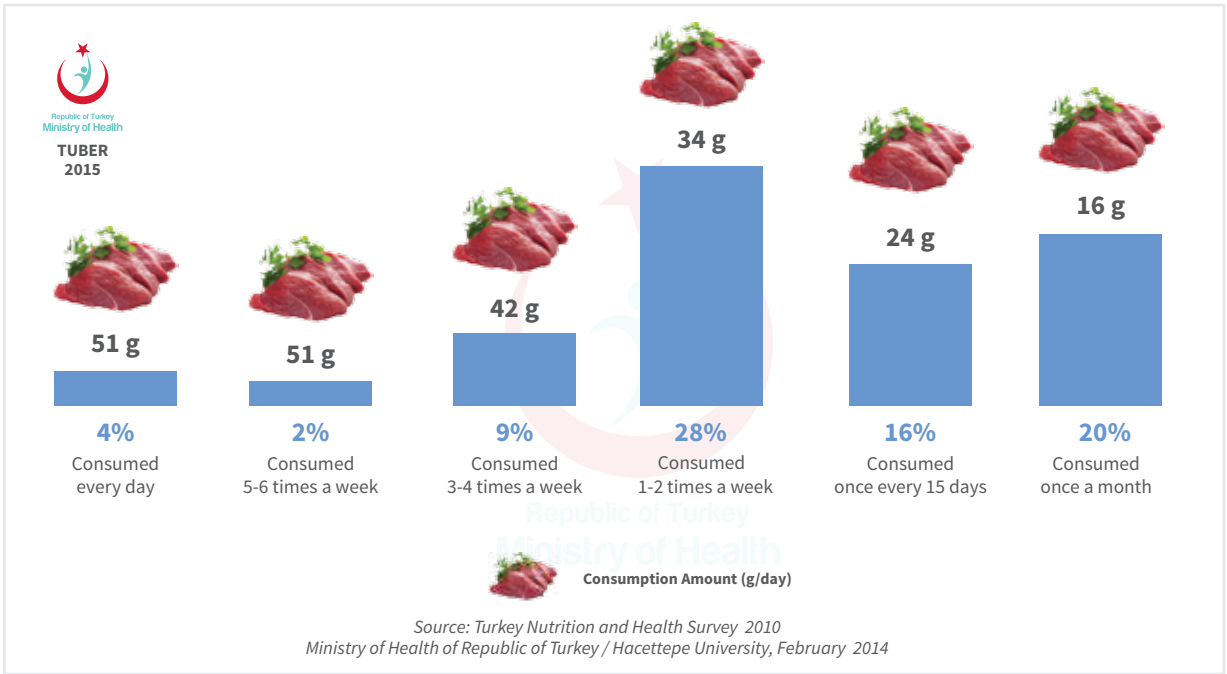
FREQUENCY OF RED MEAT CONSUMPTION



Source: Turkey Nutrition and Health Study 2010
Ministry of Health of Republic of Turkey / Hacettepe University, February 2014

4.6.7. Percentage of adults with consumption of red meat according to the response categories of food frequency (%).

According to TNHS 2010, the frequency of individuals who consumed red meat every day or every other day is quite low at 6.4 % in last mount. It was determined that 56.9 % of adults consumed read meat once or twice a week or never

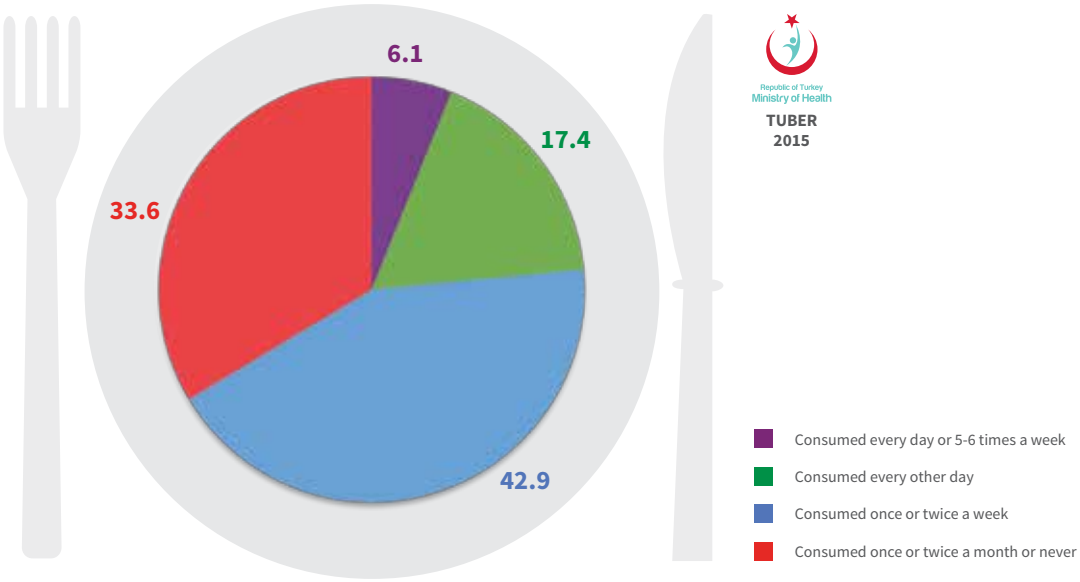


Source: Turkey Nutrition and Health Survey 2010
Ministry of Health of Republic of Turkey / Hacettepe University, February 2014

4.6.8. Average consumption of red meat (g/day) from 24 hour recall according to the response categories of food frequency in adults.

When red meat consumption amounts of adults based on the 24-hour records of food consumption are examined according to the frequency groups, it was determined that adults who consumed red meat every day, 3-4 times a week and once or twice a week daily consumed respectively 51 g (⅔ portion), 42 g (½ portion) and 34 g (about an half portion) on average.

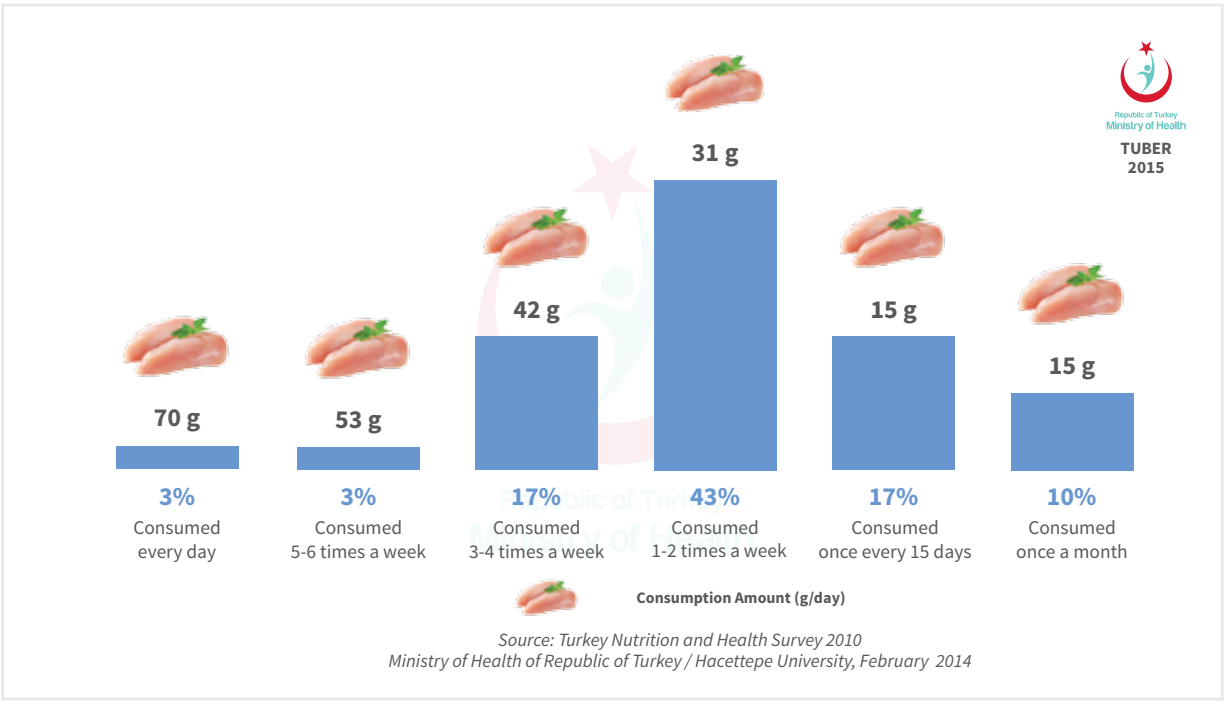
FREQUENCY OF POULTRY CONSUMPTION



Source: Turkey Nutrition and Health Study 2010
Ministry of Health of Republic of Turkey / Hacettepe University, February 2014

4.6.9. Percentage of adults with consumption of poultry according to the response categories of food frequency (%).

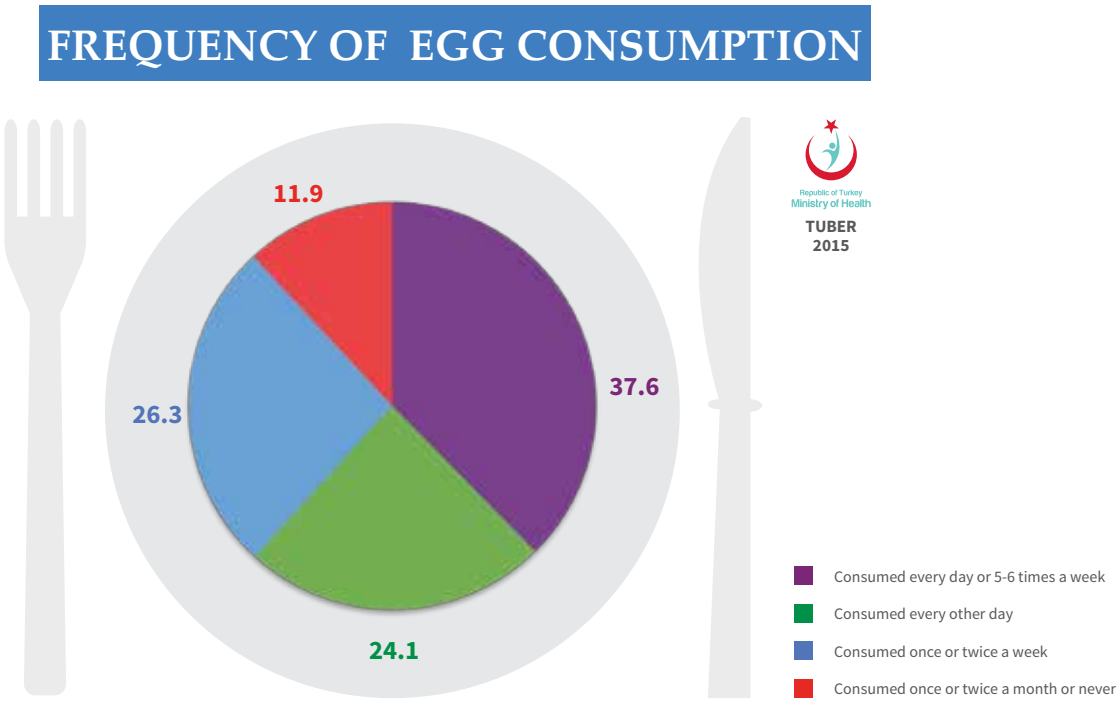
According to TNHS 2010, the frequency of individuals who consumed poultry meat every day or 5-6 times a week in the last month is 6%. Nearly half (43%) of the adults consumed poultry meat once or twice a week. ⅓ of the adults rarely (once or twice a month) or never consumed chicken meat.



Source: Turkey Nutrition and Health Survey 2010
Ministry of Health of Republic of Turkey / Hacettepe University, February 2014

4.6.10. Average consumption of poultry (g/day) from 24 hour recall according to the response categories of food frequency in adults.

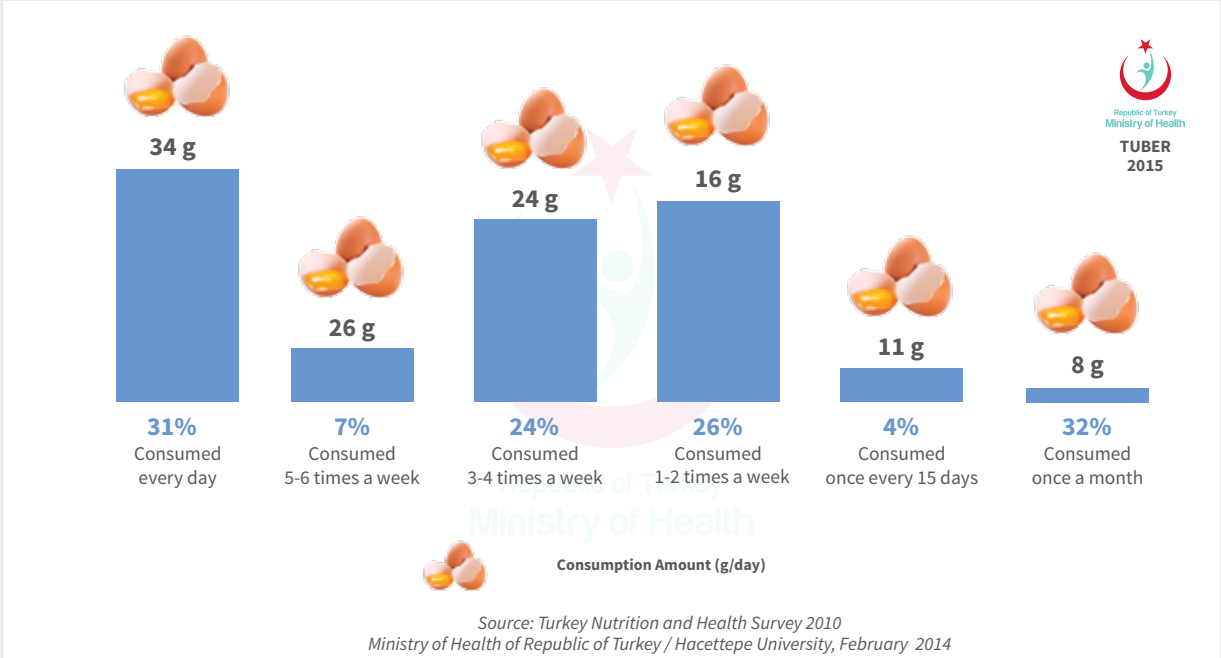
Daily consumption amount of chicken meet in adults who consumed it every day and having a frequency of 3 % is about 1 portion (70 g). It was determined that individuals who consumed poultry meat 5-6 times a week consumed ⅔ portion (53 g) and adults who consumed poultry meat 3-4 times a week consumed ½ portion (42 g). The frequency of adults who consumed poultry meat once or twice a week is the highest compared to other groups in the population and the average consumption amount of this group is ⅓ potion (30 g) of chicken meat.



Source: Turkey Nutrition and Health Study 2010
Ministry of Health of Republic of Turkey / Hacettepe University, February 2014

4.6.11. Percentage of adults with consumption of eggs according to the response categories of food frequency (%).

It was determined in the study of TNHS 2010 that 38 % of adults consumed eggs every day or 5-6 times a week in the last month. The frequency of adults who consumed eggs every other day is 24 %, the frequency of the adults who consumed eggs once or twice a week is 26%, and the frequency of adults who consumed eggs once or twice a month or never is 12 %.

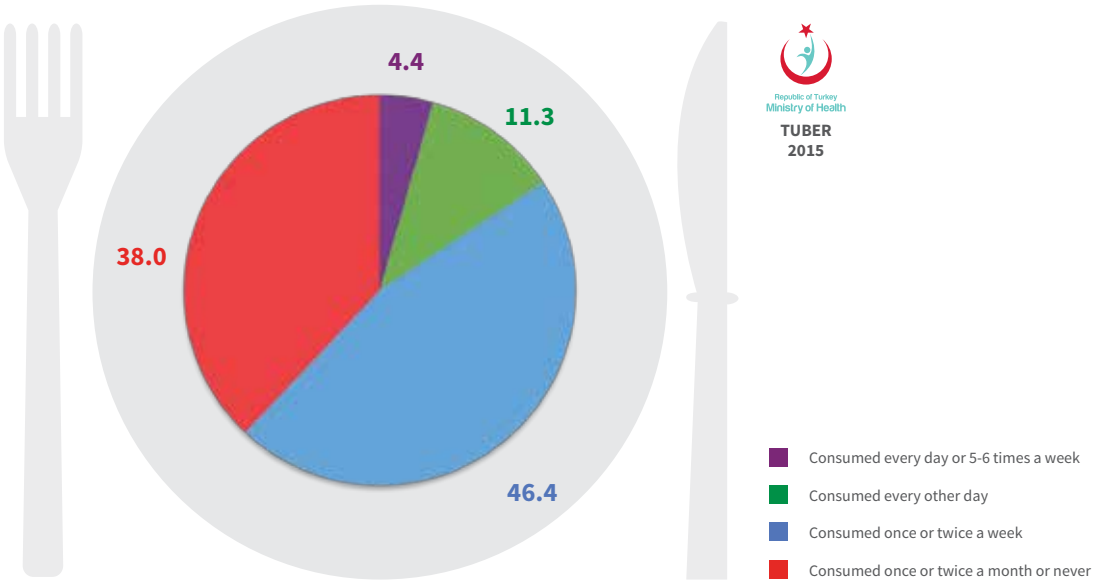


Source: Turkey Nutrition and Health Survey 2010
Ministry of Health of Republic of Turkey / Hacettepe University, February 2014

4.6.12.Average consumption of eggs (g/day) from 24 hour recall according to the response categories of food frequency in adults.

Average egg consumption is ⅓ portion (34 g) in adults who consumed eggs every day and ¼ portion (26 g / 24 g) in adults who consumed eggs 5-6 times or 3-4 times a week.

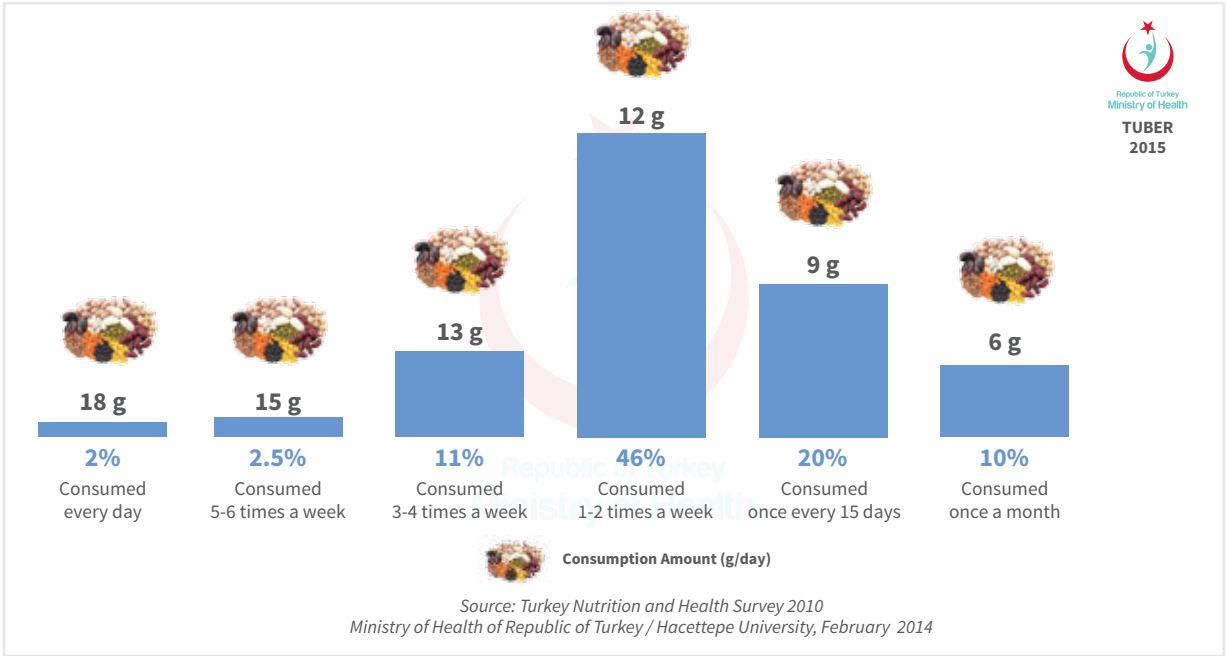
FREQUENCY OF LEGUMES CONSUMPTION



Source: Turkey Nutrition and Health Study 2010
Ministry of Health of Republic of Turkey / Hacettepe University, February 2014

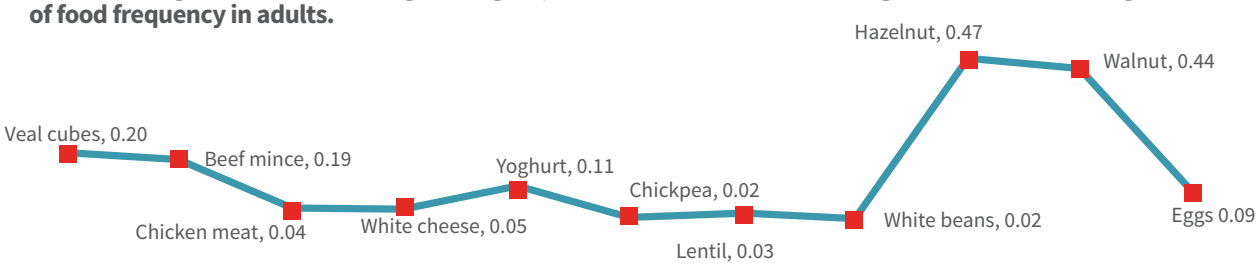
4.6.13. Percentage of adults with consumption of legumes according to the response categories of food frequency (%).

In the study of TNHS 2010, it was determined that about half of the adults consumed legumes once or twice a week in the last month. The frequency of adults who consumed legumes every day or 5-6 times a week is 4.4 % and the frequency of the adults who consumed legumes every other day is 11.3 %. However, 38 % of individuals rarely (once or twice a month) or never consume legumes.



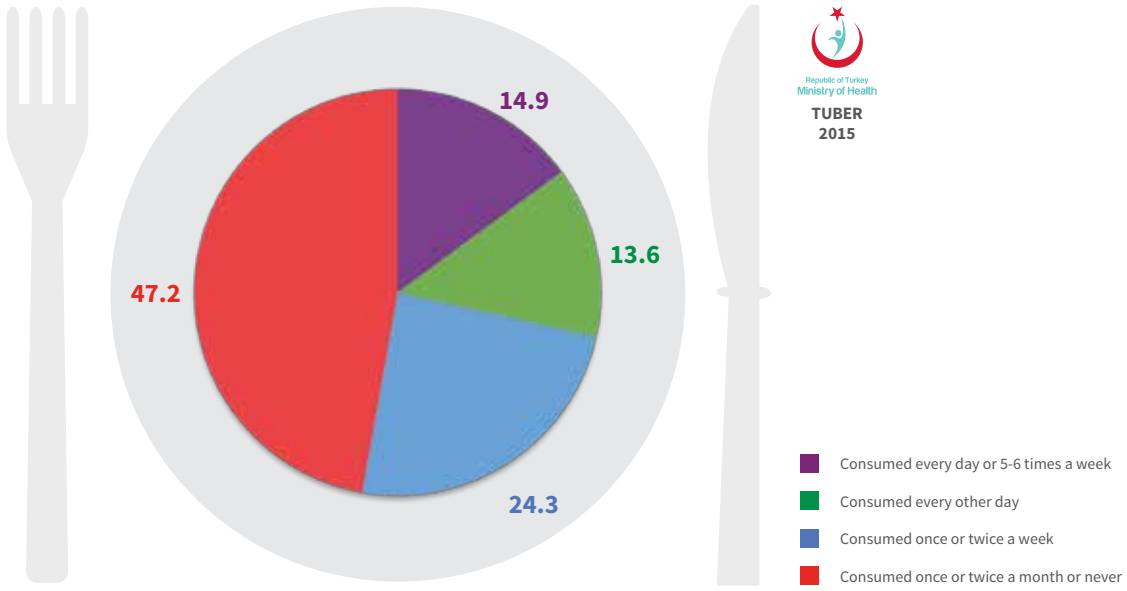
Source: Turkey Nutrition and Health Survey 2010
Ministry of Health of Republic of Turkey / Hacettepe University, February 2014

4.6.14. Average consumption of legumes (g/day) from 24 hour recall according to the response categories of food frequency in adults.



4.6.15. Cost of protein foods in diet (TL /g protein)

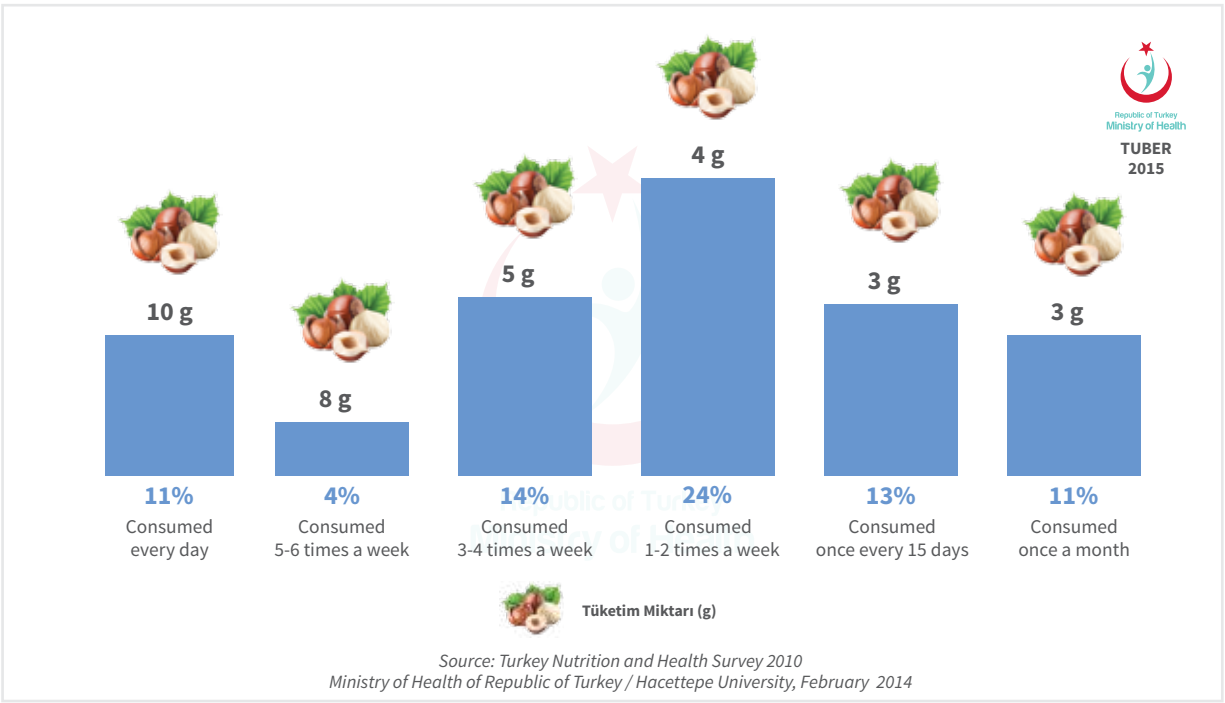
FREQUENCY OF SEEDS-NUTS CONSUMPTION



Source: Turkey Nutrition and Health Study 2010
Ministry of Health of Republic of Turkey / Hacettepe University, February 2014

4.6.16. Percentage of adults with consumption of seeds and nuts according to the response categories of food frequency (%).

According to TNHS 2010, the frequencies of adults who consumed seeds-nuts every day, every other day, and once or twice a week in the last month are respectively 15%, 14% and 24%. 47% of the adults rarely (once or twice a month) or never consumes these foods.

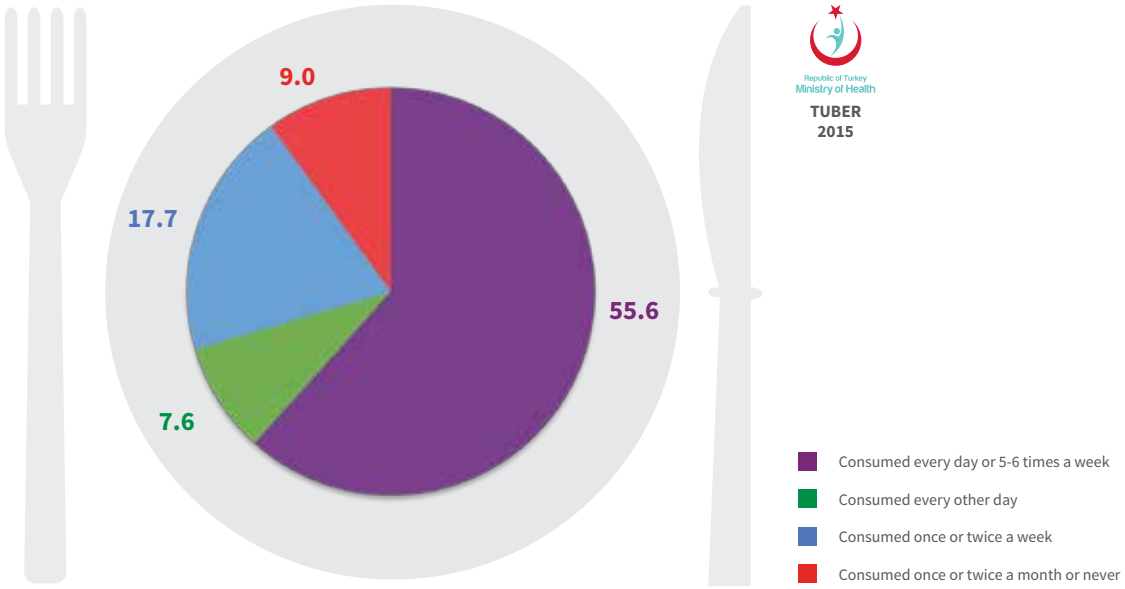


Source: Turkey Nutrition and Health Survey 2010
Ministry of Health of Republic of Turkey / Hacettepe University, February 2014

4.6.17. Average consumption of seeds and nuts (g/day) from 24 hour recall according to the response categories of food frequency in adults.

Average consumption amounts of seeds-nuts in adults who consumed them every day or every other day are respectively ⅓ portion (10 g/day) and ¼ portion (8 g/day).

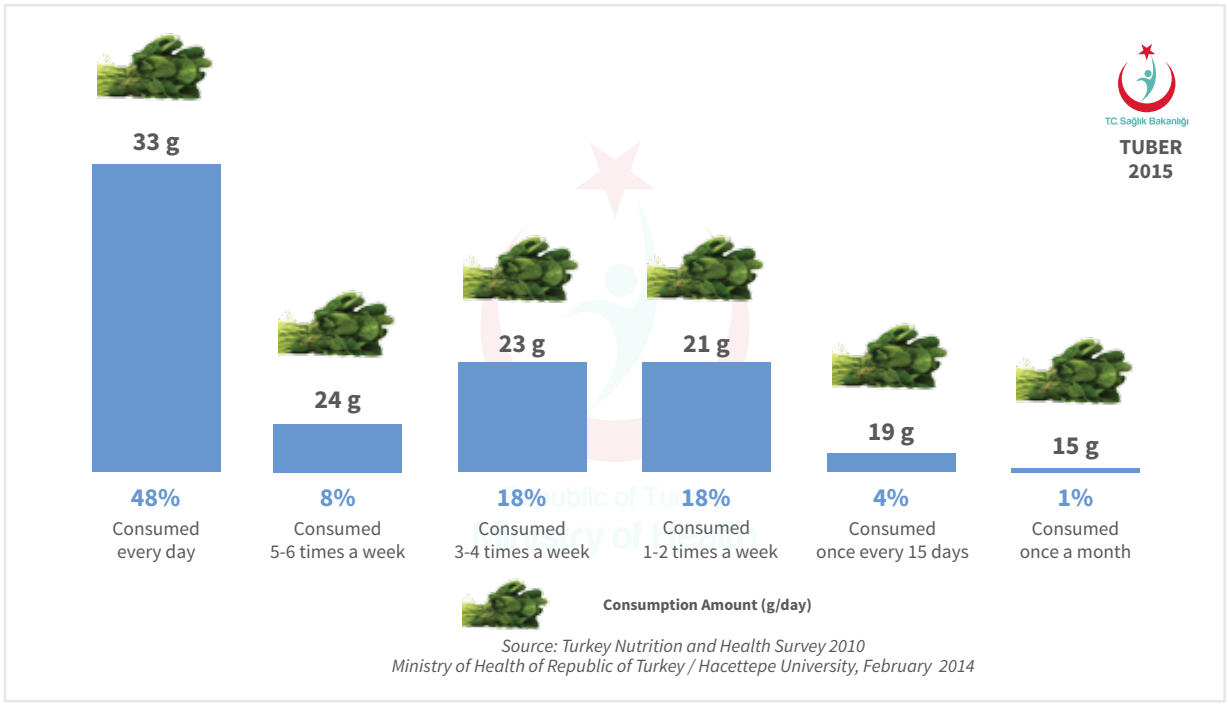
FREQUENCY OF GREEN LEAFY VEGETABLES CONSUMPTION



Source: Turkey Nutrition and Health Study 2010
Ministry of Health of Republic of Turkey / Hacettepe University, February 2014

4.6.18. Percentage of adults with consumption of green leafy vegetables according to the response categories of food frequency (%).

In the study of TNHS 2010, it was determined that 55% of adults consumed green leafy vegetables every day or 5-6-times a week in the last month. 10% of the adults consumed green leafy vegetables rarely or never.

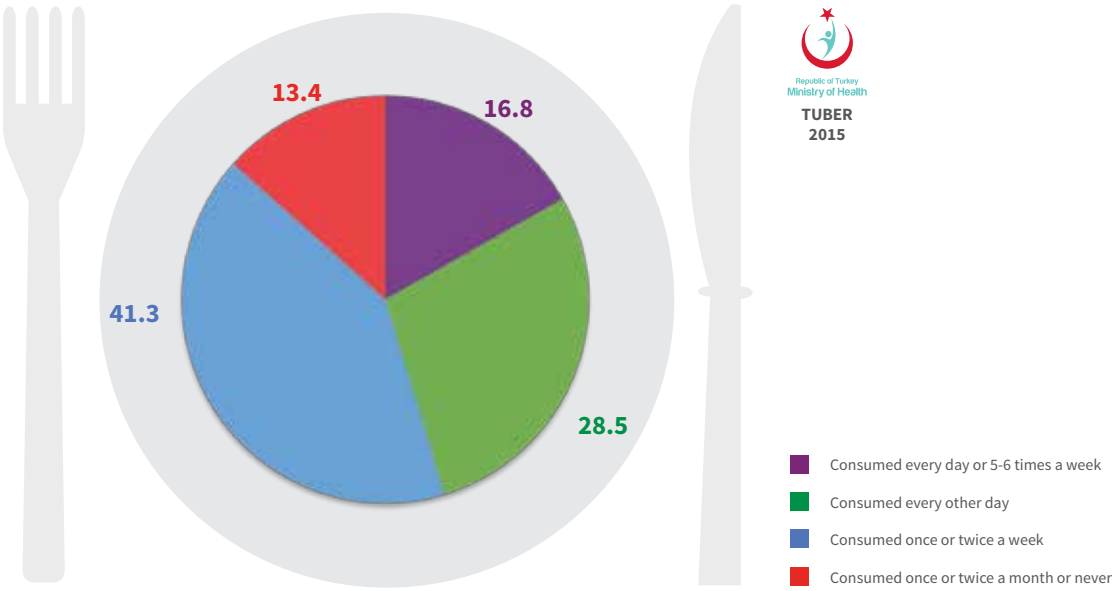


Source: Turkey Nutrition and Health Survey 2010
Ministry of Health of Republic of Turkey / Hacettepe University, February 2014

4.6.19. Average consumption of gren leafy vegetables (g/day) from 24 hour recall according to the response categories of food frequency in adults.

Average consumption amounts of green leafy vegetables in adults who consumed them every day is 1/5 portion (33 g) when compared to the portion amount (150 g) determined for green vegetables. The adults who consumed them 5-6 times or 3-4 times a week consume 1/6 portion of green vegetables on average.

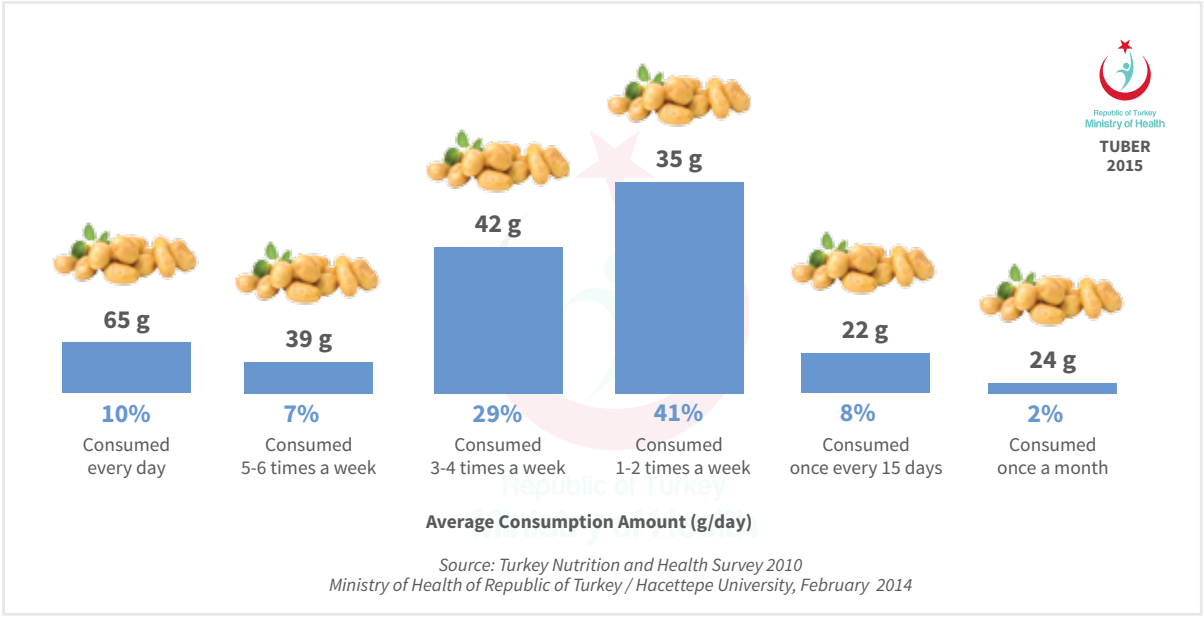
FREQUENCY OF POTATO CONSUMPTION



Source: Turkey Nutrition and Health Study 2010
Ministry of Health of Republic of Turkey / Hacettepe University, February 2014

4.6.20. Percentage of adults with consumption of potatoes according to the response categories of food frequency (%).

According to TNHS 2010, the frequency of adults who consumed potato every day is 17% and the frequency of adults who consumed them every other day is 28.5% in the last month. 13% of the adults rarely (once or twice a month) or never consumed potato and nearly half of them (41%) consumed potato once or twice a week.

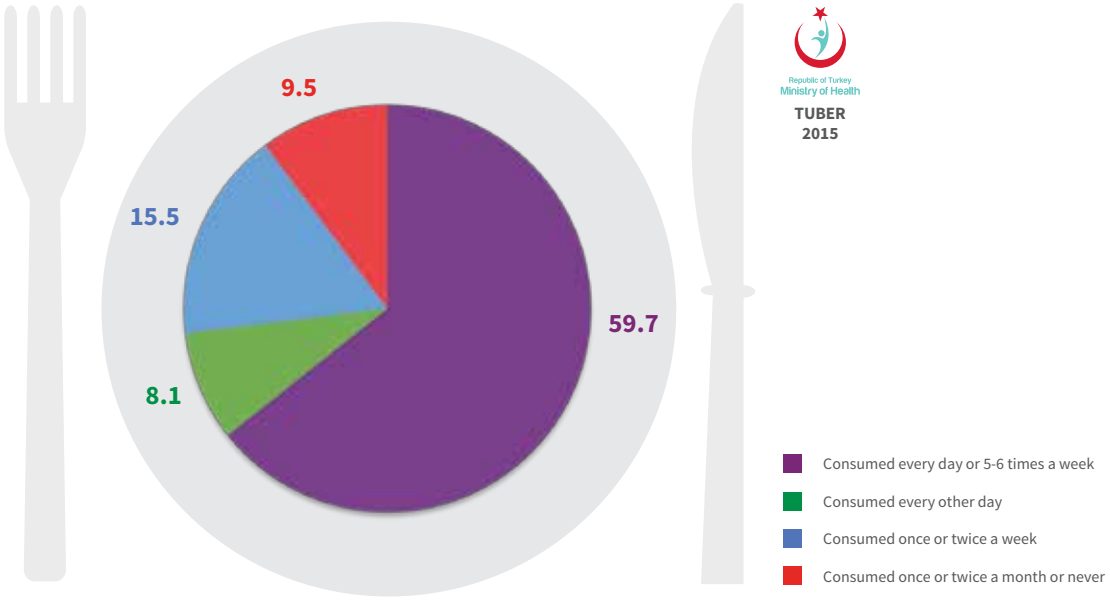


Source: Turkey Nutrition and Health Survey 2010
Ministry of Health of Republic of Turkey / Hacettepe University, February 2014

4.6.21. Average consumption of potatoes (g/day) from 24 hour recall according to the response categories of food frequency in adults.

Average consumption of potato in adults who consumed it every day is 0.7 portion (65 g/day).

FREQUENCY OF FRUITS CONSUMPTION



Source: Turkey Nutrition and Health Study 2010
Ministry of Health of Republic of Turkey / Hacettepe University, February 2014

4.6.22. Percentage of adults with consumption of fruits according to the response categories of food frequency (%).

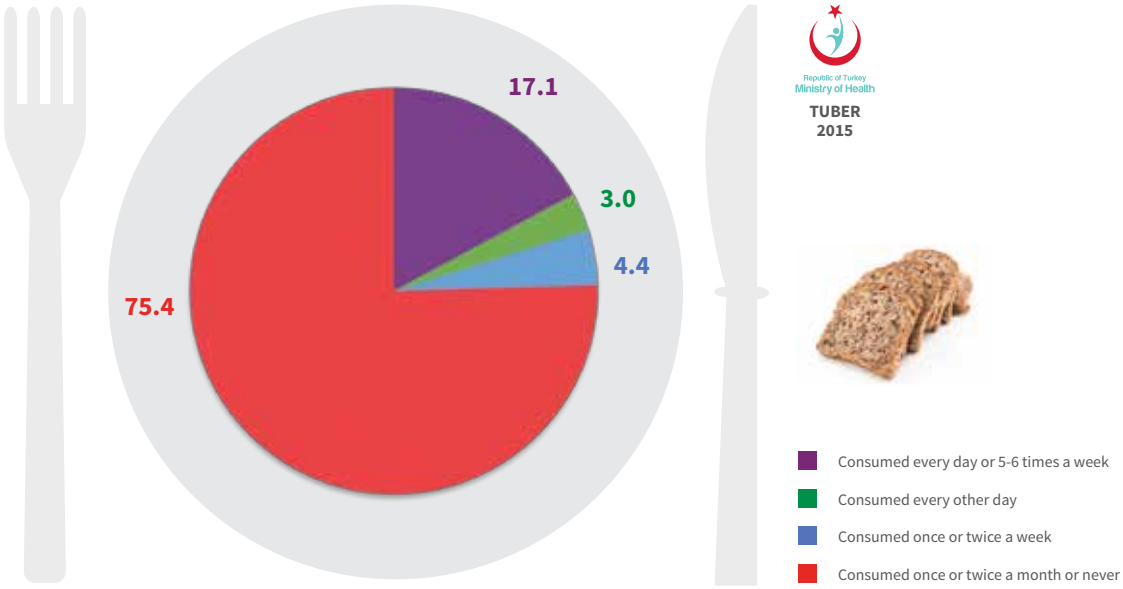
According to TNHS 2010, 59.7% of the adults consumed fruits every day or 5-6 times a week in the last month. The frequency of adults who consumed fruits once or twice a month or never is 10%.

Source: Turkey Nutrition and Health Survey 2010
Ministry of Health of Republic of Turkey / Hacettepe University, February 2014

4.6.23. Average consumption of fruits (g/day) from 24 hour recall according to the response categories of food frequency in adults.

Daily average consumption amount of fruits in adults who consumed them every day is 1.6 portions (239 g). Average consumption amount of fruits in adults who consumed them 5-6 times a week was found to be 1.3 portions (191 g).

FREQUENCY OF WHOLE GRAIN /WHOLE WHEAT BREAD CONSUMPTION

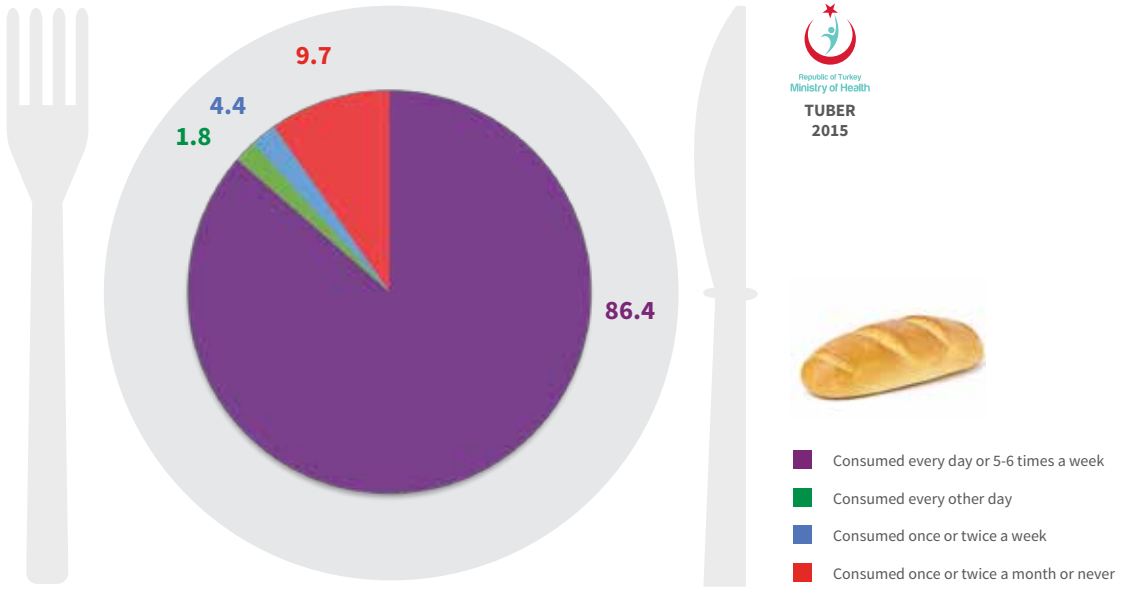


Source: Turkey Nutrition and Health Study 2010
Ministry of Health of Republic of Turkey / Hacettepe University, February 2014

4.6.24. Percentage of adults with consumption of whole wheat bread and whole grain bread according to the response categories of food frequency (%)

According to TNHS, the frequency of adults who consumed whole grain bread every day or 5-6 times a week in the last month is 17% of adults. Most of the adults (75%) consumed whole grain bread once or twice a month or never in the last month.

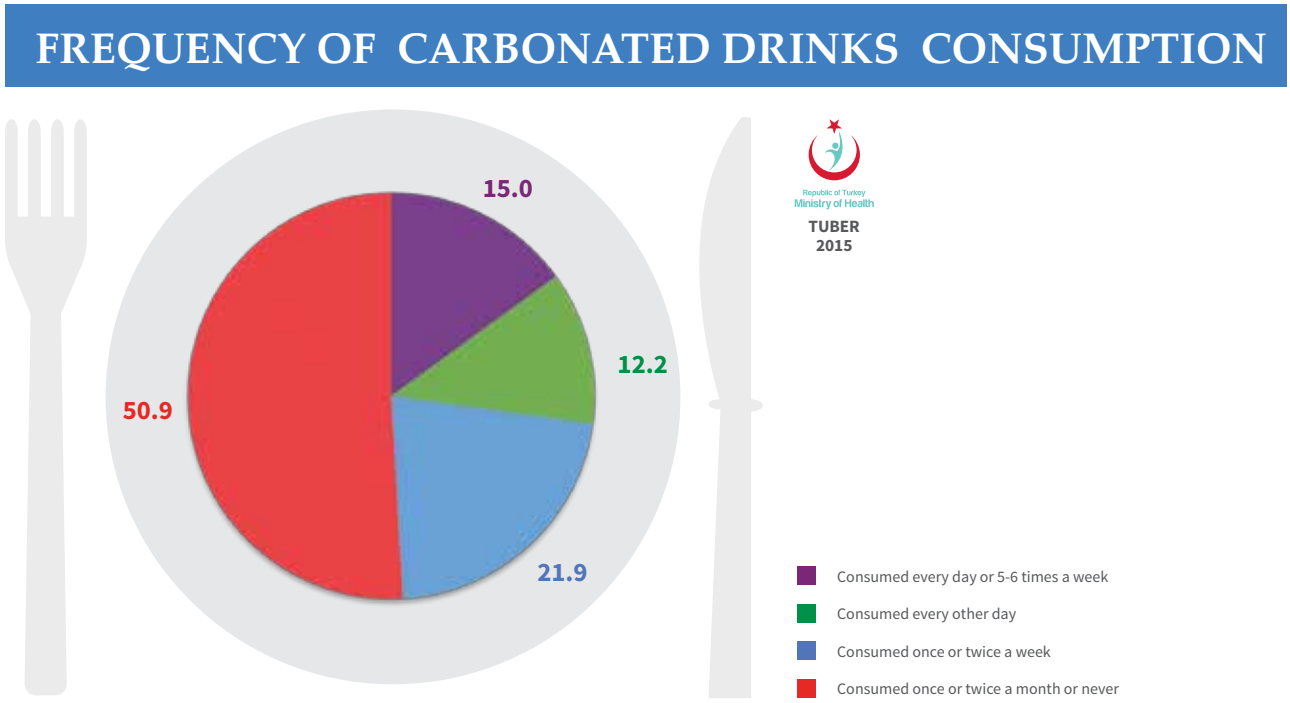
FREQUENCY OF WHITE BREAD CONSUMPTION



Source: Turkey Nutrition and Health Study 2010
Ministry of Health of Republic of Turkey / Hacettepe University, February 2014

4.6.25. Percentage of adults with consumption of white bread according to the response categories of food frequency (%).

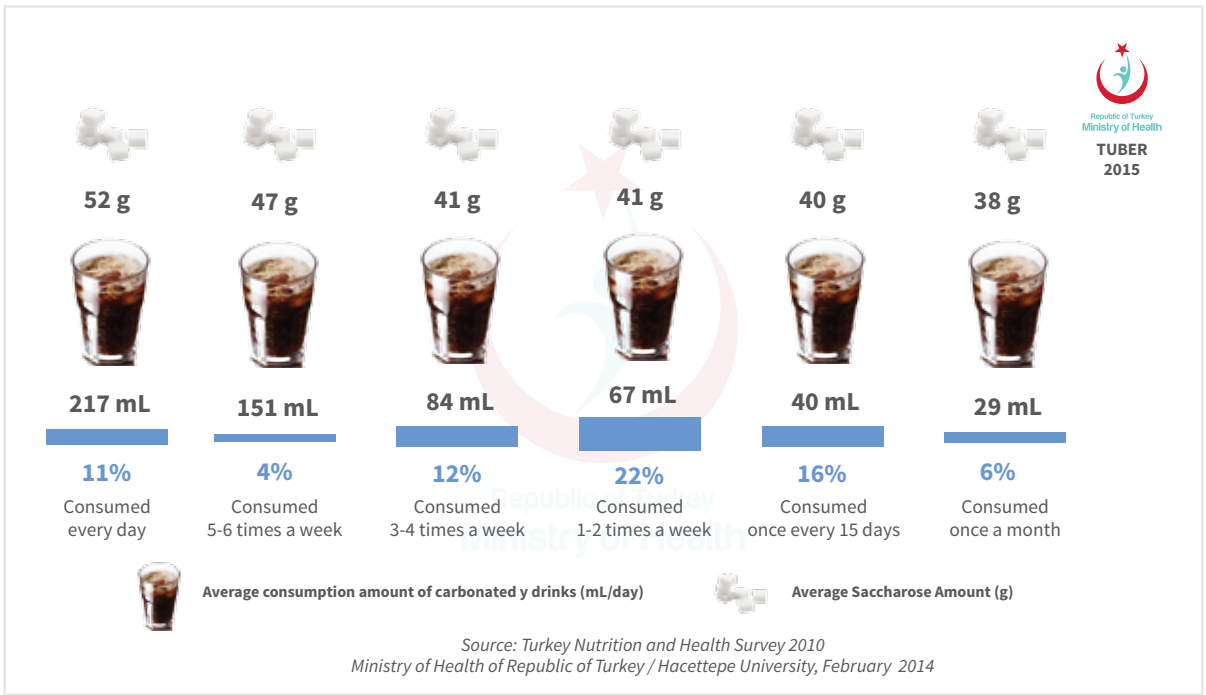
In the study of TNHS 2010, it was found that 87% of the adults consumed white bread every day or 5-6 times a week and 4% of them consumed it every other day or once or twice a week. 10% of the adults rarely (once or twice a month) or never consume white bread.



Source: Turkey Nutrition and Health Study 2010
Ministry of Health of Republic of Turkey / Hacettepe University, February 2014

4.6.26. Percentage of adults with consumption of carbonated drinks except fruit juices according to response the categories of food frequency (%).

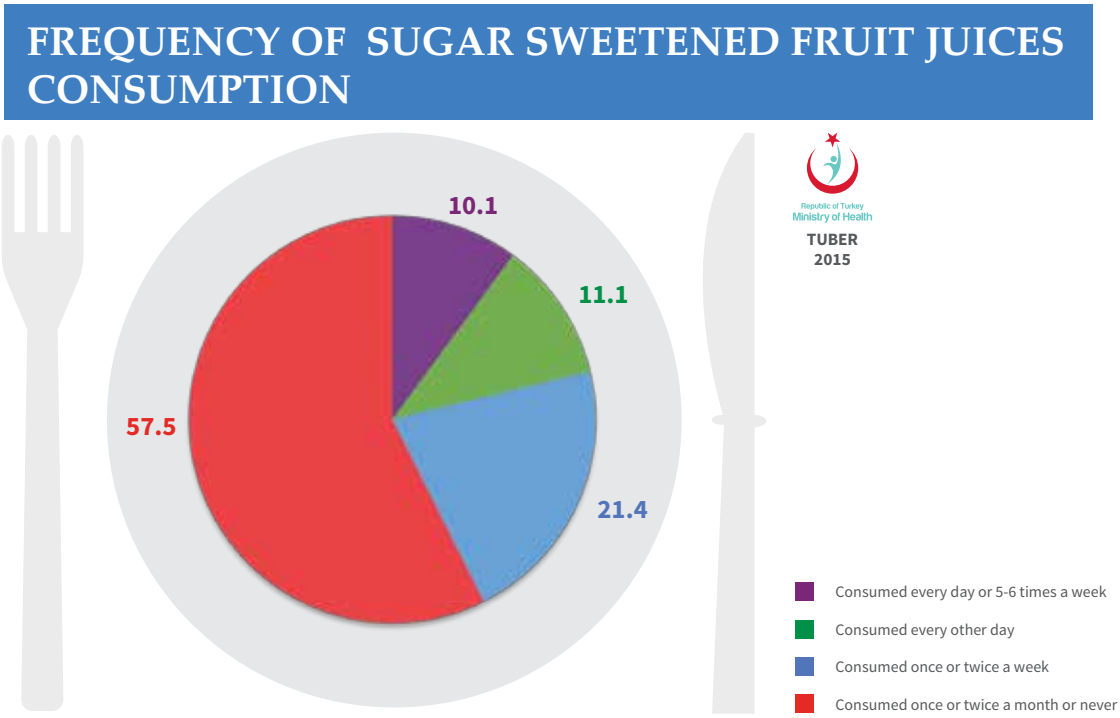
According to the study of TNHS 2010, about half of the adults consumed fizzy drinks once or twice or never in the last month. The frequency of adults who consumed fizzy drinks every day, 5-6 times a week or every other day was observed to be 27%.



Source: Turkey Nutrition and Health Survey 2010
Ministry of Health of Republic of Turkey / Hacettepe University, February 2014

4.6.27. Average consumption of carbonated drinks except fruit juices(mL/day) and average sucrose intake (g/day) from 24 hour recall according to the response categories of food frequency in adults.

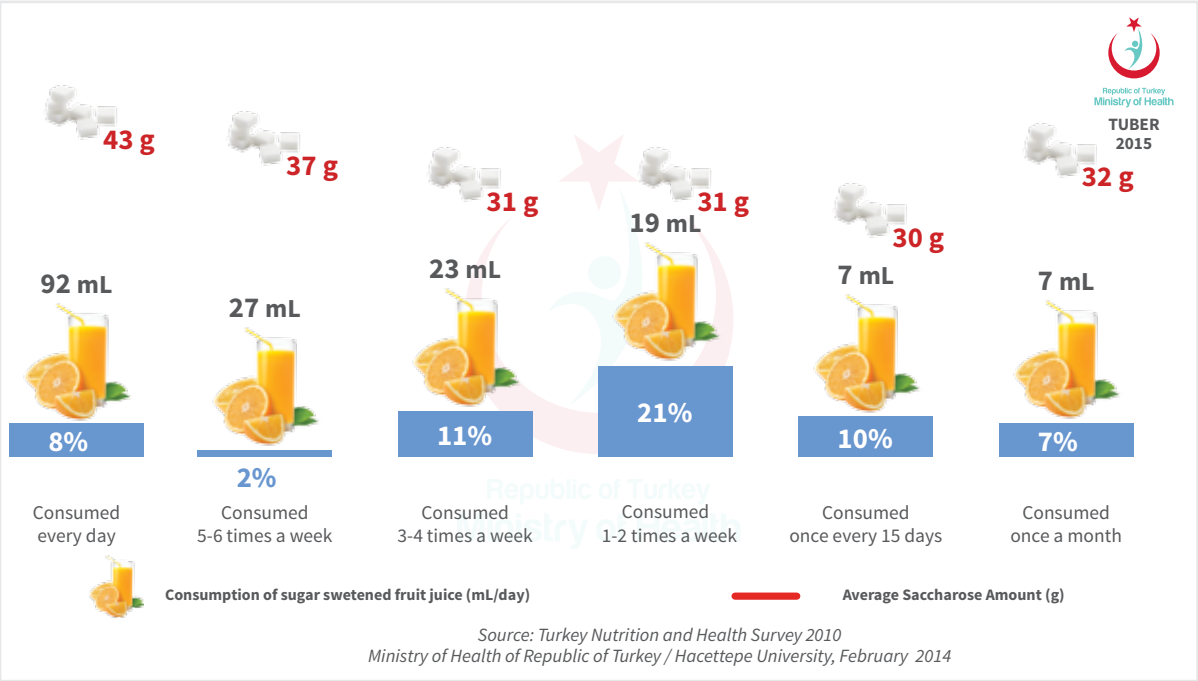
Average consumption amounts of carbonated drinks in adults who consumed carbonated drinks every day or 5-6 times a week are respectively 217 mL and 170 mL. Sucrose consumption was determined to be 51.8 g/day and 47.1 g/day in these groups.



Source: Turkey Nutrition and Health Study 2010
Ministry of Health of Republic of Turkey / Hacettepe University, February 2014

4.6.28. Percentage of adults with consumption of sugar sweetened or 100% fruit juices according to the response categories of food frequency (%).

In the study of TNHS 2010, it was determined that 57.7% of adults consumed readymade fruit juices once or twice or never in the last month. The frequency of the adults who consumed readymade fruit juices every day or 5-6 times a week is 10.1%.



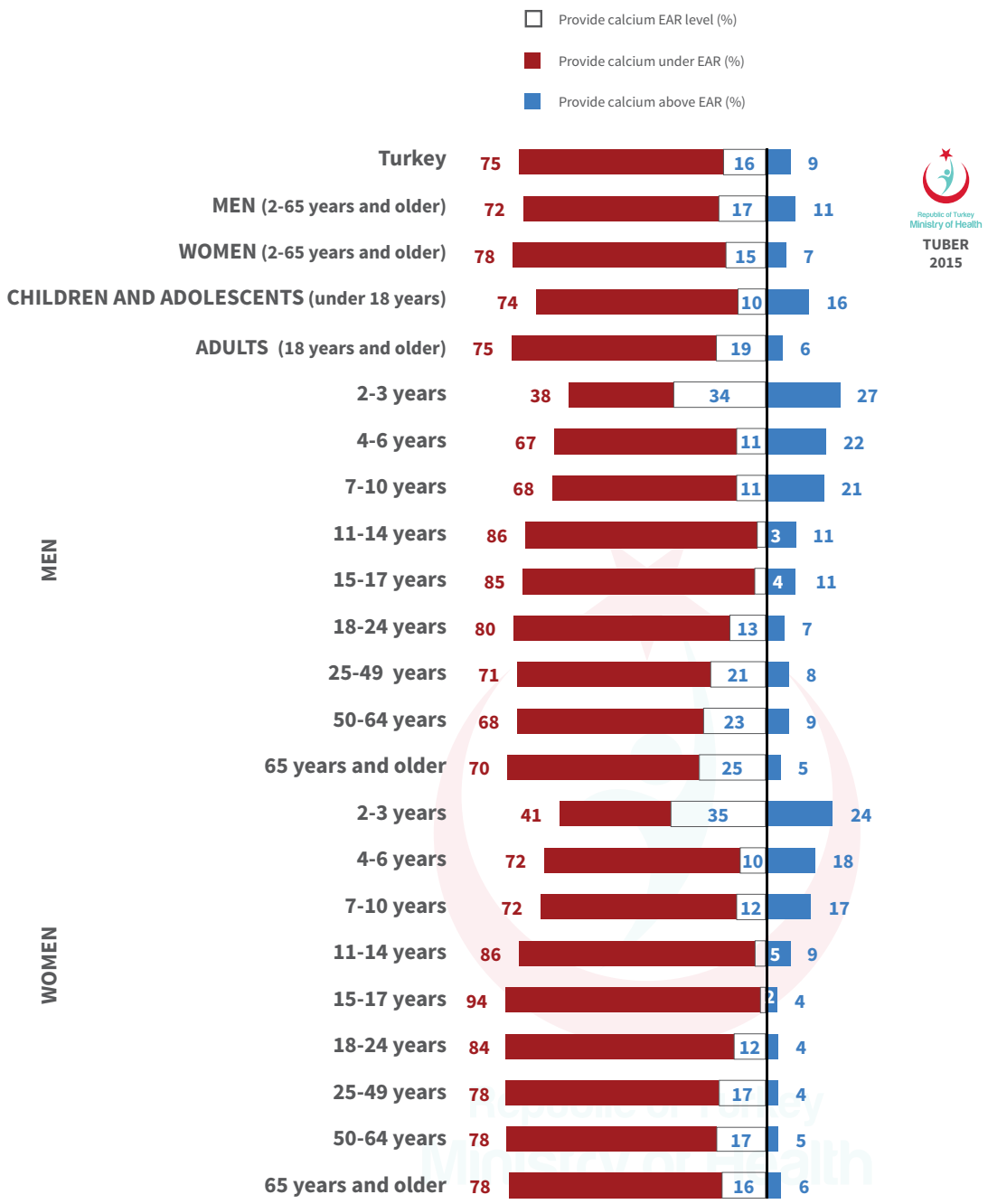
Source: Turkey Nutrition and Health Survey 2010
Ministry of Health of Republic of Turkey / Hacettepe University, February 2014

Appendix 4.6.29. Average consumption of sucrose (day/g) in adults according to the frequency of consumption of sugar sweetened fruit juice.

In the study of TNHS 2010, it was found that average sucrose consumption amounts in individuals who consumed readymade fruit juices every day or 5-6 times a week in the last month were 43 g/day and 37 g/day.

Appendix 4.7 Consumption patterns of food groups in comparison to Recommended Portions of Foods in TUBER 2015

MILK-YOGHURT-CHEESE GROUP 1-4



Source: Turkey Nutrition and Health Survey 2010
Ministry of Health of Republic of Turkey / Hacettepe University, February 2014

Appendix 4.7.1. Estimated percentage of individuals with total daily consumption of milk, yogurt and cheese, below, within and above the recommended daily number of portions by TUBER 2015 for dairy foods

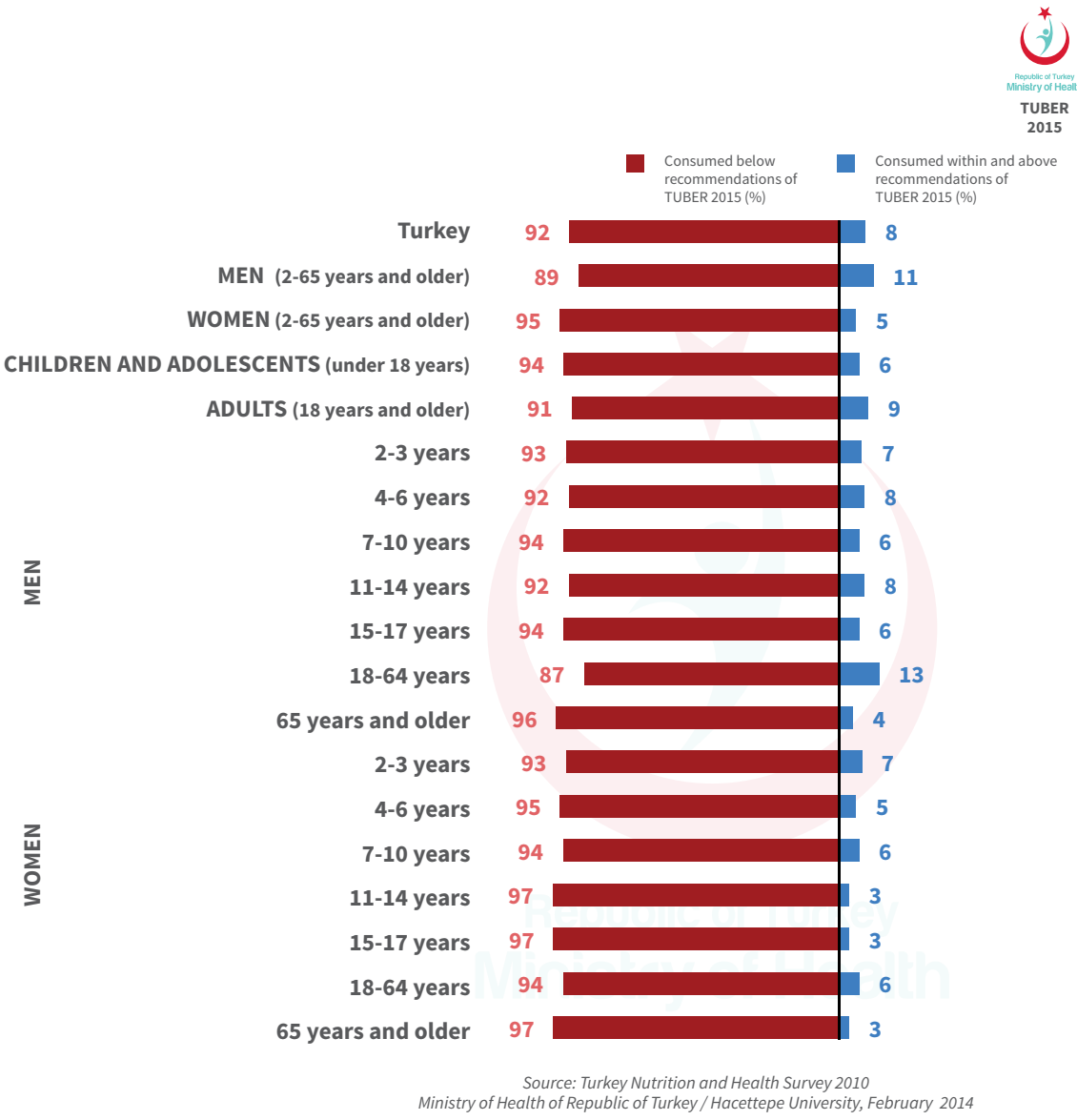
[1] Total portion recommendations for milk-yoghurt-cheese (Appendix 2.1.1-2.1.2) are determined based on the daily adequate intake amounts recommended for calcium (Appendix 1.5.2, Ek 3.1.1). The amounts recommended for milk-yoghurt-cheese in TUBER 2015 are the amounts that cover 70-100% of reference values alone (Appendix 4.7.1).

[2] Calcium intake below EAR values poses a risk of insufficiency at 50%. It is important to know the milk-yoghurt-cheese amounts to eliminate such risks in order to evaluate milk-yoghurt-cheese consumption situation of the population. Therefore, the individuals who consumed milk-yoghurt-cheese in amounts to cover EAR calcium level were evaluated separately in TNHS 2010. Consideration of milk-yoghurt-cheese amounts covering EAR values allowed separation of about 15% of the population from the individuals who consumed them in less amounts (75%) (Appendix 4.7.1-4.7.4).

[3] Total portion amount of milk-yoghurt-cheese to cover EAR calcium level was calculated supposing that minimum 220 mg of vegetative calcium would be obtained with the consumption of minimum 1.5 portions of vegetables, 1.5 portions of fruit, 3 portions of grain, ½ portion of legumes-seeds-nut. The authorities also emphasize the importance of calcium obtained from vegetables in individuals who consumed foods of animal origin rarely or never. (Position of the American Dietetic Association: Vegetarian Diets J Am Diet Assoc. 2009;109:1266-1282). In fact, it is observed that the recommended portions of milk-yoghurt-cheese in Mediterranean style nutrition models rich in vegetables are lower being close to the amounts covering EAR especially in adult age groups www.health.gov. (USDA Food Patterns: Healthy Mediterranean- Style Patterns recommended intake amounts).

In TUBER 2015, total portion recommendations for milk-yoghurt-cheese (2-3 portions, See Appendix 2.1.2) were compared with the number of portions of milk-yoghurt-cheese daily consumed by the population. The frequency of the individuals across Turkey who consumed milk-yoghurt-cheese lower than the recommendations of TUBER 2015 was found to be at the rate of 91%. The first 16% of this rate is constituted by a group who consumed milk-yoghurt-cheese in amounts which are below the portion recommendations of TUBER 2015 but which can provide calcium within EAR levels.

MEAT- CHICKEN-FISH-EGGS-LEGUMES-SEEDS-NUTS GROUP

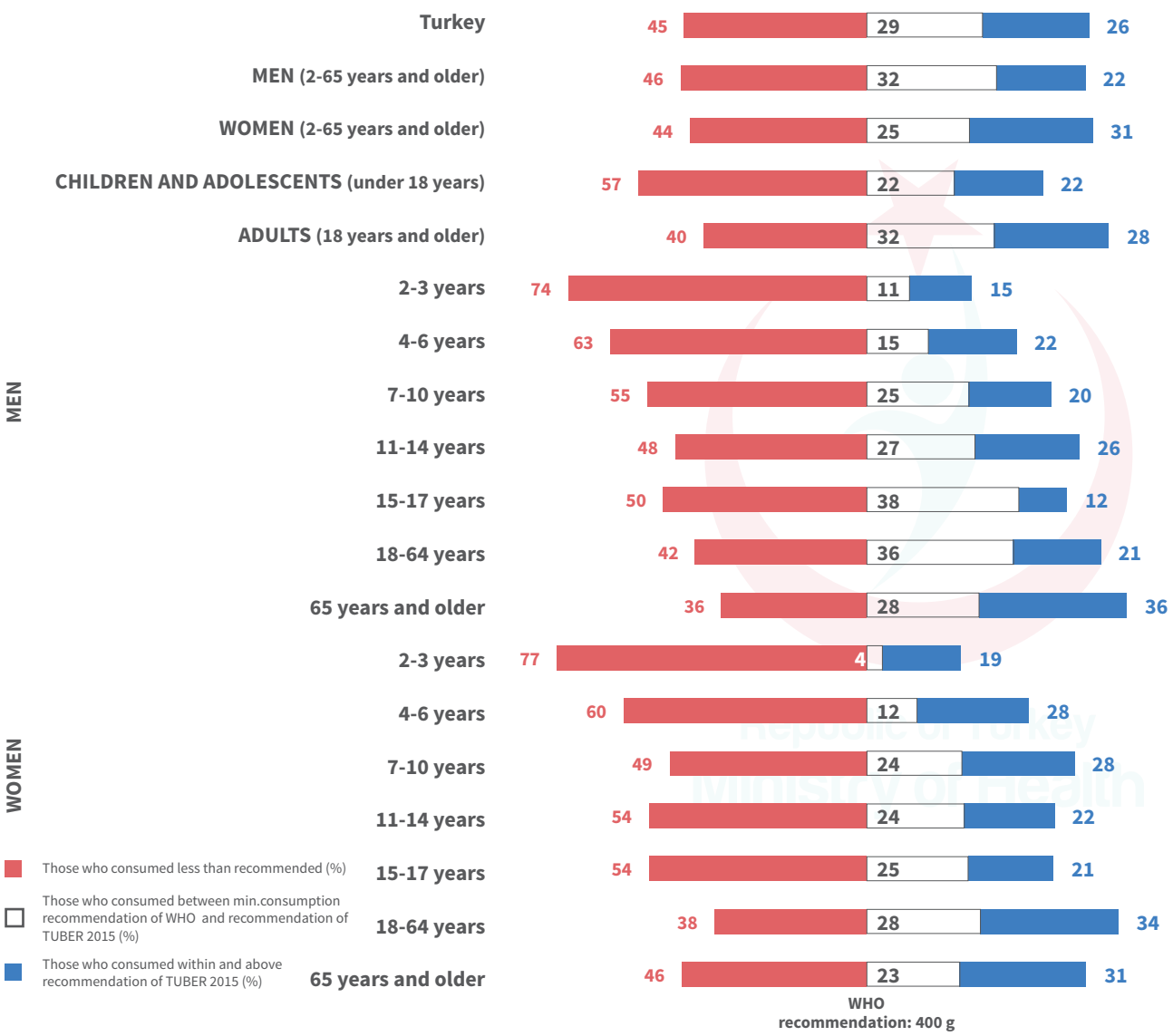


Source: Turkey Nutrition and Health Survey 2010
Ministry of Health of Republic of Turkey / Hacettepe University, February 2014

Appendix 4.7.2. Estimated percentage of individuals with total daily consumption of meat, chicken, fish,eggs, legumes,seeds and nuts below, within and above the recommended daily number of portions in TUBER 2015 for protein foods

In TUBER 2015, total portion amounts of meat - poultry - fish - eggs - legumes - seeds - nuts recommended according to age and gender (1.5-3 portions/day; Appendix 2.1.3 – 2.1.4) were compared with the total portion amounts of meat - poultry - fish - eggs - legumes - seeds - nuts daily consumed by the population. The frequency of individuals across Turkey who consumed these foods below the total portion recommended by TUBER 2015 was found to be 92% (Appendix 4.7.2). The TNHS data on this group can be seen in Appendix 4.6.7-4.6.17 and Appendix 4.7.5.

VEGETABLE-FRUIT GROUP[1-3]



Source: Turkey Nutrition and Health Survey 2010
Ministry of Health of Republic of Turkey / Hacettepe University, February 2014

[1]*The daily total vegetable and fruit amount recommended by the World Health Organization to promote health and to decrease the risks of chronic diseases is 400 g or 5 portions. This amount was accepted as limit values in determination of vegetable and fruit consumption of the population .*

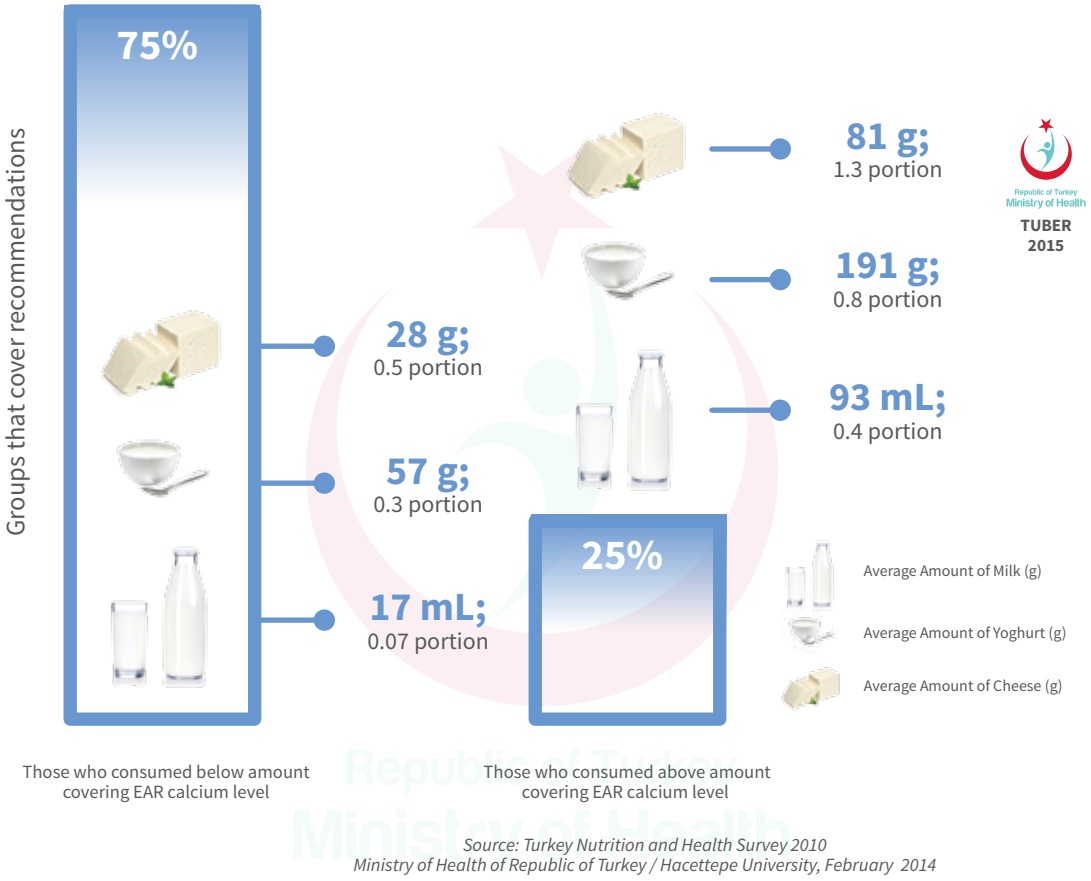
[2] *The amounts recommended for vegetables and fruits in the lowest dietary pattern in TUBER 2015 are compatible with the minimum amounts recommended by WHO (Appendix 3.1.1). As the energy content of patterns increase, their vegetable and fruit contents also increase and reach total 7 portions in a pattern of 3000 kcal. The patterns which meet the nutrient needs of individuals that increase according to their age and sex were taken as bases for determination of those amounts (Appendix 3.4.5).*

[3] *According to TUBER 2015, 400 g of vegetable-fruit = 2.7 TUBER portions = 5 WHO portions. The reason of the difference is that the potion amount determined by WHO for vegetables and fruits is 75 gram. 1 standard portion of vegetable and fruit recommended in TUBER 2015 is 150 g and this amount was determined in consideration of the serving methods of fruits and vegetables in traditional Turkish cuisine. For explanations, see Chapter 10: Method, "Determination of Standard Portions, Sizes and Amounts of Vegetables and Fruits*

Appendix 4.7.3. Estimated percentage of individuals with total consumption of vegetables and fruits below, within and above the recommended daily number of portions by WHO and TUBER 2015 for vegetables and fruits

Total portion amounts of vegetables and fruits recommended by TUBER 2015 according to age and gender (2.5-7 portions, Appendix 2.1.7-2.1.8) and the daily consumption amounts of vegetables + fruits recommended by the WHO were compared with the total number of portions of vegetables-fruits daily consumed by the population. The frequency of individuals across Turkey who consumed vegetables and fruits below the amounts recommended by WHO is 45% and the frequency of the ones who consumed them below the amounts recommended by TUBER 2015 is 74%.

OF MILK, YOGHURT AND CHEESE[1,2]



Source: Turkey Nutrition and Health Survey 2010
Ministry of Health of Republic of Turkey / Hacettepe University, February 2014

[1] *Average consumption amounts were listed based on their portion equivalents.*

[2] *In TNHS 2010, the variability between the total consumption amounts according to food groups and the consumption amounts of foods in food group is quite high and the result must be interpreted carefully. This is also valid for Group 1 and Group 2.*

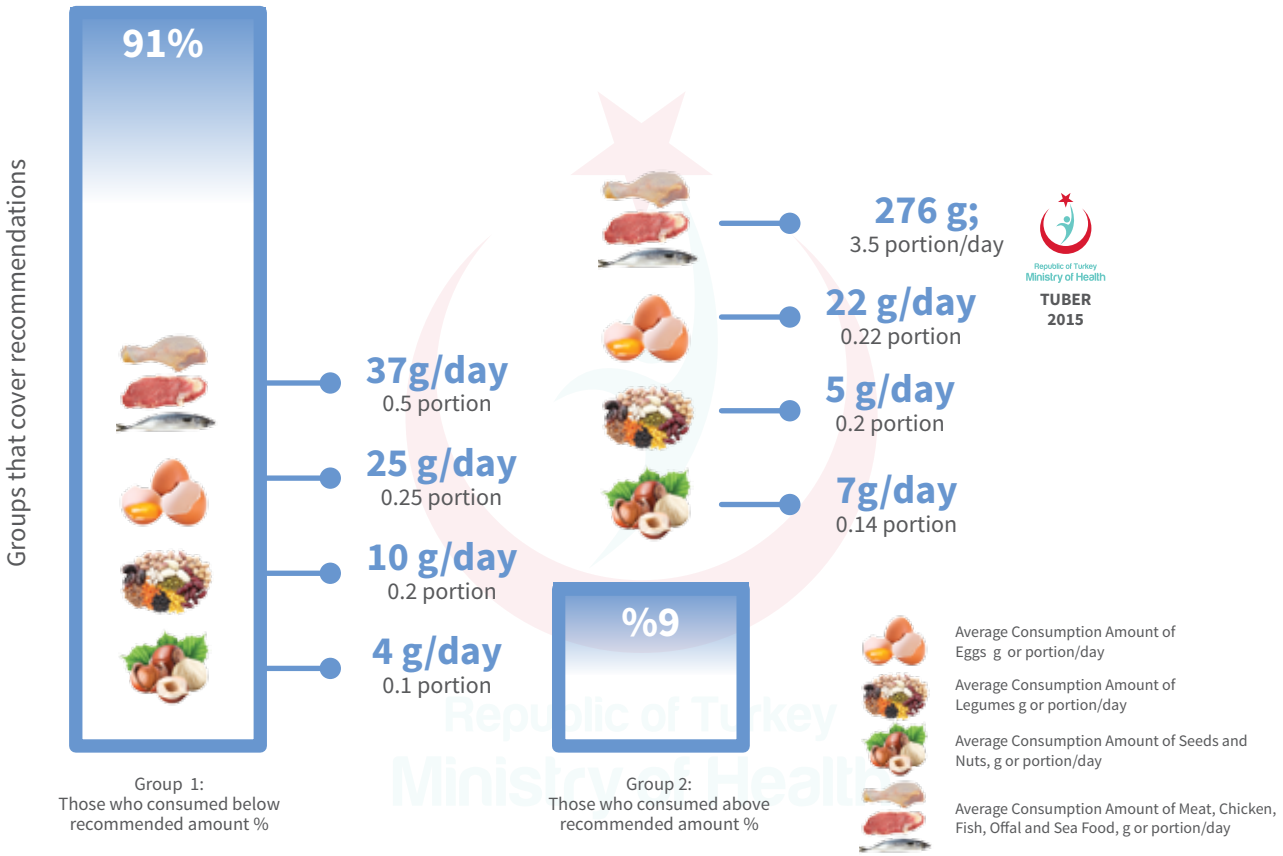
Appendix 4.7.4. Average daily consumption of milk, yogurt and cheese in individuals with total dairy consumption below, within and above the recommendation by TUBER 2015

The portion amounts of milk-yoghurt-cheese covering EAR calcium level (Appendix 3.1.1) were accepted as limit value in calculation of average consumption amounts of milk-yoghurt-cheese. The consumption amount in adults who consumed them below limit value (74% of the population, group 1) is 0.8 portion and covers only ⅓ of the recommended amount.

Milk consumption amount is 17 mL/day or 0.07 portion, cheese consumption amount is 27 g/day or about ½ portion and yoghurt consumption amount is 57 g/day or about ⅓ portion in Group 1. The consumption amount in individuals who consumed them above limit value (25% of the population, group 2) is 2.6 portions. The food consumed in the lowest amounts is milk in both groups. Similarly in both groups, cheese in the first place and yoghurt in the second place are consumed or preferred in higher number of portions compared to milk.

Median value of total consumption of milk-yoghurt-cheese in group 2 is 2.6 portions. Median consumption amounts in the individuals who consumed them above TUBER 2015 recommendation is 3.2 portions and this value was not shown in the figure.

MEAT, CHICKEN, FISH, LEGUMES, SEEDS, NUTS[1,2]



Source: Turkey Nutrition and Health Survey 2010
Ministry of Health of Republic of Turkey / Hacettepe University, February 2014

[1] *Average consumption amounts were listed based on their portion equivalents.*

[2] *In TNHS 2010, the variability between the total consumption amounts according to food groups and the consumption amounts of foods in food group is quite high and the result must be interpreted carefully. This is also valid for Group 1 and Group 2.*

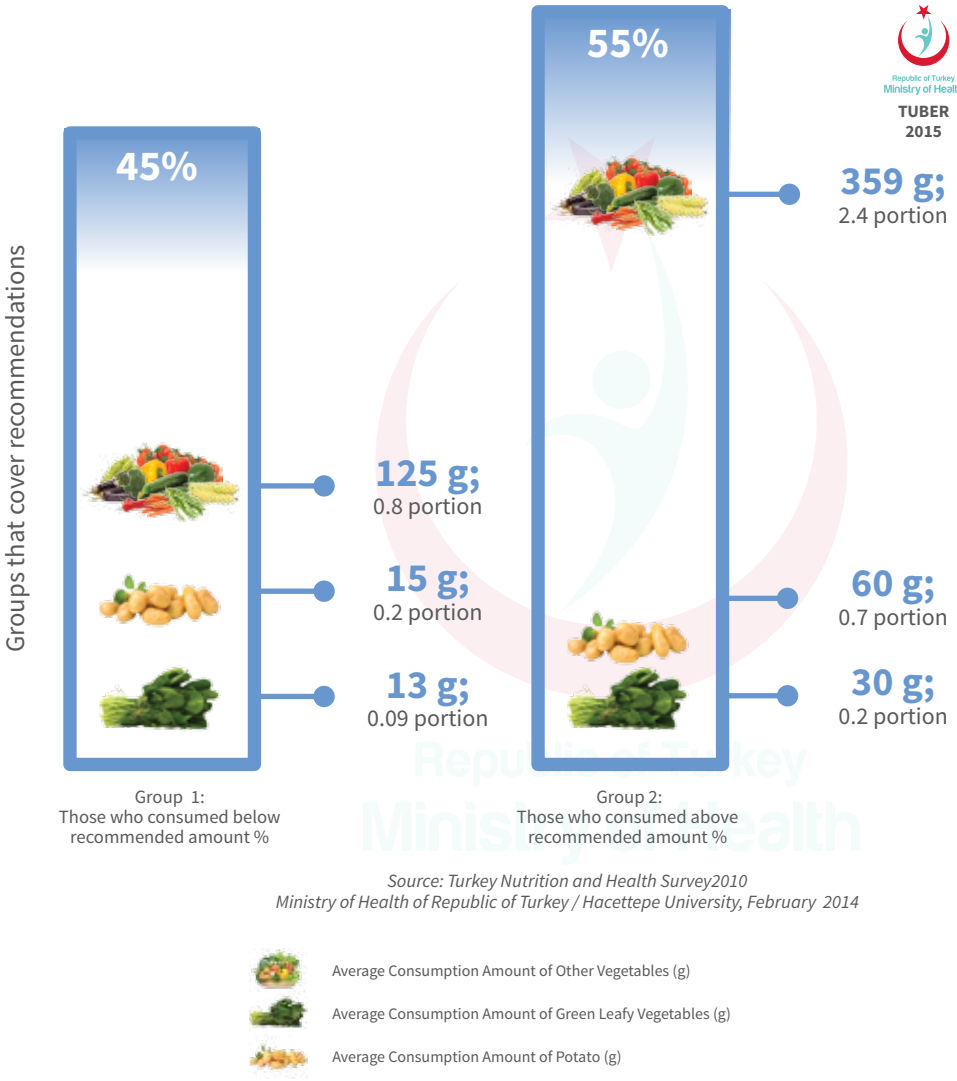
Appendix 4.7.5. Average daily consumption of meat, chicken, fish,eggs, legumes,seeds and nuts in individuals with total consumption of protein foods below, within and above the recommendation by TUBER 2015

The consumption amount of meat - poultry - fish - legumes - seeds - nuts is about 1 portion in individuals who consumed them below TUBER 2015 recommendations (91% of the population, group 1) and 4.5 portions in individuals who consumed them within and above the recommendations (only 9% of the population, group 2).

Consumption amount of eggs, legumes, seeds-nuts for Group 1 is respectively 0.25 portion, 0.1 portion and 0.1 portion. The consumption amounts of these foods are similar in the second group. The foods with higher consumption amounts in Group 2 compared to Group 1 are meet, chicken, fish, meat products and specialty meats. While the consumption amount of meat, chicken, fish, meat products and specialty meats is 0.5 portion (37 g) in the first group, it is 3.5 portions (275 g) in the second group. When the distribution of total portion amounts into foods is examined, the largest differences between the two groups were seen in chicken and red meat. While the average consumption amounts of red meat and chicken is respectively 18 g and 14 g in the first group, they were found to be 167 g and 72 g in the second group.

Median value of total consumption amounts is 0.8 portions for Group 1 and 3.6 portions for Group 2.

VEGETABLES[1-3]



Source: Turkey Nutrition and Health Survey2010
Ministry of Health of Republic of Turkey / Hacettepe University, February 2014

[1] *Average consumption amounts were listed based on their portion equivalents.*

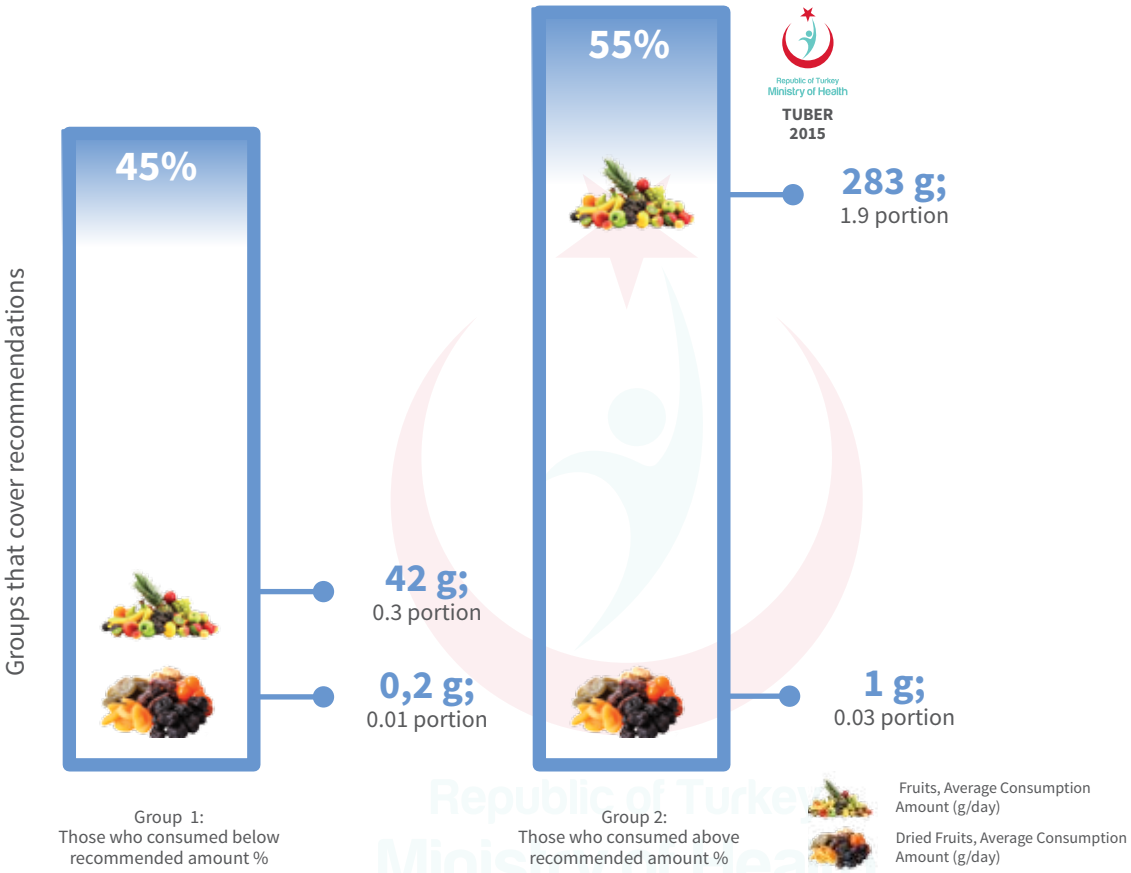
[2] *In TNHS 2010, the variability between the total consumption amounts according to food groups and the consumption amounts of foods in food group is quite high and the result must be interpreted carefully. This is also valid for Group 1 and Group 2.*

[3] *WHO, see Appendix 4.7.3 for explanations on minimum vegetable and fruit recommendations and portion amounts.*

Appendix 4.7.6. Average daily consumption of green leafy vegetables, potatoes and other vegetables in individuals with total consumption of vegetables below, within and above the recommendation by WHO and TUBER 2015

Total vegetable consumption amount is about 1.1 portions in individuals (45% frequency, group 1) who consumed them below the minimum vegetable-fruit recommendations of WHO and total 3.3 portions in individuals (55% frequency, group 2) who consumed them within and above the recommendations.

FRUITS[1-3]



Source: Turkey Nutrition and Health Survey 2010
Ministry of Health of Republic of Turkey / Hacettepe University, February 2014

[1] *Average consumption amounts were listed based on their portion equivalents.*

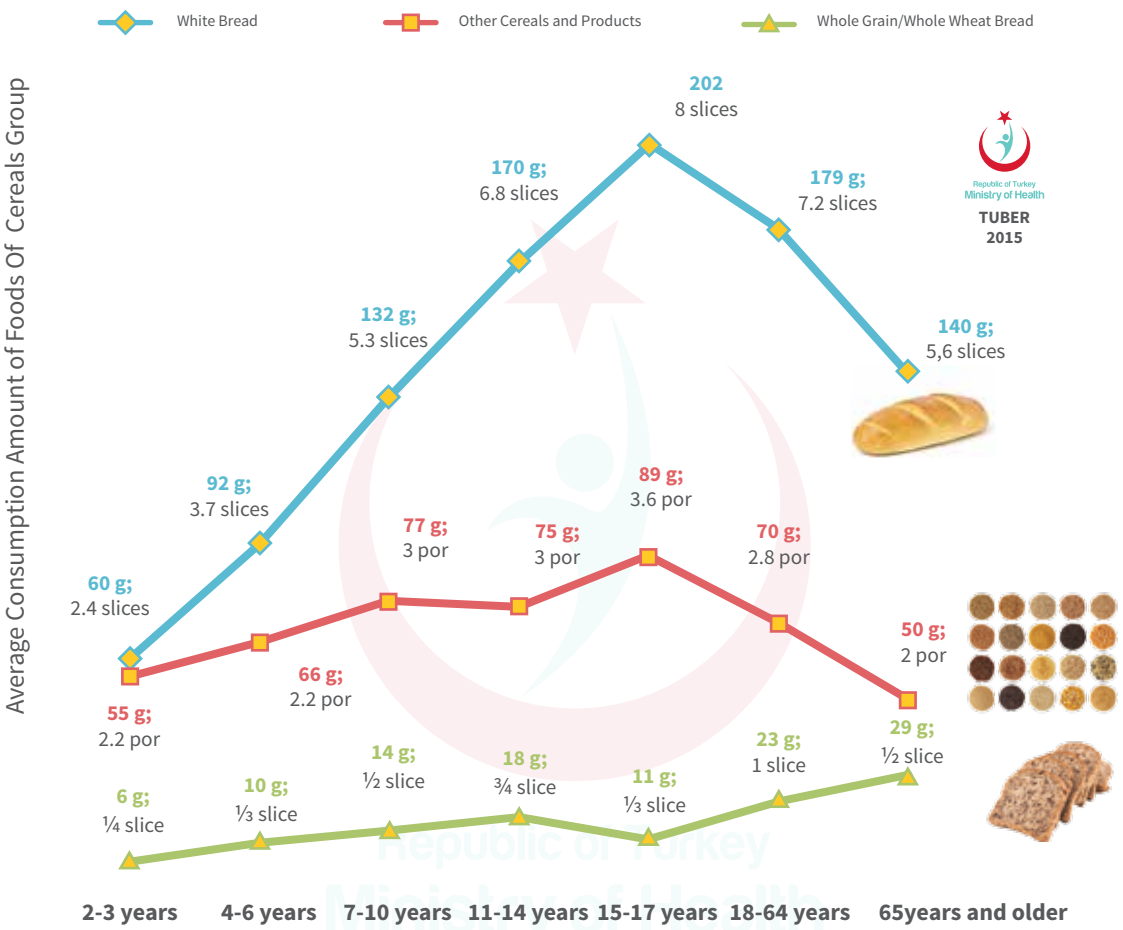
[2] *In TNHS 2010, the variability between the total consumption amounts according to food groups and the consumption amounts of foods in food group is quite high and the result must be interpreted carefully. This is also valid for Group 1 and Group 2.*

[3] *WHO, see Appendix 4.7.3 for explanations on minimum vegetable and fruit recommendations and portion amounts.*

Appendix 4.7.7. Average daily consumption of fruits in individuals with total consumption of fruits below, within and above the recommendations by WHO and TUBER 2015

Total vegetable consumption amount is about 1.1 portions in individuals (45% frequency group 1) who consumed them below the minimum vegetable-fruit recommendations of WHO and total 3.3 portions in individuals (55% frequency, group 2) who consumed them within and above the recommendations.

BREAD AND CEREALS

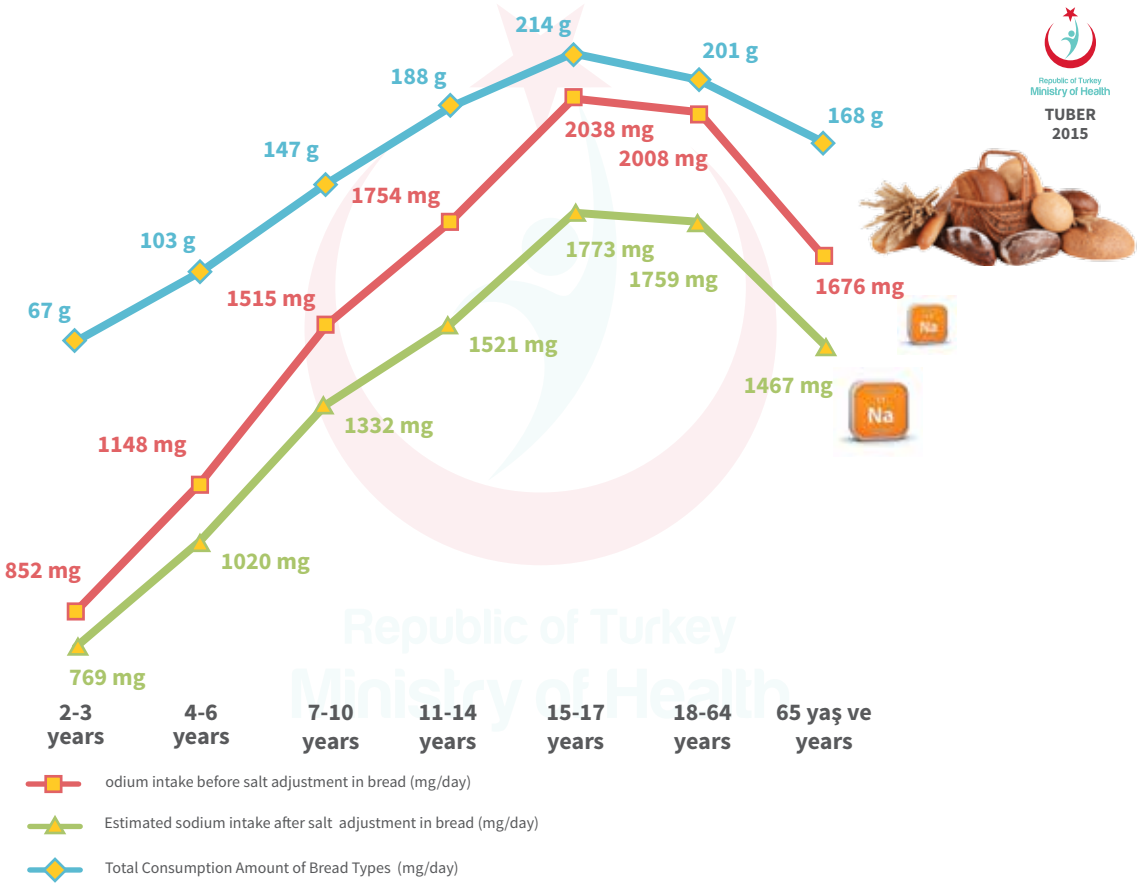


Source: Turkey Nutrition and Health Survey 2010
Ministry of Health of Republic of Turkey / Hacettepe University, February 2014

Appendix 4.7.8. Average consumption of white bread , whole wheat/whole grain bread and other cereals and cereal products of individuals by age groups

The bread type consumed in the highest amounts is white bread in all age groups. The consumption amount of white bread is at the highest level in the individuals at the age of 15-17 years with the highest energy requirement. The consumption amounts of whole grain / whole wheat bread is quite low compared to white bread.

BREAD CONSUMPTION and SODIUM INTAKE



Source: Turkey Nutrition and Health Survey 2010
Ministry of Health of Republic of Turkey / Hacettepe University, February 2014

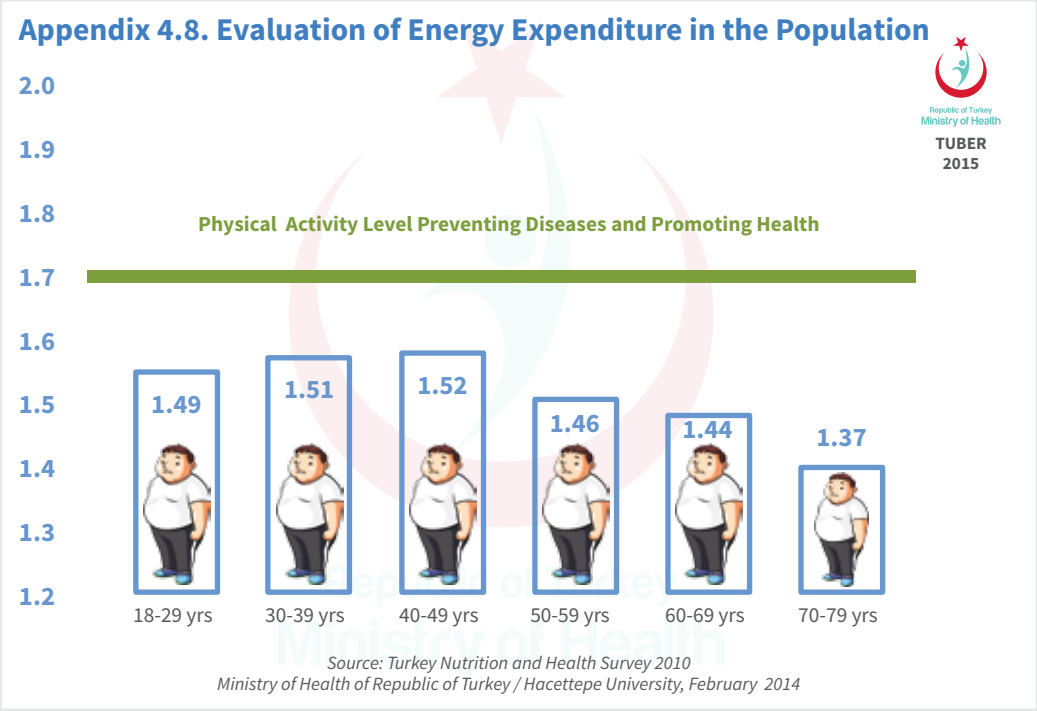
Appendix 4.7.9. Average total consumption of bread and average sodium intake of individuals by age groups

Bread is one of the most important sources of sodium in the diet. It is seen in Appendix 4.7.10 that the sodium intake is high is age groups in which bread is consumed in the largest amounts. Similar difference in bread and sodium intake values according to age groups is related with the fact that the data of TNHS 2010 about sodium intake includes the amount of sodium obtained from only foods and this differences present the great contribution of bread to salt intake. Sodium amounts do not include the salt amounts added to meals.

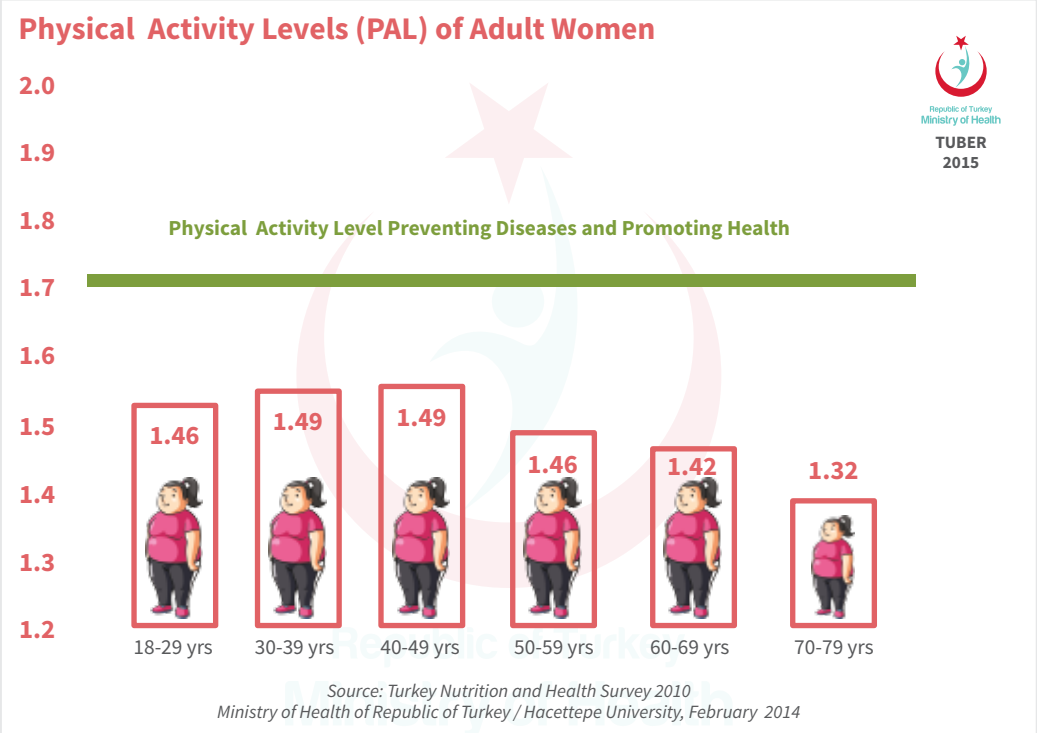
The salt amount in the dry matter of bread was decreased at the rate of 25% to an amount of 1.5 g from 2.0 gram with the Communiqué on Bread and Bread Types of Turkish Food Codex (Communiqué No: 2012/2) entered into force two years after TNHS 2010. In the view of the table about the Chemical Characteristics of Bread, Bread Types and Other Bread Types in the Appendix-1 of the Communiqué on Bread and Bread Types of Turkish Food Codex (Communiqué No: 2012/2) and the average total consumptions amount of bread in TNHS 2010; bread related salt and sodium amounts were calculated and the decrease in the bread related sodium amount was deducted from the sodium intake before salt adjustment in bread. The effect of salt adjustment in bread reducing the total sodium intake was shown under the name of “Anticipated Total Intake of Sodium After The Salt Adjustment in Bread”. The calculation was made based on the change in white bread since it is the most widely consumed type of bread. 100 g of salt adjustment with 62 g of dry matter was made and white bread was considered to include 930 mg of salt or 372 mg of sodium and the bread before salt adjustment was considered to include 1240 mg of salt or 496 mg of sodium for 100 g.

Appendix 4.8. Energy Expenditure of Turkey Adults

PHYSICAL ACTIVITY LEVEL OF ADULTS



Appendix 4.8.1. Physical activity level of adult men by age groups



Appendix 4.8.2. Physical activity level of adult women by age groups

It is observed from Appendix 4.8.1 and Appendix 4.8.2 that adult men and women in all age groups maintain a sedentary life. Physical activity level (PAL) and lifestyle classification are given in Appendix 4.8.3 (1-3). The physical activity level (PAL) decreases in both sexes with advancing age. Physical activity level of adult individuals in Turkey needs to be increased to prevent disease and to protect and promote health. See Appendix 4.8.4 for Recommendations for Reaching a Physical Activity Level (PAL) Protecting and Promoting Health.

Appendix 4. 8. 3. Classification of the lifestyle depending on the physical activity level (PAL)[1,3]

Lifestyle	PAL	Activity Type, Duration and Examples
Confined to	**1.20 - 1.39**	Fragile elderly, dependent individuals
Low Active (sedentary)	**1.40 - 1.59**	Spend half day in home with activities performed by sitting (reading, watching TV, listening to music, eating, using computer, etc.), who does not walk in long distances, who shops in short distances and time (0,5 hour), who usually use vehicles for transportation. These individuals do not have regular exercise and sports activities (PAL 1.4) *Examples* *• Non-workers, housewives or men who have housekeepers, home or office desk-bound workers, old individuals who spend most of the day at home and who have helpers, taxi drivers.* *Workers with routine jobs who work by sitting for 6 hours, being mobile for only 2 hours instead of activities performed by sitting at home (PAL=1.5)* *Examples* *• Desk-bound workers at offices* *Individuals who cook at home, care a baby, works with electronic devices instead of some activities performed by sitting. These individuals do not have regular exercise and sports activities (PAL=1.5)* *• Housewives without any helpers*
Moderately Active	**1.60 - 1.79**	Cooking, child care, working at home with electronic devices, more time for shopping by walking, who prefers brisk walking for transportation every day instead of using vehicles. These individuals do not have regular exercise and sports activities. *Examples* *• Housewives without helpers with the characteristics above* *• Students* Individuals who mainly perform non-routine jobs based on knowledge and mental activity and who generally sit and only move in close distances. These individuals perform very few or no tiring activities. *• Managers*
Active	**1.80 - 1.99**	Individuals who generally work mobile and spend physical strength through the day. *Examples* *• Housekeepers, shop workers, waiters/waitresses* *•Workers of mechanized agriculture and construction,* Individuals who willingly or unwillingly perform moderate to intensive physical activities continuously or intermittently for at least 1 hour such as running, long distance walking, bicycling, aerobic dancing, etc. as a part of their jobs. *Examples* *• Sports-exercise trainers* *• Individuals who have to carry a load such as water, firewood, etc.*
Very Active	**≥ 2.0**	Individuals who spend at least two hours of a day by severe exercises or training, who spend a longer time of a day by non-mechanized agriculture activities using mattock or axe, who have to walk for long time carrying load in rough terrain. *• Sportsmen and sportswomen (athletes),* *• Agriculture workers performing non-mechanized activities*

[1] PAL is defined as the Rate of Total Energy Expenditure to Resting Energy Expenditure. It shows the share of physical activity in Total Energy Expenditure. Routine PAL defines the lifestyle PAL is the main factor that determines the total energy requirement in adults as their growing process ended.

[2] It was prepared with the help of EFSA NDA Panel 2013. Scientific Opinion on Dietary Reference Values for Energy. EFSA Journal 2013;11(1):3005 [112 pp.].

[3] FAO/WHO/UNU (Food and Agriculture Organization of the United Nations/World Health Organization/United Nations University), 2004. Human energy requirements. Report of a Joint FAO/WHO/UNU Expert Consultation: Rome, 17–24 October 2001. FAO Food and Nutrition Technical Report Series, 103 pp.

Appendix 4.8.4. Recommendations to reach a desirable Physical Activity Level (PAL)

Habitual PAL Protecting and Promoting Health

In the WHO/FAO/UNU Experts Committee Report3 (35), and in EFSA NDA Panel Scientific Opinion on DRV for energy (4) it is declared that the habitual physical activity level of 1.70 or higher is associated with the lower risk of obesity and chronic diseases including cardiovascular diseases, diabetes , some cancer types and age related diseases like sarcopenia and osteoporosis. It is required to make exercise as the regular part of life styles, then it will be possible to increase the current sedentary physical activity levels of adults in Turkey to reach to a desirable level of physical activity protecting and promoting health.

Exercise Recommendations to Help Increasing PAL

Adult men and women in all age groups in Turkey have a sedentary lifestyle as seen in Appendix 4.8.1 and Appendix 4.8.2. Men and women between the ages of 18-59 years have median PAL levels of 1.45 and 1.5 and even lower in aged people 1.32 and 1.44 respectively. PAL values need to be increased by 02.-0.3 to reach the desirable physical activity level.The following physical activites are to increase 0.2 points the PAL levels of low active men and women aged 30-39 years having median height and calculated BMI of 22 kg/m^2 (Appendix 1.1.3 – 1.1.4) are classified as moderate and vigorous intensity options.When adults perform these activities in recommended time everyday , they spend about 300 (between 275 and 325) kcal of energy. If several activities mentioned below are to be performed in the same day, their durations should be proportionally decreased (e.g. 30 minutes of low impact aerobic dance and 30 minutes of brisk walking).

Activities to increase low active PAL by 0.2 point to moderat PAL (1.6)
Moderate[4] exercise options

- 1 hour of brisk walking (at a speed of 6 - 6.5 km per hour)
- 1 hour of bicycling light effort (at a speed 15 km per hour)
- 1 hour of low impact aerobic dance
- 1 hour of gardening or field work (such as mowing, digging)
- 1 hour of double tennis
- 1 hour of mild-moderate swimming
- 1 hour of walk/run playing with children, moderate effort , only active periods
- 1 hour of walk/run playing with animals, moderate effort , only active periods
- 1.5 hours of house work (vacuuming carpets or floors, mopping, wiping windows, washing car, etc.)
- 1.5 hours of walking during work breaks,

Vigorous6 exercise options

- 40 minutes of mild-moderate swimming
- 40 minutes of bicycling moderate effort
- 45 minutes of high impact aerobic dance
- 45 minutes of jogging
- 45 minutes of playing football (without a match)
- 35-40 minutes of running (at a speed of 8 km/hour)
- 30 minutes of football match
- 25-30 minutes of squash

In WHO Global Recommendations on Physical Activity for Health[7] , it is recommended for sedentary adults to perform at least 150 minutes of moderate - exercises throughout the week or do at least 75 minutes of vigorous exercises throughout the week or an equivalent combination of moderate- and vigorous-intensity activity. For additional health benefits by rising PAL to desirable level, adults should increase their moderate exercises to 300 minutes per week, or engage in 150 minutes of vigorous-intensity aerobic physical activity per week, or an equivalent combination of moderate - and vigorous-intensity activity.
Muscle - strengthening activities should be done involving major muscle groups on 2 or more days a week.

Screen time is a significant factor limiting physical activity in children and adolescents. In TNHS 2010, it was found in adolescents that the average screen time for watching television and using computer was 3.9 hours during weekdays and 4.1 hours during weekend. In another study, it was determined that screen time by the similar age group was longer than the recommended time (4.03 ± 2.71 and 3.00 ± 1.93 hours/day for boys and girls respectively). Screen time in Saturday and Sunday was observed to be longer than in weekdays for both sexes (74). It is recommended for children and adolescents to perform moderate and vigorous physical activities for at least 1 hour every day[7] and not to be exposed to screen more than 2 hours a day in order to protect their health and to avoid health problems that may arise due to immobility.

[1] *EFSA NDA Panel 2013. Scientific Opinion on Dietary Reference Values for Energy. EFSA Journal 2013;11(1):3005 [112 pp.] and Ainsworth BE, Haskell WL, Herrmann SD,Meckes N, Bassett DRJ, Tudor-Locke C, Greer JL, Vezina J, Whitt-Glover MC and Leon AS, 2011. The Compendium of Physical Activities Tracking Guide. Healthy Lifestyles Research Center, College of Nursing & Health Innovation, Arizona State University. https://sites.google.com/site/compendiumofphysicalactivitieof s/. It was prepared by considering the reference energy values of men and women between agess 30-59 years who have median height as shown in Appendix 1.1.*

[2] *Regular physical exercise is usually a safe way of increasing PAL. However, some individuals may require medical evaluation before changing their exercising habits.*

[3] *FAO/WHO/UNU (Food and Agriculture Organization of the United Nations/World Health Organization / United Nations University), 2004. Human energy requirements. Report of a Joint FAO /WHO /UNU Expert Consultation: Rome, 17–24 October 2001. FAO Food and Nutrition Technical Report Series, 103 pp.*

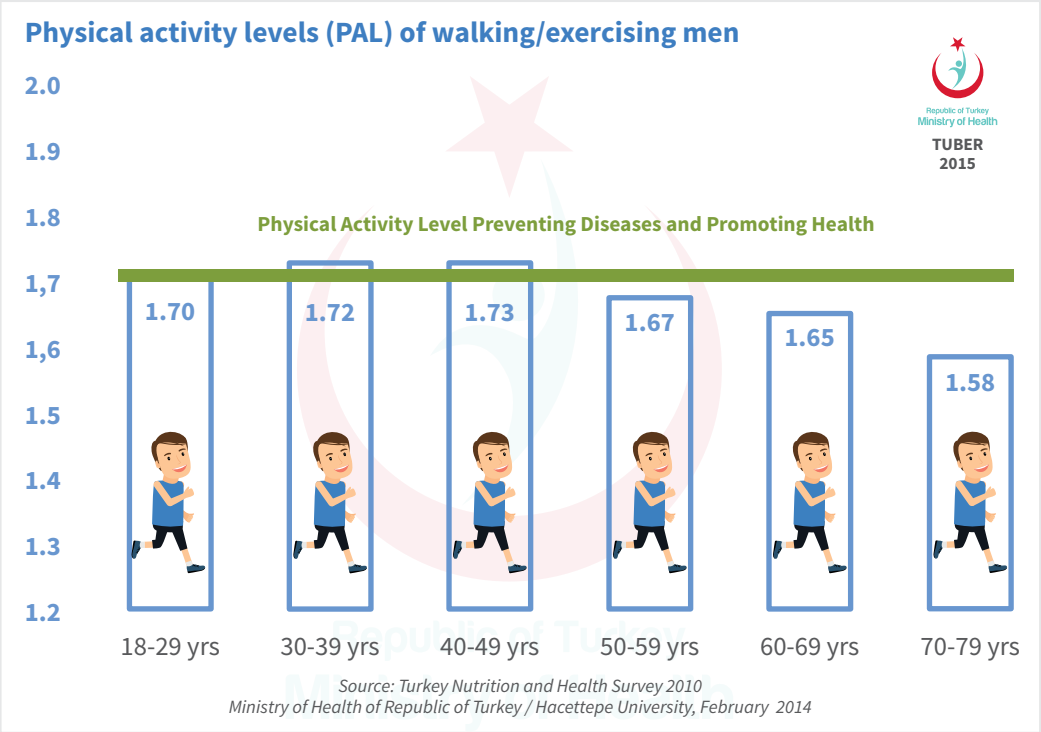
[4] *Intensity of activity shows the effort spend by an individual during exercising. Brisk walking performed at a speed of 5.7 km is an example of moderate activity. The simple way to determine the intensity of walking is to perform the talk test. The walking performed at an intensity in which the individual can talk but cannot sing is a brisk walking. However , measuring of exercise intensity does not consider the age and fitness level of individuals Then brisk walking can be moderate intensity for young or middle aged individuals who have good fitness level, but it can be a very hard physical activity for individuals who have lower fitness level or for older individuals. http://www.cdc.gov/physicalactivity/basics/measuring/index.html*

[5] *Climbing a ladder, carrying baby in arms, housecleaning activities such as mopping or bathtub scrubbing by making effort, other activities such as car washing can help increasing PAL level when repeated frequently.*

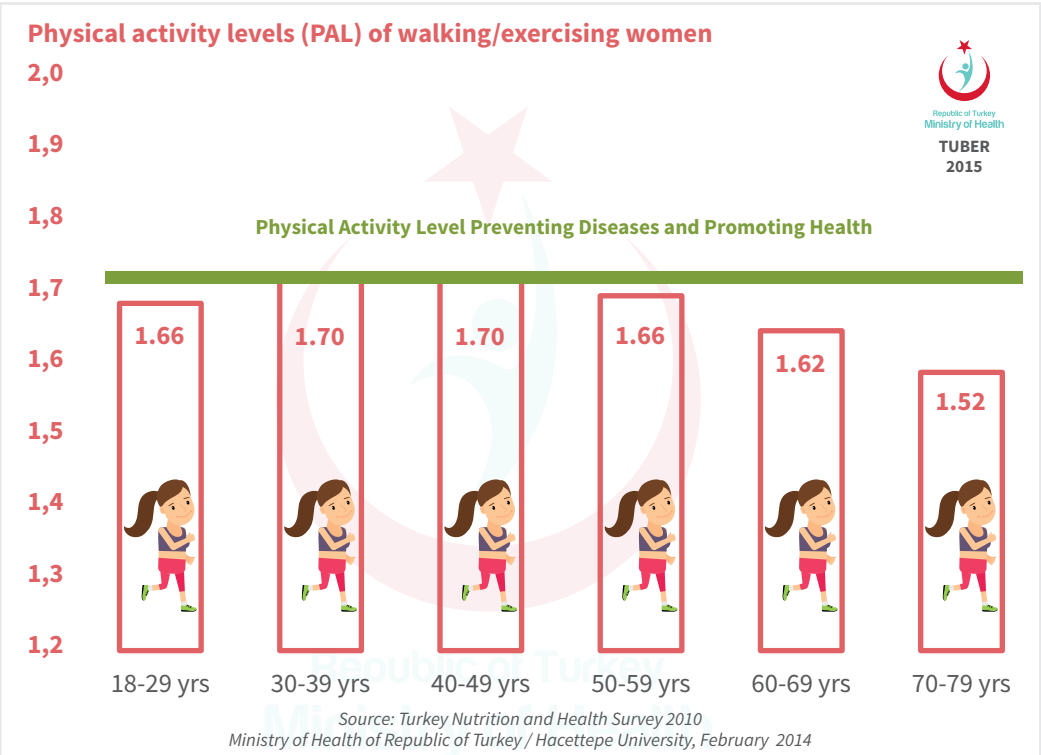
[6] *The activities during which an individual can speak only a few words without gasping for breath are vigorous activities.*

[7] *WHO Global Strategy on Diet, Physical Activity and Health,2010*

ADULTS CAN REACH A HEALTHY ACTIVITY LEVEL WITH EXERCISE HABIT



Appendix 4.8.5. Physical activity levels of low active adult men by age groups with the assumption that to have a habit of brisk walking every day for an hour to reach a desirable PAL



Appendix 4.8.6. Physical activity levels of low active adult women by age groups with the assumption that to have a habit of brisk walking every day for an hour to reach a desirable PAL

Appendix 5

Sample Menu Plans for Different Age Groups

Appendix 5. Sample Menu Plans For Different Age Groups

Appendix 5.1. Boy (4 years old)

He has his breakfast at home,
He goes to kindergarten

Breakfast	½ cup of milk 1 boiled egg ½ portion white cheese ½ small bowl of sliced vegetables 1 thin slice of bread
Snack (Morning snack)	1 medium apple
Lunch	1 bowl of lentil oup ½ portion green peas with meat ½ bowl of yoghurt 1 thin slice of bread
Snack (Afternoon snack)	½ cup of milk ½ thin slice of carrot cake
Dinner	½ portion mealball stew (with sauce) ½ portion rice pilaf with vermicelli 1 small bowl of seasonal salad 1 thin slice of bread
Snack (Evening snack)	1 medium mandarin

Appendix 5.2. Girl (10 years old)

She goes to school by school bus, eats her lunch in school's hall, joins etude after school, doesn't do exercise.

Breakfast	½ cup of milk 1 boiled egg 3-4 olives 1 dessert spoon of honey 1 small bowl of sliced vegetables 2 thin slices of bread
Snack (Morning snack)	1 medium apple
Lunch	½ portion chick peas with meat 1 portion rice pilaf with vermicelli 1 large glass of diluted yoghurt (ayran)
Snack (Afternoon snack)	½ cup of milk 1 handful of hazelnuts
Dinner	1 portion meatball stew ((with sauce) ½ slice of pie with cheese 1 bowl of seasonal salad 1 thin slice of bread
Snack (Evening snack)	1 medium orange

Appendix 5.3. Adolescent Boy (16 years old)

He plays in school's basketball team, trains four times a week.

Breakfast	1 cup of milk 1 boiled egg ½ portion white cheese 1 dessert spoon of honey 3 - 4 walnuts 1 small bowl of sliced vegetables 2 thin slices of bread
Snack (Morning snack)	1 slice of carrot cake 2 medium mandarins
Lunch	1 bowl of tomato soup ½ portion white bean stew with meat 1 portion rice pilaf with vermicelli ½ small bowl of Shepherd's salad 1 medium orange 2 thin slices of bread
Snack (Afternoon snack)	1 portion spinach with minced meat (with yoghurt) 1 portion spaghetti with sauce ½ small bowl of seasonal salad 2 thin slices of bread
Dinner	1 bowl of Ezogelin soup 1 portion meatball stew (with sauce) 1 portion rice pilaf with vermicelli ½ bowl of yoghurt 1 small bowl of seasonal salad 2 thin slices of bread
Snack (Evening snack)	1 medium apple

Appendix 5.4. Adult Woman (42 years old)

She is an officer, she lives with her husband and 2 children, she does houseworks and goes to work on foot.

Breakfast	1 boiled egg 1 portion white cheese 3 - 4 olives 1 dessert spoon of sesame seed paste with grape molasses 1 small bowl of sliced vegetables 2 thin slices of bread
Snack (Morning snack)	1 medium apple
Lunch	1 bowl of broccoli soup ½ portion chick peas with meat 1 portion bulghur pilaf ½ bowl of yoghurt 1 small bowl of seasonal salad 1 thin slice of bread
Snack (Afternoon snack)	1 bowl of yoghurt 2 big walnuts
Dinner	1 portion yayla (rice, yoghurt and mint soup)soup 1 portion baked meatballs ½ portion green beans in olive oil 1 thin slice of bread
Snack (Evening snack)	½ bowl of yoghurt 1 medium orange

Appendix 5.5. Adult Man (36 years old)

He is single, lives alone, he has lunch in workplace's hall, dinners out or making simple foods at home by himself.

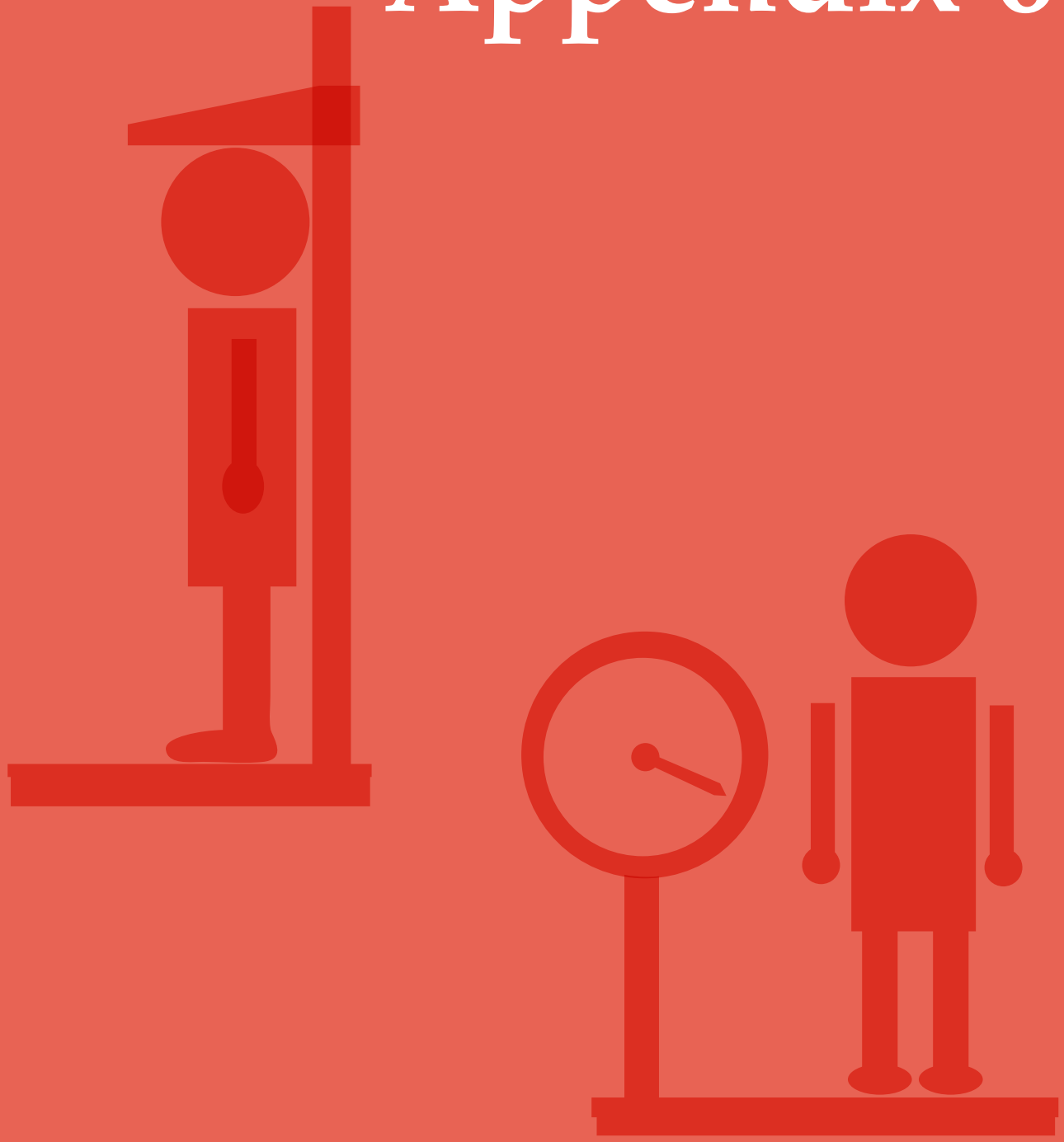
Breakfast	1 vegetable omelette 3 - 4 olives 1 dessert spoon of honey 1 dessert spoon of butter 1 small bowl of seasonal greens 1 medium tomato 2 thin slices of bread
Snack (Morning snack)	½ tea glass of raisin 1 handful of almonds
Lunch	1 portion green beans with meat ½ portion bulghur pilaf 1 bowl of tzatziki 1 small bowl of seasonal salad 1 thin slice of bread
Snack (Afternoon snack)	1 toast with white cheese 1 medium mandarin
Dinner	1 portion red tarhana soup 1 portion grilled meatball ½ portion green lentil salad 1 thin slice of bread 1 medium apple
Snack (Evening snack)	1 bowl of yoghurt

Appendix 5.6. Elderly Man (68 years old)

He is retired, lives with his wife, usually stays at home.

Breakfast	½ cup of milk ½ portion white cheese 1 dessert spoon of honey 3 - 4 olives 1 small bowl of sliced vegetables 2 thin slices of bread
Snack (Morning snack)	1 medium orange
Lunch	1 bowl of tarhana soup 1 portion of Izmir meatball (casserole of meatballs, potatoes, tomatoes and peppers) 1 portion macaroni with green lentil ½ bowl of yoghurt
Snack (Afternoon snack)	½ bowl of yoghurt ⅛ cup of oatmeal 1 fig
Dinner	1 bowl of lentil soup 1 portion grilled fish ½ small bowl of seasonal salad 1 thin slice of bread
Snack (Evening snack)	½ bowl of yoghurt 1 medium apple

Appendix 6



GROWTH STANDARD / REFERENCE VALUES, for 0-19 years (WHO 2006, 2007)

6.1.Body Weight For Age (0 to 5 years and 5.5 to 10 years)

Appendix 6.1.1. Body weight for age: 0 to 5 years (WHO, 2006)

Age			Boys (percentiles) (kg)					Girls (percentiles) (cm)				
Year	Month	Week	3rd	15th	50th	85th	97th	3rd	15th	50th	85th	97th
	0	0	2.5	2.9	3.3	3.9	4.3	2.4	2.8	3.2	3.7	4.2
		1	2.6	3.0	3.5	4.0	4.5	2.5	2.9	3.3	3.9	4.4
		2	2.8	3.2	3.8	4.3	4.9	2.7	3.1	3.6	4.1	4.6
		3	3.1	3.5	4.1	4.7	5.2	2.9	3.3	3.8	4.4	5.0
	1	0	3.4	3.9	4.5	5.1	5.7	3.2	3.6	4.2	4.8	5.4
	3		5.1	5.6	6.4	7.2	7.9	4.6	5.1	5.8	6.7	7.4
	6		6.4	7.1	7.9	8.9	9.7	5.8	6.4	7.3	8.3	9.2
	9		7.2	7.9	8.9	10.0	10.9	6.6	7.3	8.2	9.3	10.4
1	0		7.8	8.6	9.6	10.8	11.8	7.1	7.9	8.9	10.2	11.3
1	6		8.9	9.7	10.9	12.3	13.5	8.2	9.0	10.2	11.6	13.0
2	0		9.8	10.8	12.2	13.7	15.1	9.2	10.1	11.5	13.1	14.6
2	6		10.7	11.8	13.3	15.0	16.6	10.1	11.2	12.7	14.5	16.2
3	0		11.4	12.7	14.3	16.3	18.0	11.0	12.1	13.9	15.9	17.8
3	6		12.2	13.5	15.3	17.5	19.4	11.8	13.1	15.0	17.3	19.5
4	0		12.9	14.3	16.3	18.7	20.9	12.5	14.0	16.1	18.6	21.1
4	6		13.6	15.2	17.3	19.9	22.3	13.2	14.8	17.2	20.0	22.8
5	0		14.3	16.0	18.3	21.1	23.8	14.0	15.7	18.2	21.3	24.4

Source: TWHO Multicentre Growth Reference Study Group. 2006.

Appendix 6.1.2. Body weight for age: 5.5 to10 years (WHO, 2007)

Age Year	Month	Boys (percentiles) (kg)					Girls (percentiles) (kg)				
		3rd	15th	50th	85th	97th	3rd	15th	50th	85th	97th
5	6	15.3	17.0	19.4	22.3	25.1	14.8	16.5	19.1	22.4	25.7
6	0	16.1	17.9	20.5	23.6	26.7	15.5	17.4	20.2	23.7	27.3
6	6	17.0	18.9	21.7	25.0	28.3	16.3	18.2	21.2	25.0	28.9
7	0	17.9	19.9	22.9	26.5	30.1	17.0	19.2	22.4	26.5	30.8
7	6	18.8	21.0	24.1	28.1	32.0	17.9	20.2	23.6	28.1	32.8
8	0	19.8	22.0	25.4	29.7	34.0	18.9	21.3	25.0	29.8	34.9
8	6	20.7	23.1	26.7	31.4	36.2	20.0	22.6	26.6	31.8	37.4
9	0	21.6	24.2	28.1	33.2	38.6	21.1	23.9	28.2	33.9	40.0
9	6	22.6	25.3	29.6	35.2	41.1	22.3	25.3	30.0	36.1	42.7
10	0	23.6	26.6	31.2	37.3	43.9	23.7	26.9	31.9	38.5	45.7

Source: WHO Multicentre Growth Reference Study Group. 2007.

6.2.Lengh/height for age (0 to 5 years and 5.5 to 10 years)

Appendix 6.2.1. Recumbent length and standing height for age: 0 to 5 years (WHO, 2006)

Age			Boys (percentiles) (cm)					Girls (percentiles) (cm)				
Year	Month	Week	3rd	15th	50th	85th	97th	3rd	15th	50th	85th	97th
Recumbent length*												
	0	0	46.3	47.9	49.9	51.8	53.4	45.6	47.2	49.1	51.1	52.7
		1	47.5	49.1	51.1	53.1	54.7	46.8	48.4	50.3	52.3	53.9
		2	48.8	50.4	52.3	54.3	55.9	47.9	49.5	51.5	53.5	55.1
		3	49.8	51.4	53.4	55.4	57.0	48.8	50.5	52.5	54.5	56.1
	1	0	51.1	52.7	54.7	56.7	58.4	50.0	51.7	53.7	55.7	57.4
	3		57.6	59.3	61.4	63.5	65.3	55.8	57.6	59.8	62.0	63.8
	6		63.6	65.4	67.6	69.8	71.6	61.5	63.4	65.7	68.1	70.0
	9		67.7	69.6	72.0	74.3	76.2	65.6	67.6	70.1	72.6	74.7
1	0		71.3	73.3	75.7	78.2	80.2	69.2	71.3	74.0	76.7	78.9
1	6		77.2	79.5	82.3	85.1	87.3	75.2	77.7	80.7	83.7	86.2
2	0		82.1	84.6	87.8	91.0	93.6	80.3	83.1	86.4	89.8	92.5
Standing height**												
2	0		81.4	83.9	87.1	90.3	92.9	79.6	82.4	85.7	89.1	91.8
2	6		85.5	88.4	91.9	95.5	98.3	84.0	87.0	90.7	94.3	97.3
3	0		89.1	92.2	96.1	99.9	103.1	87.9	91.1	95.1	99.0	102.2
3	6		92.4	95.7	99.9	104.0	107.3	91.4	94.8	99.0	103.3	106.7
4	0		95.4	99.0	103.3	107.7	111.2	94.6	98.3	102.7	107.2	110.8
4	6		98.4	102.1	106.7	111.2	115.0	97.6	101.5	106.2	110.9	114.7
5	0		101.2	105.2	110.0	114.8	118.7	100.5	104.5	109.4	114.4	118.4

Source: WHO Multicentre Growth Reference Study Group. 2006

* In children less than 2 years old, recumbent length is measured

** In children over 2 years old, standing height is measured.

Appendix 6.2.1.1. Body weight for recumbent length: 0 to 2 years (WHO, 2006)

Length (cm)	Boys (percentiles) (kg)					Girls (percentiles) (kg)				
	3rd	15th	50th	85th	97th	3th	15th	50th	85th	97th
45.0	2.1	2.2	2.4	2.7	2.9	2.1	2.2	2.5	2.7	2.9
46.0	2.2	2.4	2.6	2.9	3.1	2.2	2.4	2.6	2.9	3.1
47.0	2.4	2.5	2.8	3.1	3.3	2.4	2.6	2.8	3.1	3.3
48.0	2.5	2.7	2.9	3.2	3.5	2.5	2.7	3.0	3.3	3.5
49.0	2.7	2.9	3.1	3.4	3.7	2.7	2.9	3.2	3.5	3.8
50.0	2.8	3.0	3.3	3.7	4.0	2.8	3.1	3.4	3.7	4.0
51.0	3.0	3.2	3.5	3.9	4.2	3.0	3.2	3.6	3.9	4.3
52.0	3.2	3.4	3.8	4.1	4.5	3.2	3.5	3.8	4.2	4.5
53.0	3.4	3.7	4.0	4.4	4.7	3.4	3.7	4.0	4.4	4.8
54.0	3.6	3.9	4.3	4.7	5.0	3.6	3.9	4.3	4.7	5.1
55.0	3.9	4.2	4.5	5.0	5.4	3.9	4.1	4.5	5.0	5.4
56.0	4.1	4.4	4.8	5.3	5.7	4.1	4.4	4.8	5.3	5.8
57.0	4.4	4.7	5.1	5.6	6.0	4.3	4.6	5.1	5.6	6.1
58.0	4.6	5.0	5.4	5.9	6.4	4.5	4.9	5.4	5.9	6.4
59.0	4.9	5.2	5.7	6.2	6.7	4.8	5.1	5.6	6.2	6.7
60.0	5.1	5.5	6.0	6.5	7.0	5.0	5.4	5.9	6.5	7.0

Appendix 6.2.1.1. (continued) Body weight for recumbent length: 0 to 2 years (WHO, 2006)

Length (cm)	Boys (percentiles) (kg)					Girls (percentiles) (kg)				
	3rd	15th	50th	85th	97th	3rd	15th	50th	85th	97th
61.0	5.4	5.8	6.3	6.8	7.4	5.2	5.6	6.1	6.7	7.3
62.0	5.6	6.0	6.5	7.1	7.7	5.4	5.8	6.4	7.0	7.6
63.0	5.8	6.2	6.8	7.4	8.0	5.6	6.0	6.6	7.3	7.9
64.0	6.0	6.5	7.0	7.7	8.2	5.8	6.2	6.9	7.5	8.2
65.0	6.3	6.7	7.3	7.9	8.5	6.0	6.5	7.1	7.8	8.5
66.0	6.5	6.9	7.5	8.2	8.8	6.2	6.7	7.3	8.0	8.7
67.0	6.7	7.1	7.7	8.4	9.1	6.4	6.9	7.5	8.3	9.0
68.0	6.9	7.3	8.0	8.7	9.3	6.6	7.1	7.7	8.5	9.2
69.0	7.1	7.5	8.2	8.9	9.6	6.7	7.3	8.0	8.8	9.5
70.0	7.2	7.7	8.4	9.2	9.9	6.9	7.4	8.2	9.0	9.7
71.0	7.4	8.0	8.6	9.4	10.1	7.1	7.6	8.4	9.2	10.0
72.0	7.6	8.2	8.9	9.7	10.4	7.3	7.8	8.6	9.4	10.2
73.0	7.8	8.4	9.1	9.9	10.7	7.4	8.0	8.8	9.6	10.4
74.0	8.0	8.5	9.3	10.1	10.9	7.6	8.2	9.0	9.9	10.7
75.0	8.2	8.7	9.5	10.4	11.2	7.8	8.3	9.1	10.1	10.9
76.0	8.3	8.9	9.7	10.6	11.4	7.9	8.5	9.3	10.3	11.1
77.0	8.5	9.1	9.9	10.8	11.6	8.1	8.7	9.5	10.5	11.3
78.0	8.7	9.3	10.1	11.0	11.8	8.2	8.9	9.7	10.7	11.5
79.0	8.8	9.4	10.3	11.2	12.1	8.4	9.0	9.9	10.9	11.8
80.0	9.0	9.6	10.4	11.4	12.3	8.6	9.2	10.1	11.1	12.0
81.0	9.1	9.8	10.6	11.6	12.5	8.8	9.4	10.3	11.3	12.2
82.0	9.3	10.0	10.8	11.8	12.7	8.9	9.6	10.5	11.6	12.5
83.0	9.5	10.1	11.0	12.0	13.0	9.1	9.8	10.7	11.8	12.8
84.0	9.7	10.4	11.3	12.3	13.2	9.3	10.0	11.0	12.1	13.1
85.0	9.9	10.6	11.5	12.5	13.5	9.5	10.2	11.2	12.3	13.3
86.0	10.1	10.8	11.7	12.8	13.7	9.8	10.5	11.5	12.6	13.6
87.0	10.3	11.0	12.0	13.1	14.0	10.0	10.7	11.7	12.9	13.9
88.0	10.6	11.3	12.2	13.3	14.3	10.2	10.9	12.0	13.2	14.2
89.0	10.8	11.5	12.5	13.6	14.6	10.4	11.2	12.2	13.4	14.5
90.0	11.0	11.7	12.7	13.8	14.9	10.6	11.4	12.5	13.7	14.8
91.0	11.2	11.9	13.0	14.1	15.1	10.8	11.6	12.7	14.0	15.1
92.0	11.4	12.2	13.2	14.4	15.4	11.0	11.8	13.0	14.2	15.4
93.0	11.6	12.4	13.4	14.6	15.7	11.2	12.1	13.2	14.5	15.7
94.0	11.8	12.6	13.7	14.9	16.0	11.4	12.3	13.5	14.8	16.0
95.0	12.0	12.8	13.9	15.1	16.2	11.6	12.5	13.7	15.1	16.3
96.0	12.2	13.0	14.1	15.4	16.5	11.9	12.7	14.0	15.4	16.6
97.0	12.4	13.2	14.4	15.7	16.8	12.1	13.0	14.2	15.6	16.9
98.0	12.6	13.5	14.6	15.9	17.1	12.3	13.2	14.5	15.9	17.3
99.0	12.8	13.7	14.9	16.2	17.4	12.5	13.5	14.8	16.2	17.6
100.0	13.0	13.9	15.2	16.5	17.8	12.7	13.7	15.0	16.5	17.9
101.0	13.3	14.2	15.4	16.8	18.1	13.0	14.0	15.3	16.9	18.3
102.0	13.5	14.5	15.7	17.2	18.5	13.2	14.2	15.6	17.2	18.6
103.0	13.8	14.7	16.0	17.5	18.8	13.5	14.5	15.9	17.5	19.0
104.0	14.0	15.0	16.3	17.8	19.2	13.7	14.8	16.2	17.9	19.4
105.0	14.2	15.3	16.6	18.2	19.6	14.0	15.1	16.5	18.2	19.8
106.0	14.5	15.5	16.9	18.5	20.0	14.3	15.4	16.9	18.6	20.2
107.0	14.8	15.8	17.3	18.9	20.4	14.5	15.7	17.2	19.0	20.6
108.0	15.0	16.1	17.6	19.3	20.8	14.8	16.0	17.6	19.4	21.1
109.0	15.3	16.4	17.9	19.6	21.2	15.1	16.3	18.0	19.8	21.5
110.0	15.6	16.7	18.3	20.0	21.6	15.4	16.7	18.3	20.2	22.0

Source: WHO Multicentre Growth Reference Study Group. 2006.

Appendix 6.2.1.2. Body weight for standing height: 2 to 5 years (WHO, 2006)

Height (cm)	Boys (percentiles) (kg)					Girls (percentiles) (kg)				
	3rd	15th	50th	85th	97th	3rd	15th	50th	85th	97th
65.0	6.4	6.8	7.4	8.1	8.7	6.1	6.6	7.2	8.0	8.6
66.0	6.6	7.1	7.7	8.4	9.0	6.3	6.8	7.5	8.2	8.9
67.0	6.8	7.3	7.9	8.6	9.3	6.5	7.0	7.7	8.5	9.2
68.0	7.0	7.5	8.1	8.9	9.5	6.7	7.2	7.9	8.7	9.4
69.0	7.2	7.7	8.4	9.1	9.8	6.9	7.4	8.1	8.9	9.7
70.0	7.4	7.9	8.6	9.4	10.1	7.0	7.6	8.3	9.1	9.9
71.0	7.6	8.1	8.8	9.6	10.3	7.2	7.8	8.5	9.4	10.1
72.0	7.8	8.3	9.0	9.8	10.6	7.4	7.9	8.7	9.6	10.4
73.0	7.9	8.5	9.2	10.1	10.8	7.6	8.1	8.9	9.8	10.6
74.0	8.1	8.7	9.4	10.3	11.1	7.7	8.3	9.1	10.0	10.8
75.0	8.3	8.9	9.6	10.5	11.3	7.9	8.5	9.3	10.2	11.1
76.0	8.5	9.0	9.8	10.7	11.6	8.0	8.6	9.5	10.4	11.3
77.0	8.6	9.2	10.0	10.9	11.8	8.2	8.8	9.6	10.6	11.5
78.0	8.8	9.4	10.2	11.1	12.0	8.4	9.0	9.8	10.8	11.7
79.0	8.9	9.5	10.4	11.3	12.2	8.5	9.2	10.0	11.0	11.9
80.0	9.1	9.7	10.6	11.5	12.4	8.7	9.3	10.2	11.2	12.2
81.0	9.3	9.9	10.8	11.8	12.6	8.9	9.5	10.4	11.5	12.4
82.0	9.4	10.1	11.0	12.0	12.9	9.1	9.7	10.7	11.7	12.7
83.0	9.6	10.3	11.2	12.2	13.1	9.3	10.0	10.9	12.0	13.0
84.0	9.8	10.5	11.4	12.5	13.4	9.5	10.2	11.1	12.2	13.3
85.0	10.1	10.7	11.7	12.7	13.7	9.7	10.4	11.4	12.5	13.5
86.0	10.3	11.0	11.9	13.0	13.9	9.9	10.6	11.6	12.8	13.8
87.0	10.5	11.2	12.2	13.2	14.2	10.1	10.9	11.9	13.1	14.1
88.0	10.7	11.4	12.4	13.5	14.5	10.3	11.1	12.1	13.3	14.4
89.0	10.9	11.7	12.6	13.8	14.8	10.5	11.3	12.4	13.6	14.7
90.0	11.1	11.9	12.9	14.0	15.1	10.8	11.5	12.6	13.9	15.0
91.0	11.3	12.1	13.1	14.3	15.3	11.0	11.8	12.9	14.2	15.3
92.0	11.5	12.3	13.4	14.5	15.6	11.2	12.0	13.1	14.4	15.6
93.0	11.7	12.5	13.6	14.8	15.9	11.4	12.2	13.4	14.7	15.9
94.0	11.9	12.7	13.8	15.0	16.1	11.6	12.4	13.6	15.0	16.2
95.0	12.1	12.9	14.1	15.3	16.4	11.8	12.7	13.9	15.3	16.5
96.0	12.3	13.2	14.3	15.6	16.7	12.0	12.9	14.1	15.6	16.9
97.0	12.5	13.4	14.6	15.9	17.0	12.2	13.1	14.4	15.8	17.2
98.0	12.8	13.6	14.8	16.1	17.3	12.4	13.4	14.7	16.1	17.5
99.0	13.0	13.9	15.1	16.4	17.7	12.7	13.6	14.9	16.4	17.8
100.0	13.2	14.1	15.4	16.7	18.0	12.9	13.9	15.2	16.8	18.2
101.0	13.4	14.4	15.6	17.1	18.4	13.1	14.1	15.5	17.1	18.5
102.0	13.7	14.6	15.9	17.4	18.7	13.4	14.4	15.8	17.4	18.9
103.0	13.9	14.9	16.2	17.7	19.1	13.6	14.7	16.1	17.8	19.3
104.0	14.2	15.2	16.5	18.1	19.5	13.9	15.0	16.4	18.1	19.7
105.0	14.4	15.4	16.8	18.4	19.9	14.2	15.3	16.8	18.5	20.1
106.0	14.7	15.7	17.2	18.8	20.3	14.5	15.6	17.1	18.9	20.5
107.0	14.9	16.0	17.5	19.1	20.7	14.7	15.9	17.5	19.3	21.0
108.0	15.2	16.3	17.8	19.5	21.1	15.0	16.2	17.8	19.7	21.4
109.0	15.5	16.6	18.2	19.9	21.5	15.4	16.6	18.2	20.1	21.9
110.0	15.8	16.9	18.5	20.3	22.0	15.7	16.9	18.6	20.6	22.4
111.0	16.1	17.2	18.9	20.7	22.4	16.0	17.3	19.0	21.0	22.8
112.0	16.3	17.6	19.2	21.1	22.9	16.3	17.6	19.4	21.5	23.4
113.0	16.6	17.9	19.6	21.6	23.4	16.7	18.0	19.8	21.9	23.9
114.0	17.0	18.2	20.0	22.0	23.8	17.0	18.4	20.2	22.4	24.4
115.0	17.3	18.6	20.4	22.4	24.3	17.3	18.7	20.7	22.9	24.9
116.0	17.6	18.9	20.8	22.9	24.8	17.7	19.1	21.1	23.4	25.5
117.0	17.9	19.3	21.2	23.3	25.3	18.0	19.5	21.5	23.8	26.0
118.0	18.2	19.6	21.6	23.8	25.8	18.4	19.9	22.0	24.3	26.5
119.0	18.5	20.0	22.0	24.2	26.3	18.7	20.3	22.4	24.8	27.1
120.0	18.8	20.3	22.4	24.7	26.8	19.1	20.6	22.8	25.3	27.6

Source : WHO Multicentre Growth Reference Study Group. 2006.

Appendix 6.2.2. Height for age: 5.5 to 19 years (WHO, 2007)

Year	Month	Boys (percentiles) (cm)					Girls (percentiles) (cm)				
		3rd	15th	50th	85th	97th	3rd	15th	50th	85th	97th
5	6	104.0	108.0	112.9	117.8	121.8	102.9	107.1	112.2	117.3	121.5
6	0	106.7	110.8	116.0	121.1	125.2	105.5	109.8	115.1	120.4	124.8
6	6	109.3	113.6	118.9	124.2	128.5	108.0	112.5	118.0	123.5	127.9
7	0	111.8	116.3	121.7	127.2	131.7	110.5	115.1	120.8	126.5	131.1
7	6	114.3	118.9	124.5	130.2	134.8	113.1	117.8	123.7	129.5	134.3
8	0	116.6	121.4	127.3	133.1	137.9	115.7	120.5	126.6	132.6	137.5
8	6	119.0	123.9	129.9	136.0	140.9	118.3	123.3	129.5	135.7	140.7
9	0	121.3	126.3	132.6	138.8	143.9	121.0	126.2	132.5	138.8	144.0
9	6	123.5	128.8	135.2	141.6	146.8	123.8	129.1	135.5	142.0	147.3
10	0	125.8	131.2	137.8	144.4	149.8	126.6	132.0	138.6	145.3	150.7
10	6	128.1	133.6	140.4	147.2	152.7	129.5	135.0	141.8	148.6	154.1
11	0	130.5	136.1	143.1	150.1	155.8	132.5	138.1	145.0	151.9	157.5
11	6	133.0	138.8	146.0	153.1	159.0	135.5	141.2	148.2	155.2	160.9
12	0	135.8	141.7	149.1	156.4	162.4	138.4	144.1	151.2	158.3	164.1
12	6	138.8	144.9	152.4	160.0	166.1	141.0	146.8	154.0	161.2	167.0
13	0	142.1	148.3	156.0	163.7	170.0	143.3	149.2	156.4	163.6	169.4
13	6	145.4	151.8	159.7	167.5	173.9	145.2	151.1	158.3	165.5	171.4
14	0	148.7	155.2	163.2	171.2	177.6	146.7	152.6	159.8	167.0	172.8
14	6	151.7	158.3	166.3	174.4	180.9	147.9	153.7	160.9	168.1	173.9
15	0	154.3	160.9	169.0	177.0	183.6	148.7	154.5	161.7	168.8	174.6
15	6	156.5	163.1	171.1	179.2	185.8	149.3	155.1	162.2	169.3	175.0
16	0	158.3	164.8	172.9	181.0	187.5	149.8	155.5	162.5	169.6	175.3
16	6	159.7	166.2	174.2	182.2	188.7	150.0	155.7	162.7	169.7	175.4
17	0	160.8	167.2	175.2	183.1	189.5	150.3	155.9	162.9	169.8	175.4
17	6	161.5	167.9	175.8	183.6	190.0	150.5	156.1	163.0	169.9	175.5
18	0	162.1	168.4	176.1	183.9	190.2	150.6	156.2	163.1	169.9	175.5
18	6	162.5	168.7	176.4	184.0	190.3	150.8	156.3	163.1	169.9	175.5
19	0	162.8	169.0	176.5	184.1	190.3	150.9	156.4	163.2	169.9	175.5

Source: WHO Multicentre Growth Reference Study Group. 2006.

In children and adolescents; body weight for age, height for age, body weight for height, and BMI for age are evaluated according to the percentile values set out in Appendix 6.3. BMI values according to age are given in Table 8.2-Table 8.5.

Appendix 6.3. Evaluation according to percentiles

Percentiles	Evaluation
< 3rd percentile	Wasted / Underweight / Stunted
≥3rd - <15th percentile	Risk of wasted/Underweight / Short
≥15th - <85th percentile	Normal
≥85th - <97th percentile	Overweight / Tall
≥97th percentile	Obese / Very tall

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