

HEALTH PROMOTION AND DISEASE PREVENTION A Handbook for Teachers, Researchers, Health Professionals and Decision Makers	
Title	Healthy Nutrition
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Key words	Nutrition, health, prevention
Learning objectives	After completing this module students and public health professionals should: <ul style="list-style-type: none"> • define healthy nutrition • recognise health food and healthy feeding • understand all about healthy nutrition • improve knowledge in nutrition
Abstract	<p>Many costly and disabling conditions - cardiovascular diseases, cancer, diabetes and chronic respiratory diseases - are linked by common preventable risk factors. Tobacco use, prolonged, unhealthy nutrition, physical inactivity, and excessive alcohol use are major causes and risk factors for these conditions. The ongoing nutritional transition expressed through increased consumption of high fat and high salt food products will contribute to the rising burden of heart disease, stroke, obesity and diabetes. Changes in activity patterns as a consequence of the rise of motorised transport, sedentary leisure time activities such as television watching will lead to physical inactivity in all but the poorest populations. Many diseases can be prevented, yet health care systems do not make the best use of their available resources to support this process. All too often, health care workers fail to seize patient interactions as opportunities to inform patients about health promotion and disease prevention strategies.</p> <p>Nutrition is an input to and foundation for health and development. Interaction of infection and malnutrition is well-documented. Better nutrition means stronger immune systems, less illness and better health. Healthy children learn better. Healthy people are stronger, are more productive and more able to create opportunities to gradually break the cycles of both poverty and hunger in a sustainable way. Better nutrition is a prime entry point to ending poverty and a milestone to achieving better quality of life.</p>

Teaching methods	The introduction lecture relating to basic definitions and concepts. The guided discussion in small groups. The distribution of topics for seminar papers to each student. The presentation and evaluation for seminar paper. Learning how to measure with specific equipement.
Specific recommendations for teachers	Module to be organized in 0.5 ECTS
Assessment of students	Multiple choice questionnaire (MCQ) and seminar paper.

HEALTHY NUTRITION

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Introduction

Due to increased standard of living for people worldwide and public health successes, populations are ageing and increasingly, people are living with one or more chronic conditions for decades. This places new, long-term demands on health care systems. Not only are chronic conditions projected to be the leading cause of disability throughout the world by the year 2020; if not successfully prevented and managed, they will become the most expensive problems faced by our health care systems. People with diabetes, for example, generate health care costs that are two to three times those without the condition, and in Latin America the costs of lost production due to diabetes are estimated to be five times the direct health care costs. In this respect, chronic conditions pose a threat to all countries from a health and economic standpoint.

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In 1998, NIH (National Heart, Lung and Blood Institute of the National Institutes of Health) published evidence based clinical guidelines on the identification, evaluation, and treatment of overweight and obesity (2). These guidelines included BMI (Body Mass Index), which calculated as weight in kilograms divided by the square of height in meters-kg/m², and WC (waist circumference). This classification system was divided in 6 categories

Underweight < 18.5

Normal weight (18.5-24.9)

Overweight (25.0-29.9)

Obese-I class (30.0-34.9)

Obese-II class (35.0-39.9)

Obese-III class >40.0

BMI-for-age

BMI is used differently for children. It is calculated the same way as for adults, but then compared to typical values for other children of the same age. Instead of set thresholds for underweight and overweight, then, the BMI percentile allows comparison with children of the same gender and age. A BMI that is less than the 5th percentile is considered underweight and above the 95th percentile is considered overweight. Children with a BMI between the 85th and 95th percentile are considered to be at risk of becoming overweight.

WC categories were divided into two groups (normal – WC less than 102 cm in men

and less than 94 cm in women). The health risk increased when the BMI moved to higher group (3). The same in case is with WC where also was notified that people with greater WC have greater risk than patients with normal WC values. Increased visceral fat has been associated with increased plasma triglycerides (TG), decreased high-density lipoprotein (HDL), cholesterol, and increased glucose levels, as well as with type 2 diabetes (4, 5, 6).

The first National Health Examination Survey covering 1960-62. estimated the prevalence of obesity to be 13.4% (7). In the United States more than 64% of adults aged 20 to 74 were overweight or obese according to the NHANES (8). Obesity is associated with conventional cardiovascular risk factors (eg. hypertension, dyslipidemia, and diabetes mellitus), (9).

Lately, obesity is also associated with so called novel risk factors (inflammatory markers such as high-sensitivity C-reactive protein [hs-CRP] and interleukin-6 [IL-6]). (10). Obesity is now the second most preventable cause of death in USA (11).

Nutrition is an input to and foundation for health and development. Interaction of infection and malnutrition is well-documented. Better nutrition means stronger immune systems, less illness and better health. Healthy children learn better. Healthy people are stronger, are more productive and more able to create opportunities to gradually break the cycles of both poverty and hunger in a sustainable way. Better nutrition is a prime entry point to ending poverty and a milestone to achieving better quality of life (1).

Food Pyramid

The Food Pyramid, developed by the US Department of Agriculture (USDA), is an excellent tool to help you make healthy food choices. The food pyramid can help you choose from a variety of foods so you get the nutrients you need, and the suggested serving sizes can help you control the amount of calories, fat, saturated fat, cholesterol, sugar or sodium in your diet (12).

Breads, grains, cereals and pastas

At the base of the food pyramid, there is the group that contains breads, grains, cereals and pastas. These foods provide complex carbohydrates, which are an important source of energy, especially for a low-fat meal plan. You can make many low-fat choices from foods in this group. You will need 6 to 11 servings of these foods in a day. One serving of this group can be:

- 1 slice of bread
- 1/2 cup of rice, cooked cereal or pasta
- 1 cup of ready-to-eat cereal
- 1 flat tortilla

Try to eat whole-grain breads, cereal and pasta for most of your servings from this group. Whole-grain foods (which are made with whole wheat flour) are less processed and retain more valuable vitamins, minerals and fiber than foods made with white flour.

Fruits and Vegetables

Fruits and vegetables are rich in nutrients. Many are excellent sources of vitamin A, vitamin C, folate or potassium. They are low in fat and sodium and high in fiber. The Food Pyramid suggests 3 to 5 servings of vegetables each day. One serving of vegetables can be:

- 1 cup of raw leafy vegetables
- 1/2 cup of other vegetables, cooked or raw
- 3/4 cup of vegetable juice

The Food Pyramid suggests 2 to 4 servings of fruit each day. One serving of fruit can be:

- One medium apple, orange or banana
- 1/2 cup of chopped, cooked or canned fruit
- 3/4 cup of fruit juice

Figure 1. Food Pyramid (13)



Beans, Eggs, Lean Meat and Fish

Meat, poultry and fish supply protein, iron and zinc. Non-meat foods such as dried peas and beans also provide many of these nutrients. The Food Pyramid suggests 2 to 3 servings of cooked meat, fish or poultry. Each serving should be between 2 and 3 ounces. The following foods count as one ounce of meat. (An ounce is equal to 437.5 grains, 1/16 of a pound, or 28.350 grams), (14):

- One egg
- 2 tablespoons of peanut butter
- 1/2 cup cooked dry beans
- 1/3 cup of nuts

Dairy Products

Products made with milk provide protein and vitamins and minerals, especially calcium. The Food Pyramid suggests 2 to 3 servings each day. If you are breastfeeding, pregnant, a teenager or a young adult age 24 or under, try to have 3 servings. Most other people should have 2 servings daily.

Fats and Sweets

A food pyramid's tip is the smallest part, so the fats and sweets in the top of the Food Pyramid should comprise the smallest percentage of your daily diet. The foods at the top of the food pyramid should be eaten sparingly because they provide calories but not much in the way of nutrition. These foods include salad dressings, oils, cream, butter, margarine, sugars, soft drinks, candies and sweet desserts.

Calory needs

You need to have enough calories every day in order for your body to have the nutrients it needs. How many calories that actually amounts to depends on a variety of factors including your:

- Age
- Sex
- Size
- Activity level
- Special Needs such as pregnancy and dieting, or chronic illness

The Dietary Guidelines for Americans are the cornerstone of Federal nutrition policy and nutrition education activities. They are jointly issued and updated every 5 years by the Departments of Agriculture (USDA) and Health and Human Services (HHS). The Dietary Guidelines provide authoritative advice for people two years and older about how good dietary habits can promote health and reduce risk for major chronic diseases.

Components of energy requirements

Basal metabolism. This comprises a series of functions that are essential for life, such as cell function and replacement; the synthesis, secretion and metabolism of enzymes and hormones to transport proteins and other substances and molecules; the maintenance of body temperature; uninterrupted work of cardiac and respiratory muscles; and brain function. The amount of energy used for basal metabolism in a period of time is called the *basal metabolic rate (BMR)*, and is measured under standard conditions that include being awake in the supine position after ten to 12 hours of fasting and eight hours of physical rest, and being in a state of mental relaxation in an ambient environmental temperature that does not elicit heat-generating or heat-dissipating processes. Depending on age and lifestyle, BMR represents 45 to 70 percent of daily total energy expenditure, and it is determined mainly by the individual's age, gender, body size and body composition.

Physical activity. This is the most variable and, after BMR, the second largest component of daily energy expenditure. Humans perform *obligatory* and *discretionary* physical activities. Obligatory activities can seldom be avoided within a given setting, and they are imposed on the individual by economic, cultural or societal demands. The term "obligatory" is more comprehensive than the term "occupational" that was used in the 1985 report (WHO, 1985) because, in addition to occupational work, obligatory activities include daily activities such as going to school, tending to the home and family and other demands made on children and adults by their economic, social and cultural environment.

Discretionary activities, although not socially or economically essential, are important for health, well-being and a good quality of life in general. They include the regular practice of physical activity for fitness and health; the performance of optional household tasks that may contribute to family comfort and well-being; and the engagement in individually and socially desirable activities for personal enjoyment, social interaction and community development.

Estimated Average Requirement (EAR)

This is an estimate of the average requirement for energy or a nutrient - approximately 50% of a group of people will require less, and 50% will require more. For a group of people receiving adequate amounts, the range of intakes will vary around the EAR.

Reference Nutrient Intake (RNI): The RNI is the amount of a nutrient that is enough to ensure that the needs of nearly all the group (97.5%) are being met. By definition, many within the group will need less.

Lower Reference Nutrient Intake (LRNI)

The amount of a nutrient that is enough for only the small number of people who have low requirements (2.5%). The majority need more.

Energy requirements

The EARs for energy are based on the present lifestyles and activity levels of the UK population. Energy requirements are related to age, gender, body size and level of activity. Energy requirements tend to increase up to the age of 15-18 years. On average, boys have slightly higher requirements than girls and this persists throughout adulthood. After the age of about 18 years energy requirements tend to be lower, but this depends on the individual's level of activity. By the age of 50 years, energy requirements are lower still which is partly due to a reduction in the basal metabolic rate (BMR) and to a reduced level of activity.

The EARs for various groups are shown in Table 1.

(Joule (J) is the amount of mechanical energy required to displace a mass of 1 kg through a distance of 1 m with an acceleration of 1 m per second ($1 \text{ J} = 1 \text{ kg} \times 1 \text{ m}^2 \times 1 \text{ sec}^{-2}$). Multiples of 1 000 (kilojoules, kJ) or 1 million (megajoules, MJ) are used in human nutrition. The conversion factors between joules and calories are: $1 \text{ kcal} = 4.184 \text{ kJ}$, or conversely, $1 \text{ kJ} = 0.239 \text{ kcal}$.)

The EARs for adults are based on the current lifestyle in the UK which is fairly sedentary. The EARs were calculated by multiplying BMR by a factor – the Physical Activity Level or PAL – which reflects current levels of physical activity.

Table 1. Estimated Average Requirements for Energy (15)

Age	EAR - MJ/day (Kcal/day)			
	Males		Females	
	(MJ)	(Kcal)	(MJ)	(Kcal)
0-3 mo	2.28	(545)	2.16	(515)
4-6 mo	2.89	(690)	2.69	(645)
7-9 mo	3.44	(825)	3.20	(765)
10-12 mo	3.85	(920)	3.61	(865)
1-3 yr	5.15	(1230)	4.86	(1165)
4-6 yr	7.16	(1715)	6.46	(1545)
7-10 yr	8.24	(1970)	7.28	(1740)
11-14 yr	9.27	(2220)	7.72	(1845)
15-18 yr	11.51	(2755)	8.83	(2110)
19-50 yr	10.60	(2550)	8.10	(1940)
51-59 yr	10.60	(2550)	8.00	(1900)
60-64 yr	9.93	(2380)	7.99	(1900)
65-74 yr	9.71	(2330)	7.96	(1900)
74+ yr	8.77	(2100)	7.61	(1810)

Energy EAR = BMR x Physical Activity Level (PAL).

A factor, or multiple of BMR, of 1.4 reflects the lifestyle of most adults in the UK. This factor is suitable for people who do little physical activity at work or in leisure time. If people are more active, larger factors (PALs) are used. For example a PAL of 1.9 would be appropriate for very active adults.

Special note

The EAR for women who become pregnant increases by 0.8 MJ/day (200 kcal/day) but only in the final three months. Although energy is needed for the growth of the fetus and to enable fat to be deposited in the mother's body, pregnant women can compensate for these extra demands by becoming less active and using energy more efficiently.

Breastfeeding mothers have increased requirements for energy but this will depend on the amount of milk produced, the fat stores that have accumulated during pregnancy and the duration of breastfeeding (15).

Calculation of energy requirements

The total energy expenditure of free-living persons can be measured using the doubly labelled water technique (DLW) or other methods that give comparable results. Among these, individually calibrated heart rate monitoring has been successfully validated. Using these methods, measurements of total energy expenditure over a 24-hour period include the metabolic response to food and the energy cost of tissue synthesis. For adults, this is equivalent to daily energy requirements. Additional energy for deposition in growing tissues is needed to determine energy requirements in infancy, childhood, adolescence and during pregnancy, and for the production and secretion of milk during lactation. It can be estimated from calculations of growth (or weight gain) velocity and the composition of weight gain, and from the average volume and composition of breastmilk (16).

Good nutrition and regular physical activity are fundamental to healthy living. According to the National Institutes of Health, sedentary lifestyles and unhealthy eating are linked to an increased risk of more than 20 physical ailments as well as a number of psychological problems. Specifically, poor eating and activity habits are major contributors to cancer, coronary heart disease, hypertension, diabetes, and stroke. (17).

Knowing what to eat can be confusing. Everywhere you turn, there is news about what is or isn't good for you. Some basic principles have weathered the fad diets, and have stood the test of time. Here are a few tips on making healthful food choices for you and your entire family.

- Eat lots of vegetables and fruits. Try picking from the rainbow of colors available to maximize variety. Eat non-starchy vegetables such as spinach, carrots, broccoli or green beans with meals;
- Choose whole grain foods over processed grain products. Try brown rice with your stir fry or whole wheat spaghetti with your favorite pasta sauce;
- Include dried beans (like kidney or pinto beans) and lentils into your meals;
- Include fish in your meals 2-3 times a week;
- Choose lean meats like cuts of beef and pork that end in "loin" such as pork loin and sirloin. Remove the skin from chicken and turkey;
- Choose non-fat dairy such as skim milk, non-fat yogurt and non-fat cheese;
- Choose water and calorie-free "diet" drinks instead of regular soda, fruit punch, sweet tea and other sugar-sweetened drinks;

- Choose liquid oils for cooking instead of solid fats that can be high in saturated and *trans* fats. Remember that fats are high in calories. If you're trying to lose weight, watch your portion sizes of added fats;
- Cut back on high calorie snack foods and desserts like chips, cookies, cakes, and full-fat ice cream;
- Eating too much of even healthful foods can lead to weight gain. Watch your portion sizes (18).

Exercises

Task 1:

Calculate your Body Mass Index

Task 2:

Calculate your energy necessity

Task 3:

The distribution of topics for seminar papers. Each student should choose one of suggested topics, find and read appropriate paper. After consultations with tutor and corrections, if any, student should prepare Power Point presentation for final discussion. During this session the quality of the paper and presentation will be evaluated and discussed.

Task 4:

Proposal for meny in kindergarden.

List of potential topics for seminar papers:

1. Healthy nutrition in pregnancy
2. Healthy nutrition for old people
3. Prevention of obesity in childhood
4. Healthy food – how to choose and prepare
5. Health risk for obesity
6. Health nutrition in community
7. The relationship between water and nutrition

References:

1. WHO. Title of the reference. Available from: www.who.int (Accessed: 07.08.2007).
2. National Heart, Lung and Blood Institute. Clinical guidelines on the identification, evaluation and treatment of overweight and obesity in adults: the evidence report. *Obes Res* 1998;6(2):S51-S210.
3. Brown CD, Higgins M, Donato KA, et al. Body mass index and prevalence of hypertension and dyslipidemia. *Obes Res* 2000; 8:605-19
4. Despres JP, Moorjani S, Ferland M, et al. Adipose tissue distribution and plasma lipoprotein levels in obese women: importance of intra-abdominal fat. *Arteriosclerosis* 1989; 9:203-10
5. Fujioka S, Matsuzawa Y, Tokunaga K, et al. Contribution of intra-abdominal fat accumulation to the impairment of glucose and lipid metabolism in human obesity. *Metabolism* 1987; 36:54-9
6. Shuman WP, Morris LL, Leonetti DL, et al. Abnormal body fat distribution detected by computed tomography in diabetic men. *Invest Radiol* 1986; 21:483-7
7. Flegal KM, Carroll MD, Kuczmarski RJ, Johnson CL. et al. Overweight and obesity in the United States: prevalence and trends, 1960-1994. *Int J Obes Relat Metab Disord* 1998; 22:39-47
8. National Center for Health Statistics. Prevalence of overweight and obesity among adults: United States, 1999 – 2000. Available from: www.cdc.gov (Accessed: 07.08.2007).
9. Han TS, van Leer EM, Seidell JC et al. Waist circumference action levels in the identifications of cardiovascular risk factors: prevalence study in a random sample. *BMJ* 1995; 311:1401-5.

10. Pradhan AD, Skerrett PJ, Manson JE. Obesity, diabetes and coronary risk in women. *J Cardiovasc Risk*. 2002; 9:323-30.
11. Davis RB, Turner LW. A review of current weight management: research and recommendations. *Journal of the American Academy of Nurse Practitioners* 2001; 13 (1):15-9
12. Steps to a Healthier You. Available from: <http://www.mypyramid.gov/> (Accessed: 06.08.2007).
13. American Diabetes Association. Using the Diabetes Food Pyramid.
14. Available from: <http://www.diabetes.org/nutrition-and-recipes/nutrition/foodpyramid.jsp> (Accessed: 09.08.2007).
15. Safety Emporium. Mass Conversion Calculator. Available from: <http://www.ilpi.com/msds/ref/massunits.html> (Accessed: 03.08.2007).
16. British Nutrition Foundation. Food and Fitness for Life. Available from: www.nutrition.org.uk (Accessed: 09.08.2007).
17. Food and Agriculture Organization of the United Nations. Global plan of action for animal genetic resources adopted. Available from: www.fao.org (Accessed: 02.08.2007).
18. Prevention Institute. Nutrition and Physical Activity. Available from: <http://www.preventioninstitute.org/nutrition.html> (Accessed: 02.08.2007).
19. American Diabetes Association. Making Healthy Choices. Available from: <http://www.diabetes.org/nutrition-and-recipes/nutrition/healthyfoodchoices.jsp> (Accessed: 01.08.2007).