

Republic of Kenya



Ministry of Health

# **National Guidelines for Healthy Diets**

**and Physical Activity**

**2017**

National Guidelines for Healthy Diets

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To all of you I say thank you.



**GLADYS MUGAMBI**

**HEAD, NUTRITION AND DIETETICS UNIT**



## FOREWORD

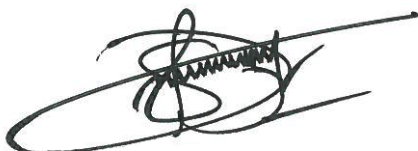
The Kenya Health Sector Strategic and Investment Plan (KHSSP) 2013-2017 is guided by Kenya's Vision 2030, which aims to transform Kenya into a "globally competitive and prosperous country with a high quality of life by 2030." The KHSSP acknowledges that improved health is a critical driver to the achievement of this vision. Good health cannot be achieved without adequate nutrition. Three of the plan's strategic objectives therefore have critical actions related to the improvement of nutritional status and food and nutrition related behaviours. These are:

- **Strategic Objective 2:** Halt, and reverse rising burden of noncommunicable diseases (NCDs)
- **Strategic Objective 5:** Minimise exposure to the major health risk factors
- **Strategic Objective 6:** Strengthen collaboration with health-related sectors

The Food and Nutrition Security Policy (FNSP) 2011 goals are to ensure that all Kenyans, throughout their lifecycle enjoy at all times safe food and water in sufficient quantity and quality to satisfy their nutritional needs for optimal health. The objectives of the policy are to: achieve adequate nutrition for optimum health of all Kenyans; increase the quantity and quality of food available, accessible and affordable to all Kenyans at all times; and protect vulnerable populations using innovative and cost-effective safety nets linked to long-term development. The National Nutrition Action Plan (NNAP) 2012–2017, which is based on the FNSP recognises the need to address the double burden of malnutrition, presenting as overnutrition and undernutrition.

The Ministry of Health, through the Nutrition and Dietetics Unit (NDU), has developed the National **Guidelines for Healthy Diets and Physical Activity** through a broad consultative process. The Guidelines aim to promote healthy eating and active living as preventive measures that can help reduce the double burden of malnutrition, as well as diet and physical inactivity related to noncommunicable diseases (NCDs). They complement the long-established and ongoing work carried out by the Ministry of Health through the NDU and other stakeholders on other areas of nutrition, such as micronutrient deficiencies control, maternal infant and young child nutrition and strengthening the linkages between health, nutrition and agriculture.

The Guidelines identify the resources and national/county focal points that would be necessary to facilitate implementation and outlines collaborative opportunities across key sectors such as Agriculture, Education, Urban Planning, Gender and Sports, Transport and Communication, and Monitoring and Evaluation. They are intended for use across sectors by professionals including health managers, health care workers, implementing partners, training institutions, agriculture extension workers among others in all their efforts to promote optimal nutrition and health.



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## ACRONYMS AND ABBREVIATIONS

|              |   |
|--------------|---|
| <b>ACSM</b>  | Advocacy, Communication and Social Mobilisation     |
| <b>AWP</b>   | Annual Work Plans                                   |
| <b>BIA</b>   | Bioelectrical Impedance Analysis                    |
| <b>BMI</b>   | Body Mass Index                                     |
| <b>DHS</b>   | Demographic Health Survey                           |
| <b>FAO</b>   | Food and Agriculture Organization                   |
| <b>FBDG</b>  | Food Based Dietary Guidelines                       |
| <b>FFQ</b>   | Food Frequency Questionnaire                        |
| <b>FNSP</b>  | Food and Nutrition Security Policy                  |
| <b>GDP</b>   | Gross Domestic Product                              |
| <b>IEC</b>   | Information, Education and Communication            |
| <b>KHSSP</b> | Kenya Health Sector Strategic and Investment Plan   |
| <b>KNDI</b>  | Kenya Nutritionists and Dieticians Institute        |
| <b>KNNCF</b> | Kenya National Nutrition Capacity Framework         |
| <b>MET</b>   | Metabolic Equivalent                                |
| <b>MIYCN</b> | Maternal, Infant and Young Child Nutrition          |
| <b>MNP</b>   | Micronutrient Powders                               |
| <b>MOH</b>   | Ministry of Health                                  |
| <b>MUAC</b>  | Mid-Upper Arm Circumference                         |
| <b>NCDs</b>  | Noncommunicable Diseases                            |
| <b>NDU</b>   | Nutrition and Dietetics Unit                        |
| <b>NGO</b>   | Non-Governmental Organisations                      |
| <b>NNAP</b>  | National Nutrition Action Plan                      |
| <b>PAGAC</b> | Physical Activity Guidelines Advisory Committee     |
| <b>PMTCT</b> | Prevention of Mother to Child Transmission (of HIV) |
| <b>RDA</b>   | Recommended Dietary Allowance                       |
| <b>RNI</b>   | Recommended Nutrient Intake                         |
| <b>TBW</b>   | Total Body Water                                    |
| <b>TOT</b>   | Training of Trainers                                |
| <b>WHO</b>   | World Health Organization                           |

## DEFINITION OF TERMS

|  |  |
|--|--|
| <b>Advocacy</b>                        | The act of supporting a cause or issue to achieve a desired result; or an action directed at changing policies, positions, or programs and resource allocation decisions within political, economic, and social systems and institutions.  |
| <b>Aerobic physical activity</b>       | Means the body's large muscles move in a rhythmic way for a sustained period. This improves cardio-respiratory fitness (heart and lungs). Aerobic activity is also called endurance activity. Examples include walking, running, swimming and cycling.   |
| <b>Aflatoxins</b>                      | A form of naturally occurring poison produced by certain fungi, mainly found in maize, oil-seeds, spices, groundnuts, tree nuts and dried fruit.   |
| <b>Breastfeeding</b>                   | Feeding an infant or young child with breast milk, either directly from the breast or expressed.   |
| <b>Complementary feeding</b>           | Introduction of or giving other suitable foods and liquids to infants in addition to breast milk from 6 months.  |
| <b>Communication</b>                   | The process by which information is exchanged between individuals through a common system of symbols, signs, or behaviour. Communication activities make use of some form of media or channel of communication (e.g. mass media, social media, community media, and interpersonal communication). Communication is a two-way process, with "participation" and "dialogue" as key elements. |
| <b>Frequency</b>                       | The number of times you perform an exercise or activity, expressed in sessions, episodes or bouts per week.  |
| <b>Healthy diet</b>                    | Diet that provides an adequate amount and variety of nutritious safe foods to cover (but not exceed) a person's energy and nutrient needs.   |
| <b>Health-related physical fitness</b> | A physiological state of well being that reduces the risk of hypokinetic disease: a basis for participation in sports; and vigour for the tasks of daily living. Components include cardio-respiratory endurance, muscle strength endurance, flexibility, and body composition.  |
| <b>Intensity</b>                       | The amount of effort you make, and can vary depending on the activity. It means how much work you are doing or how much you have to push yourself to perform an activity or exercise.  |
| <b>Kilocalorie (kcal)</b>              | A unit of energy; usually called a calorie. The energy you get from food and the energy you use in physical activity can be expressed in calories.   |
| <b>Moderate-intensity</b>              | Activity that raises your heartbeat and leaves you feeling warm and slightly out of breath. It increases the body's metabolism to 3–6 times the resting level (also called metabolic equivalents (METs)).  |
| <b>Physical activity</b>               | "Any bodily movement produced by skeletal muscles that requires energy expenditure above resting level". This means that virtually all types of physical activity count, including walking or cycling, dance, traditional games and pastimes, gardening and housework, as well as sport or deliberate exercise.  |
| <b>Physical fitness</b>                | A set of physical attributes related to a person's ability to perform physical activity successfully, without undue strain and with a margin of safety.  |

|                                       |  |
|---------------------------------------|--|
| <b>Progression</b>                    | Means that once you reach a certain fitness level, you progress to a higher level of physical activity by continuing to push yourself and change your routine. Small, progressive changes help your body adapt to the additional stress while minimising your risk of injury.  |
| <b>Overload</b>                       | Is the stress placed on your body when you are more physically active than usual. You achieve overload by increasing the frequency, duration and intensity of your activity – pushing yourself harder, for longer, more often.   |
| <b>Resource mobilisation</b>          | The process by which an organisation acquires and manages the financial, human and logistical resources it needs to fulfil its mission. Resource mobilisation in this case refers to a process of raising different types of support either in cash or in-kind to support the implementation of the National Guidelines for Healthy Diets. |
| <b>Skill-related physical fitness</b> | Common components of physical fitness (e.g., agility, balance, coordination, speed, power, reaction time) that enable participation in sports and other physical activities; also called performance or motor fitness.   |
| <b>Sedentary</b>                      | Means that your lifestyle is not very active. This happens if you sit most of the time, at work and at home. Sedentary activities include computer work and driving. You can balance these by having more active leisure time.   |
| <b>Social mobilisation</b>            | A process that engages, unites and motivates a wide range of partners and allies at national and local levels to raise awareness of, and demand for a particular development objective through dialogue.   |
| <b>Specificity</b>                    | Means that the benefits of physical activity are specific to the body systems that are doing the work. For example, aerobic physical activity largely benefits your cardiovascular system (heart and lungs).   |
| <b>Sport</b>                          | Sport is a particular type of physical activity. It usually involves some form of competition.   |
| <b>Z-scores</b>                       | Indicates how far (in standard deviations) a measurement is above or below the mean for that population.   |

# Chapter 1. Introduction

Nutrition plays a critical role in every stage of our lives, right from conception, through pregnancy, birth, childhood, adulthood and into older age. Good nutrition signals the realisation of the right to food and health as enshrined in the Constitution of Kenya. It is also central to human development.

Malnutrition, coupled with physical inactivity and sedentary behaviour, are among the leading risk factors for noncommunicable diseases (NCDs), principally cardiovascular diseases, diabetes, cancers and chronic respiratory diseases. The Government of Kenya has committed to global targets to reduce premature mortality due to NCDs by 25% by 2025. These targets include reduction of physical inactivity by 10%; reduction of salt/sodium intake by 30%; reduction of raised blood pressure by 25%; and 0% increase in diabetes/obesity.

To this end, the National Guidelines for Healthy Diets and Physical Activity, articulate key messages to assist the general Kenyan population in following nutrition and health recommendations. The Guidelines are recommended for use by policy makers, program designers and implementers of healthy diets and physical activity programmes, nutritionists, other health practitioners, community educators, agriculture extension workers and teachers.

## 1.1. The global state of nutrition and physical activity

While the number of people suffering from hunger and undernutrition globally has reduced significantly over the past 25 years, the challenge of malnutrition persists. Malnutrition affects one in three people globally, and that number is rapidly increasing. Nearly a quarter of children aged below five years are stunted, and 45% of all deaths in this age group, which translates to 3 million deaths annually, are caused by effects of undernutrition, such as foetal growth restriction, sub-optimal breastfeeding, stunting, wasting and micronutrient deficiencies - especially of iron, and vitamin A. Most of these deaths are occurring in Asia and Africa (Foroufanzar et al., 2015; Global Panel on Agriculture and Food Systems for Nutrition, 2016).

In low- and middle-income countries, the rates of overweight and obesity are also increasing rapidly. In 2014, 39% of adults over the age of 18 were overweight, while the prevalence of obesity doubled between 1980 and 2014 (WHO, 2015). In sub-Saharan Africa, the growth rate of overweight and obese men is now more than that of undernourished men. If current trends continue, the number of overweight and obese people is projected to increase from 1.33 billion in 2005 to 3.286 billion in 2030 (Foroufanzar et al., 2015). At the same time, global rates of inadequate physical activity are estimated to be 10% in males and 14% in females (WHO, 2010b).

Along with overweight and obesity, unhealthy diets and physical inactivity are major risk factors for noncommunicable diseases (NCDs), which are a leading cause of morbidity and mortality. Of the 57 million deaths in 2008, NCDs accounted for 63% of all global deaths. Eighty percent of these deaths occur in low- and middle-income countries. Unless effective interventions are put in place, the number of deaths from NCDs are projected to continue rising (WHO, 2004, WHO, 2010b).

## 1.2. Global policy framework

The Sustainable Development Goal (SDG) 2 aims to end hunger, achieve food security, improve nutrition and promote sustainable agriculture by 2030: with a target of ending all forms of malnutrition, including achieving by 2025, the internationally agreed targets on stunting and wasting in children under five years of age, and addressing the nutritional needs of adolescent girls, pregnant and lactating women and older persons. SDG 3 aims to 'ensure healthy lives and promote wellbeing for all ages' by 2030: with a target of reducing by one third, premature mortality from NCDs through prevention and treatment (United Nations, 2015). The UN Decade of Action for Nutrition 2016-2025 provides an opportunity for im-

proving diets through appropriate policies.

The Global Strategy on Diet, Physical Activity and Health was endorsed in the 57th World Health Assembly, of which Kenya is a member country. The strategy encourages governments to develop evidence based dietary guidelines, and guidelines for health enhancing physical activity targeted towards reduction of NCDs (WHO, 2004).

The ICN 2 declaration highlights commitments and recommendations agreed by countries, one of which is to develop, adopt and adapt, where appropriate, international guidelines on healthy diets. Countries committed to develop policies, programs and initiatives to ensure healthy diets throughout the life course, including of people with special nutritional needs. They also committed to reverse the rising trends in overweight and obesity and reduce the burden of diet related noncommunicable diseases in all age groups (FAO, 2014).

### 1.3. The state of nutrition and physical activity in Kenya

Kenya is faced with a triple burden of malnutrition, which includes overnutrition and undernutrition. According to the 2014 Kenya Demographic Health Survey (KDHS), 26% of children under the age of five are stunted, 4% are wasted and 11% are underweight. Between 2008 and 2014, consumption of minimum acceptable diet among children aged 6-23 months dropped from 39% to 31%. The primary causes of undernutrition among children are inappropriate breastfeeding and complementary feeding practices (KNBS, 2015).

Nationally, 9% of women of 15-49 years are underweight. Younger and rural women are more likely to be thin. The North Eastern region has the highest proportion (29%) of women who are thin, while Nairobi has the lowest (3%) (KNBS, 2015). Micronutrient deficiencies are highly prevalent among women and children under the age of five. The prevalence of anaemia, iron deficiency and iron deficiency anaemia in pregnant women is 41%, 36.1% and 26% respectively; and in children between 6-59 months, it is 26.3%, 21.8% and 13.3% respectively (KNBS, 2015).

On the other end of the scale, the Kenya Stepwise Survey for NCDs Risk Factors (2015) shows that 28% of Kenyans aged 18-69 years are either overweight or obese, with the percentage being significantly higher in women (38.5%) than men (17.5%). This rate is 33% among women of reproductive age (15-49 years). The proportion of overweight and obese women is higher in urban areas (43%), as compared to rural areas (26%), but even there, it is steadily rising. In fact, almost half of women living in Nyeri, Kirinyaga, and Mombasa are overweight or obese. With regard to children, 4.1% of those under the age of five are either overweight or obese (Ministry of Health, 2015b)

Unhealthy diets and physical inactivity are prevalent in the country. Only 5.2% of adults aged 18-69 years consume the WHO recommended five servings of fruits and/or vegetables, with fruits consumed 2.4 days in a week, and vegetables consumed five days in a week. Approximately 20% add salt or salty sauce to their food before eating; 3.7% consume processed foods high in salt; 83.5% often add sugar when cooking or preparing beverages at home; and 28% always add sugar to beverages. The proportion of Kenyans who use oil is higher (59.1%) than that of those who use vegetable fat (38.5%). About 6.5% do not engage in the WHO recommended level of physical activity, which is 150 minutes of moderate-intense activity per week for 18-64 year olds (Ministry of Health, 2015b).

Similar to other parts of the world, NCDs are an increasing public health concern in Kenya. NCDs account for more than 50% of total hospital admissions and over 55% of hospital deaths. Approximately 7% of Kenyans die from cancer; and 37,000 new cases are diagnosed every year; 22.6% of adults aged 18-69 years have raised blood pressure or are currently on medication for raised BP; while 2.3% have elevated levels of fasting blood glucose (Ministry of Health, 2015b). In recognition of the negative impact that NCDs could have on health care costs, productivity, household income, and ulti-



mately the Gross Domestic Product, a raft of measures has been taken to invest more in healthy diets and physical activity.

## 1.4. Kenya policy framework

Various national documents including the Constitution of Kenya 2010 and the Kenya Vision 2030 highlight the right of Kenyans to adequate food of acceptable quality, and to a quality life, that includes the highest attainable standard of health.

The Government of Kenya developed the Food and Nutrition Security Policy (FNSP) to ensure that all Kenyans have access to safe food and water in sufficient quantity and quality to meet their nutrition and health needs throughout their lives. The FNSP commits to support efforts to prevent NCDs through the promotion and consumption of healthy foods and diet and physical activity and exercise (Government of Kenya, 2011).

The National Nutrition Action Plan (NNAP), 2012-2017 operationalises the FNSP. It serves as a road map for coordinated implementation of nutrition interventions by the government and nutrition stakeholders. The strategic objectives in the NNAP that are relevant to healthy diets include objectives to improve: (a) prevention, management and control of diet related NCDs; (b) nutrition in schools, public and private institutions; and (c) nutrition knowledge, attitudes and practices among the population (Ministry of Public Health and Sanitation, 2012).

The Kenya Health Policy 2012-2030 and the KHSSP are some of the policies and strategies that aim at reversing the rising burden of NCDs through prevention and control. The Kenya National Strategy for the Prevention and Control of NCDs 2015-2020 aims to promote healthy lifestyles and implement interventions to reduce the modifiable risk factors for NCDs; unhealthy diets, physical inactivity, tobacco use and alcohol abuse.

## 1.5. Rationale for the Guidelines

The Kenya National Strategy for the Prevention and Control of NCDs 2015-2020 is a significant development towards achieving targets to reduce premature mortality due to NCDs. However, to date, there is no guiding document for promotion of healthy diets and physical activity among the general population. Instead, there are guidelines for implementation of nutrition interventions for some specific groups based on their vulnerability. This includes guidelines for maternal infant and young child nutrition and for prevention and control of micronutrient deficiencies.

The ***National Guidelines for Healthy Diets and Physical Activity*** aim to address this gap. They provide key messages to assist the general population to follow recommendations on healthy diets and physical activity.

## 1.6. Goal and objectives

The overall objective of the ***National Guidelines for Healthy Diets and Physical Activity*** is to promote health and wellbeing through consumption of healthy diets and promotion of physical activity.

**The specific objectives of the Guidelines are to:**

1. Provide principles of healthy diets for the general population;
2. Establish a set of dietary guidelines for the Kenyan population throughout the life cycle;
3. Provide recommendations for physical activity for all age groups including those with special needs;
4. Define roles and responsibilities of various stakeholders in promoting healthy diets;
5. Provide guidance for advocacy and resource mobilisation for promotion of healthy diets.

## 1.7. Scope and target audience

The ***National Guidelines for Healthy Diets and Physical Activity*** were developed through a broad consultative process, led by the Division of Nutrition within the Ministry of Health.

The Guidelines draw on WHO guidelines for healthy diets; and the global recommendations on physical activity for health. They provide key messages to help the general population adhere to healthy diets and recommended levels of physical activity.

These Guidelines are recommended for use by policy makers, program designers and implementers. They are also suitable for professionals who educate others on nutrition for optimal health, such as nutritionists, health practitioners, teachers at institutions, including colleges and technical training institutes, community educators, and agricultural extension workers. They also include a framework for resource mobilisation, collaboration and between the health sector and other key sectors such as agriculture, education, urban planning, gender and sports, transportation and communication; and monitoring and evaluation.

These Guidelines will culminate in the development of food based dietary guidelines (FBDG), which will be a tool for nutrition education and behaviour change. The languages and symbols used to develop the FBDG will take into account the diversity of lifestyles, cultures, public health priorities and variations in food availability, accessibility and food patterns.

## 1.8. Guideline structure

**Chapter 1** provides the background for these Guidelines. It highlights the global and Kenyan state of nutrition and physical activity, commitments to improve nutrition and reduce physical inactivity, and diet related NCDs, and the policy framework on which these Guidelines are anchored. It also presents the rationale, goal and objectives, scope and target audience of the Guidelines.

**Chapter 2** aims to improve the understanding of basic nutrition. It sets the scene for the rest of the Guidelines by addressing three components of good nutrition: food nutrients; food groups; and general principles for healthy eating.

**Chapter 3** describes the nutritional requirements and key messages to promote healthy diets of people at different stages of the lifecycle: pregnancy and lactation; early childhood; late childhood; adolescence; adulthood and old age.

**Chapter 4** highlights the importance of understanding a person's nutritional status as part of health care. It explains the methods for determining nutritional status: anthropometry; biochemical assessment; clinical assessment; dietary assessment; and Bioelectric Impedance Analysis.

**Chapter 5** contains key messages that support the promotion of home gardens for fresh produce for the family and food processing and preservation technologies that enhance micronutrient bioavailability. Information on meal planning, preparation and cooking methods and food safety and hygiene is also provided.

**Chapter 6** provides key messages to reduce sedentary behaviour for age groups: 0-4 years old, 5-11 years old and 12-17 years old. It also details the frequency, duration, intensity, type and total amount and benefits of physical activity, and the recommended levels of physical activity for all age groups.

**Chapter 7** provides a detailed implementation framework that covers roles and responsibilities of various stakeholders, the coordination framework, capacity development, advocacy, communication and social mobilisation, resource mobilisation and monitoring and evaluation.

# Chapter 2. Principles Of Healthy Eating

An understanding of the basic information about nutrition is a skill that everyone requires, to help promote improved nutrition practices in their own lives and in other people's lives as well.

Diets and eating habits are influenced by various factors, such as the location, type and amount of food available, individual needs, beliefs about foods, income, time and other resources, information about nutrition, among others. Nonetheless, the basic principles of healthy eating remain the same.

This chapter sets the scene for the rest of the Guidelines by addressing three components of good nutrition:

- Food nutrients
- Food groups
- General principles for healthy eating

## 2.1. Food nutrients

Food contains nutrients. However, no single food provides all the nutrients that people need. Nutrients have many functions in the body. They provide materials for growth and repair of body tissues and energy for physical activity and basic body functions; including breathing, body temperature and blood circulation. They help to keep the immune system healthy so that the body can resist and fight diseases. In effect, nutrients maintain people's lives.

The nutrients required by the human body are protein, carbohydrates (including dietary fibre), fat, minerals, vitamins and water. Nutrients are divided into two groups: macronutrients and micronutrients.

### 2.1.1. Macronutrients

**Macronutrients** include carbohydrates, proteins and fats. They are needed in large quantities by the body.

**Carbohydrates** (starches and sugars) are the primary energy source for the body. The basic building blocks are sugars. The sugars may be joined into longer chains called starches, and may be bound in indigestible forms called fibre. Minimally or unprocessed carbohydrates are high in fibre and other nutrients.

**Protein** is composed of amino acids. Unlike fat and carbohydrates, protein contains nitrogen as well as carbon, hydrogen and oxygen. There are 22 different amino acids that are used in the body, but only nine of these must be supplied by the diet. The other amino acids can be built in the body from other amino acids, fat or carbohydrates.

**Fat** and related compounds are called lipids; liquid fats like vegetable oil, are called oils, while those that are solid at room temperature, like beef fat, butter, and shortening, are called fats. Fatty acids are the building blocks of fats.

All fats and oils are a mixture of saturated fatty acids and unsaturated fatty acids. Oils contain more monounsaturated and polyunsaturated fats, while solid fats contain more saturated fats and/or trans fats. Saturated fats and trans fats tend to raise "bad" cholesterol levels in the blood, which in turn increase the risk of heart disease. Trans fats may be found in vegetable oils that have been hydrogenated or heated in very high temperatures or for too long.

The table below provides a summary of the types of macronutrients, examples of their food sources and their functions in our bodies.

Table 1 *Macronutrients, food sources and functions in the body*

| CARBOHYDRATE  |   |  |
|---------------|---|--|
| NAME          | SOME FOOD SOURCES   | FUNCTIONS IN THE BODY  |
| Starches      | Maize, rice, sorghum, millet, yams, potatoes, legumes, cassava, wheat, simsim, amaranth, sunflower, starchy vegetables (carrots, pumpkin, green peas), potatoes, sweet potatoes, plantains  | <ul style="list-style-type: none"> <li>● Primary energy source</li> <li>● Prevent breakdown of proteins for energy</li> <li>● Support metabolism of fats, (preventing acidosis)</li> <li>● Aid in growth of beneficial bacteria in colon (lactose function)</li> <li>● Maintain body temperature</li> <li>● Aid in utilisation of other nutrients in the body</li> </ul>   |
| Sugars        | Ripe fruits, table sugar (sucrose), vegetables, sugar cane, honey, glucose/ dextrose, milk, sweetened beverages<br>Breast milk for infants and young children   | <ul style="list-style-type: none"> <li>● Aids/eases bowel movements, and prevents constipation</li> <li>● Increases bulk in the diet, causing a feeling of satiety</li> </ul>  |
| Fibre         | <b><i>Insoluble fibre:</i></b> Whole grains, cereals, tubers & legumes, leafy vegetables and fruit with skin  | <ul style="list-style-type: none"> <li>● Aids/eases bowel movements, and prevents constipation</li> <li>● Increases bulk in the diet, causing a feeling of satiety</li> </ul>  |
|               | <b><i>Soluble fibres:</i></b> Gelatine, apples (with skin), oats, dehusked legumes, wheat bran  | <ul style="list-style-type: none"> <li>● Aids/eases bowel movements, and prevents constipation</li> <li>● Slows down movement of food and solidifies watery stools</li> <li>● Slows absorption of sugar from the intestine and thus promotes healthy blood sugar levels</li> <li>● Binds cholesterol and prevents its absorption from the gut</li> <li>● Helps reduce blood pressure and inflammation, thus reducing risk for heart disease</li> <li>● Provides food for beneficial bacteria (through fermentation) in the small intestine, which promotes digestion, improves immunity and releases energy</li> </ul> |
| PROTEINS      |   |  |
|               | SOME FOOD SOURCES   | FUNCTIONS IN THE BODY  |
|               | <p><b><i>Animal sources:</i></b> Fish, beef, mutton, goat, pork, eggs, milk, edible insects, chicken and other edible birds (quails, guinea fowl, turkey, duck)</p> <p><b><i>Good plant sources:</i></b> Legumes (beans and peas, soya), edible algae, nuts, seeds<br/>Breast milk for infants and young children</p> | <ul style="list-style-type: none"> <li>● Helps in building new cells</li> <li>● Aids in growth and repair of tissues</li> <li>● Aids in building the framework (collagen) of bones and teeth, tendons and ligaments</li> <li>● Is an essential component of enzymes, hormones, pigments and antibodies</li> <li>● Protein that is not used for any of these functions is broken down and converted to energy</li> </ul> <p><b><i>Note: Lean meat is healthier because it has less saturated fats</i></b></p> <p><b><i>Breast milk provides all the nutrients in adequate amounts for infants 0-6 months</i></b></p>    |
| FATS AND OILS |   |  |
|               | SOME FOOD SOURCES   | FUNCTIONS IN THE BODY  |
|               | <p><b><i>Sources of oils (unsaturated):</i></b> Plant oils, nuts, seeds, avocados, soya beans, oils from fish</p> <p><b><i>Sources of fats (saturated):</i></b> Fatty meats (including chicken skin), butter, cream, cheese, and coconut</p>  | <ul style="list-style-type: none"> <li>● Source of energy</li> <li>● Is an essential component of body tissue (brain, cell membranes and nerve cells)</li> <li>● Cushions vital organs in the body from damage</li> <li>● Enables absorption and transport of fat soluble vitamins</li> <li>● Insulates the body from heat loss</li> </ul>   |

## 2.1.2. Micronutrients

**Micronutrients** include vitamins and minerals.

**Vitamins** are organic substances that must be supplied by the diet. They are needed for building body tissues, metabolising (using) food, preventing deficiency diseases, promoting healing and immune function, and overall health. Without vitamins, the human body cannot use other nutrients. There are 13 vitamins, which are divided into two classes:

1. Fat soluble vitamins, which are vitamins A, D, E and K; and
2. Water soluble vitamins, which are vitamins C and all B vitamins (B1, B2, B3, B5, B6, B12, B9, Biotin).

A list of vitamins, their sources and functions are elaborated in the Table 2.

*Table 2 Vitamins, food sources and functions in the body*

| VITAMINS  |  |  |
|---|--|--|
| NAME  | SOME FOOD SOURCES  | FUNCTIONS IN THE BODY  |
| <b>Vitamin A</b><br><br><b>Retinol</b> (animal sources)   | Animal sources - (retinol):<br>Liver, kidney, egg yolk, breast milk (especially colostrum), milk fat   | <ul style="list-style-type: none"> <li>● Promotes immunity</li> <li>● Maintains healthy mucous membranes found in the lining of the gut, lungs and skin, which help prevent infection</li> <li>● Supports eye health and night vision</li> <li>● Supports normal growth and development</li> <li>● Helps the body to use iron</li> <li>● Promotes bone health</li> <li>● Enhances taste buds</li> <li>● For reproduction (embryonic development, maintenance of male genital tract and spermatogenesis)</li> </ul> <p><b>Note: It withstands ordinary cooking temperatures, but some carotene is lost when plant foods are dried in the sun.</b></p> |
| <b>Beta-carotene</b> (plant sources)  | Plant sources - (beta-carotene):<br>Carrot, pumpkin, butternut, spinach, dark green leaves, orange-fleshed sweet potato, enriched products such as margarine<br>Plant sources should be served with a meal with some fat, to promote absorption  |  |
| <b>B-group vitamins</b><br><br>B1 (thiamine)<br>B2 (riboflavin)<br>B3 (niacin)<br>B6 pyridoxine<br>B9 (folate)<br>B12 (cyanocobalamin)<br>B5 (biotin)<br>Pantothenic acid | Unrefined cereals, nuts, seeds<br><br>Animal foods, yeast, spinach, broccoli, beans<br><br>Meat, milk, peanuts<br><br>Animal foods, whole grains, soya beans, beans, nuts, dark green vegetables<br><br>Beans, dark green vegetables, liver, yeast<br><br>Animal products<br><br>Liver, egg, yeast, nuts, beans, manufactured in intestine<br><br>Meat, fish, poultry, beans, whole grains | <ul style="list-style-type: none"> <li>● Helps the body use macronutrients for energy and other purposes</li> <li>● Helps to build and repair tissues -essential during pregnancy for new maternal and foetal tissue</li> <li>● Helps the functioning of the nervous system</li> <li>● Health of the mucous membranes</li> <li>● Involved in enzyme reactions</li> <li>● Involved in synthesis of DNA</li> <li>● Growth and wound healing</li> <li>● Maintains healthy skin</li> </ul> <p><b>Note: B vitamins are soluble in water, so are lost when food is excessively washed, or cooked in large amounts of water which is discarded</b></p>      |

## VITAMINS

| NAME      | SOME FOOD SOURCES   | FUNCTIONS IN THE BODY  |
|-----------|---|--|
| Vitamin C | Fresh fruit, especially citrus fruit, vegetables and green leaves, tomato                                     | <ul style="list-style-type: none"> <li>● Helps the body to absorb calcium and iron</li> <li>● Makes blood vessels stronger</li> <li>● Promotes wound healing</li> <li>● Protects the immune system</li> <li>● Plays a role in synthesis of hormones and other body chemicals</li> <li>● Acts as an anti-oxidant</li> </ul> <p><b>Note: It is easily destroyed by heat, such as through prolonged cooking of vegetables. Also lost when cooking water is discarded.</b></p> |
| Vitamin D | Sunlight on skin<br>Liver, egg yolk, fatty fish   | <ul style="list-style-type: none"> <li>● Helps minerals to be deposited in bones and teeth (prevents rickets)</li> <li>● Helps several organs to function including the immune system</li> </ul>   |
| Vitamin E | Vegetable (plant) oils, nuts, whole grains, leafy green vegetables, avocado, seeds                            | <ul style="list-style-type: none"> <li>● Required for the health of the reproductive system, nerves and muscles</li> <li>● Maintains healthy skin</li> <li>● Acts as an anti-oxidant</li> </ul>  |
| Vitamin K | Vegetables and dark green leaves, liver, cereals, fruits, cabbage, manufactured by bacteria in the intestines | <ul style="list-style-type: none"> <li>● Used to manufacture proteins in blood plasma</li> <li>● Responsible for blood clotting</li> <li>● Important for maintaining healthy bone and kidney tissues</li> <li>● Required for synthesis of hormones</li> </ul> <p><b>Note: It can be synthesised by intestinal bacteria. Treatment with antibiotics may destroy intestinal bacteria.</b></p>  |

**Minerals** are inorganic substances that occur naturally in non-living materials such as water, rocks and soil. Plants absorb minerals from soil, and animals get minerals by eating plants or other animals. Minerals are important for structural functions, such as building strong bones and teeth, blood, skin, hair; regulatory functions such as facilitating transmission of signals by nerves and keeping muscles contracting normally; and metabolic processes like those that turn food into energy and synthesise protein. A list of minerals, their sources and functions are elaborated in Table 3.

Table 3 Minerals, food sources and functions in the body

| MINERALS   |   |  |
|--|---|--|
| NAME   | SOME FOOD SOURCES   | FUNCTIONS IN THE BODY  |
| <p>Iron</p> <p>Haem iron</p> <p>Non- haem iron</p> | <p>Liver, kidneys, meats, chicken, fish, breastmilk (for infants)</p> <p>Dark green leafy vegetables (spinach, amaranth leaves etc.), groundnuts, beans, soya, seeds, egg yolk, enriched or fortified foods</p> | <ul style="list-style-type: none"> <li>● Needed for the body to make haemoglobin, that transports oxygen in the blood</li> <li>● Helps brain, muscles and immune system function</li> <li>● Prevents anaemia</li> <li>● Catalyses conversion of beta-carotene to vitamin A in the body</li> <li>● Required for DNA synthesis</li> <li>● Used in synthesis of collagen</li> <li>● Components of many enzymes required for metabolism of glucose and fatty acids</li> </ul> <p><b>Note: The iron from plant foods (non-haem iron) is not readily absorbed hence should be consumed with vitamin C or animal sources in the diet. Animal sources are readily absorbed.</b></p> <p><b>Tea and coffee contain anti-nutrients (e.g. tannins), that decrease absorption of iron, hence should not be consumed with food.</b></p> <p><b>Consumption of iron and calcium-rich foods (milk and milk products) in the same meal should be discouraged as calcium will be given priority for absorption.</b></p> |
| Calcium  | Milk and milk products, fish if eaten with bones (omena etc.), soy beans, sesame seeds, some vegetables (dark green leafy types)  | <ul style="list-style-type: none"> <li>● Helps to build bones and teeth</li> <li>● Important for normal heart, nervous system and muscle functions</li> <li>● Blood clotting</li> <li>● Fluid balance</li> <li>● Immune defences</li> </ul> <p><b>Note: Calcium from plant foods is not as easily absorbed compared to that from animal foods.</b></p>   |
| Iodine   | Iodised salt, seafood, deep sea fish e.g. tuna, salmon  | <ul style="list-style-type: none"> <li>● Makes thyroid hormones (prevents goitre)</li> <li>● Supports early brain development in children</li> <li>● Supports functioning of the nervous system</li> <li>● Energy and body temperature control</li> <li>● Essential for reproduction</li> <li>● Conversion of carotene to vitamin A</li> <li>● Synthesis of protein</li> <li>● Absorption of carbohydrates</li> </ul> <p><b>Note: Iodine is lost by exposure to air, moisture, (salt should be stored in covered containers away from moisture).</b></p>   |



## MINERALS

| NAME                     | SOME FOOD SOURCES   | FUNCTIONS IN THE BODY  |
|--------------------------|---|--|
| Zinc                     | Liver, meat, eggs, fish, (shellfish, etc.), peanuts, seeds, legumes | <ul style="list-style-type: none"> <li>● For growth and development, maintenance and healing of tissues</li> <li>● Metabolism of macronutrients</li> <li>● Sexual maturation and reproduction</li> <li>● Functioning of the immune system</li> <li>● Enhances sense of taste</li> <li>● Utilisation of vitamin A in the body</li> </ul>  |
| Sodium (sodium chloride) | Table salt and foods with added salt or salt based seasoning        | <ul style="list-style-type: none"> <li>● Works with potassium to maintain healthy blood pressure and normal function of nerves and muscles</li> <li>● Works with potassium to maintain water balance and acid-base equilibrium in the body fluids</li> <li>● Vital for muscle sensitivity</li> <li>● Essential for transport of glucose and other nutrients across membranes</li> <li>● Plays a role in the function of the adrenal gland</li> </ul> <p><b>Note: Salt eaten in excess may promote high blood pressure, especially if the diet is low in potassium.</b></p> |

### 2.1.3. Water

Water makes up the major portion of the human body (50-70%). Although it is not defined as a nutrient, it is as important as all other nutrients. It absorbs and transports nutrients around the body, removes waste products, regulates body temperature, and acts as a lubricant (spinal fluid, synovial fluid and mucous secretions). The body is continuously losing water, which must be replaced by drinking enough safe water and other unsweetened drinks. Feeling thirsty is a signal that the body is already dehydrated. Therefore, it is important to form the habit of drinking sufficient water every day, instead of only when thirsty.

## 2.2. Food groups

Food groups are a collection of foods that have similar nutrients, and those whose functions in the body are the same. The information presented in the tables in this section is based on the food groups for nutrition education in Kenya.

### 2.2.1. Starchy foods

Starchy foods are a source of carbohydrates. When broken down, they provide the body with most of the energy it needs. Starchy foods can also provide fibre, which is important for digestive health, as well as a range of vitamins and minerals. Foods in this group include whole grains, cereals, roots, tubers and plantains.

Whole grains and cereals that have not been processed, or that have been minimally processed, contain more nutrients and fibre than refined grains. The germ is the part of the grain that is richest in micronutrients. Because whole grains take longer to digest, they provide energy to the body over a long period. Grains can also be processed into flour. In Kenya, extra vitamins and minerals are added into commercially produced maize meal and wheat flour through fortification. Fortified starchy foods help people to get more vitamins and minerals into their diet.

In addition to dietary energy, grains, roots, tubers and plantains provide some minerals and essential vitamins. However, a proportion of these may be lost during processing. The quantity and quality of protein in these foods is varied and relatively low.



Table 4 Examples of starchy foods and nutrients contributed

| FOOD GROUP                        | NUTRIENTS CONTRIBUTED<br>(Some foods in the group may not have all the nutrients listed)   | FOOD EXAMPLES   | NUTRIENT NOTES<br>(Nutrient listed per 100 grams of food item)  |
|-----------------------------------|--|---|---|
| Cereals and products              | Carbohydrates (Starch)<br>Fibre<br>Protein<br>Fat<br>Micronutrients, (when eaten) in minimally processed or unprocessed form or in fortified maize and wheat flours. | Maize, rice, sorghum, millet, wheat, oats, pearl millet, ugali, porridge, chapati, mandazi, bread, pasta and breakfast cereal | Contain 7 – 12g of protein per 100g dry grain. This can contribute to protein intake significantly when grains are eaten in large amounts and when eaten with complementary protein foods (legumes or animal products). |
| White roots and tubers, plantains | Carbohydrates (Starch)<br>Fibre<br>Potassium   | Irish potato, white sweet potato, cassava, yams, arrowroot, green banana, plantain  | These foods mainly supply starch and fibre to the body. Cassava is very low in protein.   |

## 2.2.2. Fruits and vegetables

Fruits and vegetables are important sources of vitamins, minerals and fibre. They provide the body with the nutrients it needs for normal bodily functions, to fight illnesses and keep the body healthy.

Table 5 Examples of fruits and vegetables and nutrients contributed

| FOOD GROUP                           | NUTRIENTS CONTRIBUTED<br>(Some foods in the group may not have all the nutrients listed) | FOOD EXAMPLES   | NUTRIENT NOTES<br>(Nutrient listed per 100 grams of food item)   |
|--------------------------------------|--|---|--|
| Vitamin A rich vegetables and tubers | Vitamin A<br>Fibre<br>Vitamin C<br>Potassium   | Carrots, pumpkin and butter nuts; orange-fleshed sweet potato, red sweet bell pepper  | Rich sources are dark yellow and orange vegetables<br>Besides vitamin A, the vegetables also contain significant amounts of vitamin C, potassium and fibre |
| Dark green leafy vegetables          | Fibre<br>Vitamin A<br>Vitamin C<br>Iron<br>Folic acid<br>Potassium                       | Spinach, kales ( <b>sukuma wiki</b> ), cow peas leaves (kunde), bean leaves, black African nightshade ( <b>managu</b> ), amaranthus (Terere), stinging nettle ( <b>thabai/oilo</b> ), sweet potato leaves ( <b>matembele</b> ), non- poisonous cassava leaves (kisamvu), spider weed <b>saget/dek/akeyo/sagaa</b> , pumpkin leaves (Susa), arrow root leaves ( <b>matekyo</b> ) | Rich in vitamin A<br>Nutrients are absorbed when served in a meal with a little oil or fat   |

|  |  |   |                                  |
|--|--|---|----------------------------------|
| Other vegetables                             | Vitamin C<br>Potassium<br>Folic acid                         | Green pepper, onions, cauliflower, cabbages, cucumbers, eggplant, courgettes, French beans, okra, leeks, broccoli, celery   |                                  |
| Vitamin A rich fruits<br>(Dark orange fruit) | Sugar<br>Fibre<br>Mainly vitamin A<br>Vitamin C<br>Potassium | Mango*(very rich), papaya*<br>(must be eaten in large quantities to provide vitamin A)  | Rich in vitamin A (RAE >125mcg)  |
| Other fruits                                 | Sugar<br>Fibre<br>Vitamin C<br>Potassium                     | Guava, avocado, pineapples, green plums, green grapes, apples, gooseberries ( <b>nathi</b> ), oranges*, lemons, limes, tamarind, loquats, zambarao ( <b>jamna</b> ), ripe bananas, custard apples, peaches, thorn melon, melons, pomegranates ( <b>kungu manga</b> ), wild fruits | * Rich in vitamin C (>30mg/100g) |

### 2.2.3. Legumes and pulses, nuts and seeds

Legumes are plants with seedpods that have two halves e.g. beans, peas and lentils. Pulses are legumes in dry form. This food group provides rich sources of proteins and soluble fibre. Some also contain iron.

Nuts are dry single-seeded fruits enclosed inside an outer layer. Many seeds also fall into this category. Nuts are energy dense due to their oil content.

Table 6 Examples of legumes, pulses, nuts and seeds and nutrients contributed

| FOOD GROUP         | NUTRIENTS CONTRIBUTED<br>(Some foods in the group may not have all the nutrients listed) | FOOD EXAMPLES   | NUTRIENT NOTES<br>(Nutrient listed per 100 grams of food item)                             |
|--------------------|--|---|--|
| Legumes and pulses | Protein<br>Carbohydrates,<br>Fibre<br>Iron<br>Folate<br>Vitamin B complex                | Bambara nuts ( <b>njugu mawe/bande</b> ), beans, peas cow peas, pigeon peas ( <b>mbaazi</b> ), soya beans, dolicos beans ( <b>njahi</b> ), green grams, lentils | When legumes are eaten with grains, all amino acids are provided.                          |
| Nuts and seeds     | Unsaturated fats<br>Niacin<br>Fibre<br>Vitamin E<br>Selenium                             | Pumpkin, amaranth, sunflower, sesame (simsim), groundnuts, macadamia, cashew nuts   | Recognised for their protein, but they have more fat than protein, and have micronutrients |

### 2.2.4. Meat, fish and animal protein products

Foods in this group are a source of high quality protein, supplying all the essential amino acids in the right quantities. Edible insects also provide an affordable alternative source of animal protein. It is important to note that raw fish, poultry, meat, and eggs can be infected with many different types of germs (pathogens), which cause sickness. Such pathogens can be destroyed if these foods are handled well during preparation, cooking and storage (**refer to Chapter 5: Food production, processing and preparation**).

*Table 7 Examples of animal protein products and nutrients contributed*

| FOOD GROUP         | NUTRIENTS CONTRIBUTED<br>(Some foods in the group may not have all the nutrients listed)                             | FOOD EXAMPLES  | NUTRIENT NOTES<br>(Nutrient listed per 100 grams of food item)   |
|--------------------|--|--|--|
| Organ meat         | Protein, zinc, iron, vitamin A, B1, B2, B12 (vitamins for liver)   | Liver, kidney, heart, other organ meats or blood-based food  | Rich in iron, copper, zinc and certain B vitamins.   |
| Flesh meats        | Protein<br>Iron<br>Zinc<br>Fat   | Edible insects, goat meat, game meat, pork, beef, mutton, rabbit, donkey, chicken, guinea fowl, turkey, geese, ducks, quail, wild birds, doves | These have high quality proteins with essential amino acids.<br>They also contain vitamins and minerals.   |
| Eggs               | Protein, fat, vitamin A (in yolks)   | Eggs from chicken, guinea fowl, quail, ducks, ostrich, ants  | They are rich in essential amino acids, vitamins and minerals.   |
| Fish and sea foods | Protein, Fat, vitamin A (oily fish), calcium, vitamins D, phosphorus, magnesium, selenium, and iodine in marine fish | Fresh, frozen or dried fish  | These are rich in high quality proteins with the essential amino acids.<br>High in calcium when consumed with bones. They also contain other minerals. |

## 2.2.5. Milk and milk products

Fresh milk, fermented milk and yoghurt are the three most important foods in this group. Milk and its derived products are available in different forms - fresh, long-life, or dried. They are also available in a variety of packaging and flavours. Milk and milk products are the main source of calcium. They also supply protein, riboflavin (vitamin B<sub>2</sub>), vitamin B<sub>12</sub>, and potassium. Just like raw fish, poultry, meat and eggs, milk and milk products should be handled carefully during production and processing to destroy pathogens. Some dairy products, such as ice cream and milk based frozen dessert have not been included in this group, because they are high in saturated fat and extra sugar, and low in the essential nutrients supplied by milk. Such products should not be consumed regularly.

*Table 8 Examples of milk products and nutrients contributed*

| FOOD GROUP             | NUTRIENTS CONTRIBUTED<br>(Some foods in the group may not have all the nutrients listed) | FOOD EXAMPLES  | NUTRIENT NOTES<br>(Nutrient listed per 100 grams of food item)   |
|------------------------|--|--|--|
| Milk and milk products | Calcium<br>Protein<br>Fat (whole milk)<br>Milk sugar (lactose)<br>Riboflavin             | Milk from goats, camels, cows and sheep, fermented milk, mursik, amarurano, yoghurt, cheese and other products | The foods in this group provide most of the calcium in the diet. |

## 2.2.6. Fats and oils

Fats and oils give the body energy and help it to absorb other nutrients, such as vitamin A, D, E and K. However, some foods have invisible fat or oil that can cause damage to the body when consumed in excess. These foods include tea and coffee creamer, food that is cooked in a lot of oil, fat from meat and chicken, baked products, mandazi, biscuits and potato

chips. Consumption of excessive fat and oil can lead to too much weight gain, and consequently, an increased risk for high blood pressure and cardiovascular diseases.

*Table 9 Examples of fats and oils and nutrients contributed*

| FOOD GROUP   | NUTRIENTS CONTRIBUTED<br>(Some foods in the group may not have all the nutrients listed) | FOOD EXAMPLES  | NUTRIENT NOTES<br>(Nutrient listed per 100 grams of food item)   |
|--------------|--|--|--|
| Oils and fat | Saturated fat<br>Unsaturated fats  | Vegetable oil<br>Cooking oil/fats<br>Ghee, cod liver oils/fish oils, butter, margarine, palm oil | Important for the absorption of vitamins A, D, E and K when eaten in the same meal.<br>Oils are healthier than fats. |

### 2.2.7. Sugar and sweets

Refined sugar is added to foods and drinks such as tea, soft drinks or fruit juice, baked foods like cake and biscuits and to jam or pudding to make them taste sweet. It may also have a preservative effect like in jam and preserved fruit. Eating a lot of added sugar or sweetened foods displaces the intake of other foods that contain nutrients. Eating sugar and sweetened foods in addition to meals, results in the intake of more food energy than needed, which could lead to weight gain, and to a higher risk of NCDs.

*Table 10 Examples of sweets and nutrients contributed*

| FOOD GROUP | NUTRIENTS CONTRIBUTED<br>(Some foods in the group may not have all the nutrients listed) | FOOD EXAMPLES   | NUTRIENT NOTES<br>(Nutrient listed per 100 grams of food item) |
|------------|--|---|--|
| Sweets     | Carbohydrate (sugar)   | Table sugar, jaggery, sugar cane, honey, sugar-based cold drinks, other flavoured drinks and concentrates; sugary foods like candies, cakes, chocolate etc. fruit juice | Sugars supply energy.<br>Should be used sparingly.             |

### 2.2.8. Condiments, spices and beverages

Condiments and spices are not a food group, but are included in this section because they provide flavour to food and make meals more enjoyable.

Spices are plant products such as leaves, flowers, seeds and roots that are rich in essential oils and aromatic principles. Examples include pepper, cinnamon, nutmeg, fennel, cloves, thyme, ginger, fenugreek seeds, dill seed, turmeric, bay leaves, and cardamom.

A condiment is a spice, sauce, or preparation, added to food to enhance its flavour, impart a particular flavour, or in some cultures, to complement the dish. Condiments are often used in fast-food restaurants, prior to serving food. They include mustard, ketchup, and mayonnaise. Preparations are used during cooking to add flavour or texture to the food, such as barbecue sauce, teriyaki sauce and soy sauce. Such condiments and preparations tend to contain hidden sodium. Many people eat more salt than the body needs, meaning that they consume too much sodium and not enough potassium. This

can be a health risk, as it may contribute to high blood pressure, which in turn increases the risk of heart disease and stroke.

Iodised salt has the essential nutrient iodine added to it during processing. Iodine is important for the development of the brain; helps prevent goitre and mental retardation.

## 2.3. Healthy Eating principles for Families

Understanding what constitutes healthy eating can help people to consume the right type, quality and quantity of foods. The following principles should be applied when planning family meals, or when educating others about implementing healthy diets.

**Variety:** Foods from at least four to five food groups should be included in the eating plan each day. Choices within each food group should be varied from day-to-day, depending on what is in season, available and affordable.

**Adequacy:** Family meals should be enough to meet the nutritional requirements of each family member, depending on age, gender and other specific needs. Meals should be eaten in correct proportions and frequency.

**Balanced:** This involves using enough, but not too much of each type of food.

**Kilo calorie (energy) control:** Meals should not include too much or too little energy foods. Special consideration should go to children who only consume small amounts of food at a time.

**Nutrient density:** This refers to eating well without overeating. The selected foods should deliver the most nutrients for the least food energy. For example, one can get about 300mg of calcium from cheddar cheese, but cheese will provide more calories compared to milk.

**Moderation:** Some foods have few or no nutrients besides energy, so they do not help to keep the body healthy. Such foods should be consumed in moderation. A good example is foods that contain high amounts of fat and sugar.

**Safety in food production, preparation and storage:** Foods should be prepared, stored and served in a hygienic environment to prevent contamination.

**Minimally processed:** Most foods in family meals should be minimally processed.

## 2.4. Key messages

The following messages can be used to inform and educate people about the types of foods that they should consume. Each message is accompanied by detailed information about the specific food group. Please refer to Annex 1 for information on serving sizes and portions per day.



The quantities and types of food that the body requires differ at different stages of the life cycle. **Chapter 3** contains messages related to healthy diets for different age groups.

**1. Eat a variety of foods from different food groups every day. Include whole or unprocessed starchy foods as part of meals.**

- To make a good mixed meal, eat starchy foods with foods from at least 2-3 other food groups.
- These other foods help release energy from starchy foods.
- Choose fortified maize meal and wheat flour.

**2. Eat plenty of green leafy vegetables, red and yellow vegetables and fruits every day; and include a variety of other vegetables and fruit.**

- The recommended number of servings for fruits and vegetables is five servings a day.
- Eat at least half a cup of cooked vegetables or 1 cup of raw vegetables in each meal.
- Eat fresh fruits and vegetables that are in season as they are cheaper and readily available.
- After cooking vegetables rich in vitamin A, add a little oil before serving, or serve with a meal that has some oil, nuts or seeds in it. This helps the body to absorb and utilise the vitamin A.

**3. Eat beans, peas, lentils, cowpeas, pigeon peas, soya, nuts and edible seeds regularly (at least four times a week).**

**4. Eat lean meat, fish and seafood, poultry, insects or eggs at least twice a week.**

**5. Drink fresh milk, fermented milk or yoghurt every day.**

- Use low-fat or skim milk to lower the amount of saturated fat in the eating plan.
- Use milk and milk products with little or no added sugar.
- Give children under five years of age plain, full cream milk whenever possible.

**6. Use oil or fat in moderation in meals; limit the amount of solid fat. Use fortified oil.**

- Use healthier methods of cooking like boiling, steaming and baking rather than frying
- Use fats and oils sparingly when preparing mixed dishes.
- Use nuts and seeds as alternatives to oils and fats.
- Strain excess oil from cooked food before serving.
- Avoid processed foods containing trans fatty acids.
- Limit consumption of foods containing high amounts of saturated fats e.g. cheese, ice cream and fatty meat.
- Avoid recycling and recycled oil. Oil that has been heated many times is dangerous to your health due to presence of trans fatty acids.

**7. If you use sugar, use it sparingly**

- Limit the consumption of sweetened foods and drinks.
- Eat fresh fruits and raw vegetables as snacks instead of sugary snacks.

## **8. Use iodised salt, but use it sparingly**

- Use a little salt when preparing food, and do not add extra salt after cooking.
- Reduce use of salt by using other seasoning such as pepper, herbs, lemon, garlic and ginger.
- Use condiments and processed foods sparingly like ready meals, processed meats like bacon, ham and salami, cheese and salty snacks. Reduce the use of seasoning cubes as they also contain salt.
- Read food labels on condiments and commercial seasonings carefully, paying attention to sodium content and not having salt on the table.

## **9. Drink plenty of safe water**



# Chapter 3. Nutrition In The Lifecycle

Nutritional needs continuously change throughout the life cycle. The quantity of food that the body requires from each food group reduces or increases as people grow older. The changes are not only influenced by age, but also by the changing physical attributes, reproduction, change in mobility status, and other factors.

Chapter 2, Section 2.3 describes a healthy eating pattern for families. These family eating patterns should be adapted to meet the needs of individual members.

This chapter describes the nutrient needs of people at different stages of the lifecycle. It elaborates the nutritional requirements and key messages that can be used to promote healthy eating during pregnancy and lactation; early childhood; late childhood; adolescence; adulthood and old age.

The messages presented in the sections below are complementary to those found in other guidelines, some of which have been referenced below, and which have also been developed by the MOH.

- Maternal, Infant and Young Child Nutrition: National Operational Guidelines for Health Workers
- Guidelines for Prevention of Mother to Child Transmission (PMTCT) of HIV/AIDS in Kenya Module 8 of the Basic Training Module for Community Health Workers
- Guideline: Use of Multiple Micronutrient Powders for Home Fortification of Foods Consumed by Infants and Children 6–23 Months of Age

## 3.1. Maternal nutrition

Maternal nutrition refers to nutrition before and during pregnancy and lactation. Good maternal nutrition is the foundation for a successful outcome of pregnancy, child delivery and lactation. Interventions to improve mothers' nutritional status should start long before pregnancy, during the lifecycle of the mother herself. This is because a mother who was undernourished either as a foetus, baby, young child or adolescent is more likely to enter pregnancy stunted and/or with undernutrition. This results in compromised health and nutrition for her children, leading to a vicious cycle of malnutrition. Overweight and obese women also face higher risks of complications during pregnancy, such as hypertension and gestational diabetes, peri-natal mortality and premature delivery. Women at all stages of the lifecycle therefore need to adjust diet and physical activity levels to achieve and maintain a desirable weight for their own health as well as for better birth outcomes

Women are more likely to be well-nourished if they are born with healthy weights, receive optimal nutrition when growing up; eat nutritious meals most of the time, especially prior to and during pregnancy and lactation; take only prescribed medicines and nutrient supplements; are not over worked especially during pregnancy; and are protected from domestic violence and abuse.



### 3.1.1. Nutritional requirements during pregnancy

A pregnant woman requires high levels of all nutrients. Energy needs increase particularly during the second and third trimesters of pregnancy. A pregnant adolescent has extra nutritional requirements than an adult pregnant woman, because she too is still growing. She needs almost twice as much iron as the average female teenager, 30mg daily. She also requires more calcium than other pregnant women, as her own skeleton may not be completely developed. A pregnant teen that does not get enough calcium is at an even greater risk for losing bone density than a pregnant adult.

During pregnancy, a woman could face some food-related problems, which must be addressed to ensure that she adheres to a healthy diet. These problems include: insufficient or excess weight gain; heartburn; oedema, diabetes mellitus; and pregnancy induced hypertension.



### 3.1.2. Key messages

These key messages, adapted from the *Maternal, Infant and Young Child Nutrition: National Operational Guidelines for Health Workers* should be used to educate, encourage and support pregnant women to adhere to a healthy diet.

#### 1. Eat an extra mixed meal and two snacks in addition to regular mixed meals. This will support the nutrition of mother and baby.

- Eat a variety of foods from plants and animals to provide energy and nutrients. Choose foods from different food groups, and different foods from within each group.
- Eat food from animal sources, such as liver and red meat, when available; and drink fresh or fermented milk, yoghurt or cheese every day.
- Use iodised salt when cooking, but only in small amounts.
- Drink plenty of water or water based drinks (at least 8-10 glasses per day).
- Separate meals from beverages to prevent interference with iron absorption. It is better to drink tea or coffee an hour before or after a meal.

#### 2. Take iron and folic acid supplementation (IFAS) daily with a meal to build iron stores, and to provide enough iron to produce sufficient blood for both mother and baby.

- All pregnant women should take iron/folic acid supplements to prevent anaemia during pregnancy irrespective of their haemoglobin levels (60mg of iron and 400 µg Folic acid every day) for 270 days during pregnancy.

- IFAS is necessary because diet alone cannot meet the daily requirements for these nutrients during pregnancy.

- Folic acid supplementation for the prevention of neural tube defects is only beneficial pre-pregnancy and during the first 28 days after conception.

**3. Do not take dangerous substances such as alcohol, illegal drugs, non-prescribed medicines or supplements.**

**4. Take de-worming tablets from the second trimester to help prevent anaemia.**

**5. Ensure that weight gain is monitored regularly at the health clinic. Avoid gaining too much, or too little weight.**

- A woman should gain an average of 1kg per month; a minimum of 0.5kgs per month during the first trimester and thereafter a minimum of 1-1.5kgs per month for the last 6 months

- Weight gain recommendations for pregnancy are based on pre-pregnancy weight. Failure to achieve the desired weight gain often results in low birth weight infants.

The table below provides guidance on the recommended weight gain during pregnancy.

*Table 11 Recommended weight gain during pregnancy*

| Body Mass Index (BMI) (preconception) Kg/m <sup>2</sup>   | Appropriate weight to gain |
|---|----------------------------|
| Underweight( BMI<18.5)  | 12.5-18 kg                 |
| Normal weight (BMI 18.5-24.9)   | 12-15 kg                   |
| Overweight (BMI 25-29.9)  | 7-11.5 kg                  |
| Obese (BMI >30)   | 6 kg                       |
| Appropriate weight gain for twin pregnancy is 16.0-20.5 kg  |                            |
| Adolescent pregnancy: Upper end of recommended values for women. Weight gain of about 0.4kg per week in the 2nd and 3rd trimester |                            |

Source: Institute of Medicine (US), 2009

**6. Seek nutrition counselling to help address common food-related problems that may develop during pregnancy. Some of the problems could be addressed as follows:**

- Insufficient weight gain: Get nutrition counselling and food supplementation and check for infections.
- Excess weight gain: Get nutrition counselling and take part in some physical activity.
- Nausea and hyperemesis: Eat small frequent meals, reduce fat and sugar intake and avoid strong smelling foods. Consume liquids between rather than with meals.
- Constipation: Seek nutrition counselling, drink the recommended daily amounts of water; increase intake of foods rich in fibre (beans, fresh vegetables and fruits, whole grains), and limit refined starchy foods.

- Heartburn: Eat small frequent meals, but avoid fatty, acidic and spicy foods before bedtime. Sit upright after meals.
- Oedema: Reduce salt intake. Lie down to rest during the day and elevate feet if needed.
- Diabetes mellitus: Take an individually adapted meal plan (in line with medication).
- Pregnancy induced hypertension: Take an individually adapted meal plan (in line with medication) and consult the doctor for continuous management.

### 3.1.3. Nutritional requirements during lactation

After delivery, a healthy diet helps a mother maintain her own health, breastfeed her baby successfully, and ensure that it grows and develops well. The breastfeeding mother needs 500 kilocalories of energy above her pre-pregnancy needs. This translates to having two extra meals and two snacks in a day. A breastfeeding mother needs high levels of most nutrients. Babies take a substantial amount of calcium from breast milk. The breastfeeding mother should therefore eat foods rich in calcium. It is also important for the daily menu of the mother to include a source of vitamin B12, with an aim of getting at least 4mcg per day.

### 3.1.4. Key messages

The following key messages should be used to encourage and support lactating women to adhere to a healthy diet:

#### 1. **Take two extra meals each day in addition to the three regular meals and two snacks to support optimal nutrition and to meet lactation needs.**

- Each meal should be from four food groups. Eat a variety of foods from plants and animal source proteins, to build the body.
- Cereals, roots and tubers provide the body with energy. Eat whole meal cereals as they are healthy and contain more nutrients.
- Eat adequate vitamin C rich foods like fruits and vegetables so that they help in the utilisation of iron from other foods.

#### 2. **Take lots of nutritious fluids like milk, soup, juice, porridge, beverages and water to increase your breast milk supply.**

- Separate meals from beverages such as tea or coffee to prevent interference with iron absorption. Limit the intake of tea or coffee, otherwise take it an hour before or after a meal. Take small frequent meals.

#### 3. **Only take medicines and nutrient supplements as prescribed by a trained health care professional.**

#### 4. **Engage in light physical activities to stay healthy. Take adequate rest.**

## 3.2. Early childhood nutrition (0-59 months)

Feeding practices during early childhood affect the health and nutrition status of children, which in turn influences their mental of physical development. It is estimated that exclusive breastfeeding prevents 13% of all under five deaths and is strongly correlated with lowered risk of illness, from diarrhoea and respiratory tract infections, reduced risk of obesity, allergies, heart disease, and diabetes in adulthood. The introduction of appropriate complementary foods at six months and

continued to 24 months of age could save 6% of all under five deaths. By combining these two interventions, breastfeeding and complementary feeding, up to 19% of child mortality may be prevented.

### 3.2.1. Nutritional requirements during 0-6 months

Breast milk provides all the nutrients and water that a baby needs for growth and development from birth to the sixth month of life. Therefore, exclusive breastfeeding is recommended. The energy requirements depend on many factors, including body size and composition, the size at birth, age, sex, genetic factors and growth rate, among others. Infants can regulate the intake of food and consume the quantity that their body needs; therefore, breastfeeding should be done on a demand basis, i.e. whenever the child wants.

#### WHY IS BREASTMILK AND BREASTFEEDING IMPORTANT?

- It contains enough water for the infant's needs.
- Breast milk is easily digested and utilised by the newborn's immature digestive system.
- The first milk (colostrums) is like the first immunisation and protects the baby from illnesses such as allergies, intolerance, diarrhoea and respiratory infections. Colostrum also clears meconium (first dark stool) thus preventing yellowing of the baby's skin; and it helps the baby's intestines to mature.
- Breast milk promotes adequate growth and development in the infant; breastfed babies have been shown to have a higher IQ than those who are not breastfed.
- Suckling helps in the development of teeth, and facial and jaw bones.
- Suckling is a calming activity for babies.
- The baby stays warm, using its mother's body heat to help regulate its own.
- Breast milk is clean, cheap, safe and readily available at the right temperature whenever an infant needs it.
- When a baby is breastfed, the risk of developing diabetes and obesity later in life is reduced.
- Frequent skin-to-skin contact between the mother and infant enhances bonding, and promotes psychomotor, affective and social development of the infant.
- Breastfeeding protects the mother's health; reduces the risks of ovarian and breast cancer and helps release oxytocin in the mother which aids in uterine contraction.
- Breastfeeding within one hour after birth helps the mother's milk to come in faster.



### 3.2.2. Key messages

The following messages, adapted from the *Maternal, Infant and Young Child Nutrition: National Operational Guidelines for Health Workers*, should be used to inform and support lactating women to practice exclusive breastfeeding during the first six months. These messages can also be used to orient spouses, family members and friends of lactating mothers on providing support for breastfeeding.

#### 1. Initiate breastfeeding within an hour after delivery.

- Skin-to-skin contact, also known as Kangaroo Mother Care, results in babies that are more likely to latch on correctly.
- The baby is more alert during this time, which makes establishing the breastfeeding relationship easier.
- Breastfeeding should begin immediately after delivery to provide the baby with the first milk (colostrum).

## **2. Exclusively breastfeed the baby for the first six months of life.**

- Do not give any other food or drink (not even pre-lacteal feeds), except for medicines as recommended by a trained health care professional.
- Breastfeed babies on demand – any time when they want to during the day and night.
- Express breastmilk that can be given to the baby, from a cup, when it is not possible to be with the baby.
- If it seems that the baby is refusing to breastfeed, provide help and support to the mother so that her baby will feed again.
- The mother should keep her baby close to her, with plenty of skin-to-skin contact to promote breastfeeding.
- The mother may express milk for some of the feeds if needed, and it can be given to the baby in a cup.
- The baby may appear to refuse to breastfeed if he/she is feeling sick, if sudden changes have upset him/her, if he/she is distracted or if he/she has decided to stop breastfeeding at around one year. Use expressed milk for feeds.

## **3. Provide orientation to spouses, family members and friends of lactating mothers on supporting breastfeeding. They should:**

- Allow time and space for the mother to breastfeed while at home by providing a comfortable sitting area; and assisting with caring for and controlling older children.
- Provide emotional and physical support for the mother to exclusively breastfeed by helping with household chores, assisting the mother in feeding the baby with expressed breast milk when she is away, and supporting her to eat healthy meals.

### **3.2.3. Nutritional requirements for children aged 6-23 months**

From the age of six months, breast milk is still an important source of energy and nutrients, but it cannot adequately meet all of the child's nutritional requirements. A child of this age is also developmentally ready to start consuming other foods. Therefore, appropriate complementary foods should be introduced gradually, in addition to breast milk. Starting other foods in addition to breast milk at six completed months helps a child grow strong and healthy. Preparation of meals should consider: choice of food, frequency of feeds, amount of food, thickness (consistency), variety, food safety and hygiene, and method of feeding.

Many challenges are associated with complementary feeding. Often, foods are introduced too early or too late. Caregivers may either lack knowledge on appropriate food choices and methods of preparation. Some may lack the money to purchase appropriate foods or the time to prepare complementary foods. They could also avoid using some nutritious foods due to myths and taboos.

### 3.2.4. Key messages

The following messages can be used to help families ensure that children aged 6-23 months are fed properly. Health workers are advised to also refer to the ***Maternal, Infant and Young Child Nutrition: National Operational Guidelines for Health Workers***. The ***Guidelines for the Prevention of Mother to Child Transmission of HIV/AIDS in Kenya*** outline messages for feeding infants and young children born to HIV infected mothers

- 1. Breastfeed the child more during illness, in addition to meals. Provide extra food after illness – the equivalent of one extra meal per day.**
- 2. Feed babies a variety of meals from at least four food groups in each meal (Refer to Table 5: for information about the frequency of feeding, the types of foods and texture, and the amount).**
  - Start at six months of age with small amounts of food and increase the quantity as the child gets older, while maintaining frequent breastfeeding between meals and at night.
  - Gradually increase food consistency and variety as the child grows older, adapting to his/her requirements and abilities.
  - Separate the child's bowl from the mother's, to tell how much he/she has eaten.
  - Interact with the child during meals to respond to his/her cues about the amount of food he/she wants.
  - Do not give meals that are too spicy or salty.
  - Avoid feeding meals that contain bones or hard pieces as they might choke the child.
  - Give clean and safe water from a clean cup. Do not give tea or coffee or drinks made with sugar.
- 3. Practice good food safety and personal hygiene at all times.**
  - Wash hands with soap (or ash) and clean water before food preparation or feeding the child.
  - Keep everything very clean; this includes the food for the mother and the baby and the environment. This helps to prevent childhood illnesses, especially diarrhoea.
- 4. Take the child to the clinic to be weighed and measured, and to receive important supplements and vaccinations. The child will receive:**
  - Regular de-worming for a child above one year to maintain appetite, enhance nutrient assimilation and food efficiency in the body.
  - A check of his/her weight gain and health for growth monitoring and promotion.
  - Vitamin A supplementation at six months, and every six months thereafter, until the age of five.
  - Table 5 Amount and frequency of feeds for children 6 - 23 months
  - Complementary foods should meet the basic criteria of frequency, amount, texture (thickness), variety, adequacy, active feeding and hygiene (FATVAH).

| Age         | Types of foods and texture  | Frequency   | Amount of food per meal  | Active feeding   |
|-------------|---|---|--|--|
| 6 months    | <p>Begin with staple foods like porridge (corn, wheat, rice, millet, sorghum) pureed banana or potato. When making porridge, only mix 2 cereals, not more. It should be thick enough not to run off the spoon.</p> <p>Give the child small sips of clean drinking water.</p>  | 2 times a day   | Start with 2 tablespoons at each feed and increase to 3 tablespoons in the 3rd to 4th week. The baby needs time to get used to new food. | Do not force the baby to eat.  |
| 7-8 months  | <p>Include at least one food from each food group (animal source, staple, legumes and seeds, vitamin A rich fruits and vegetables). Add small amounts of oil to food. Enrich the food by adding milk and locally available foods e.g. avocado, peanut paste etc. Giving a baby soup of the food is not the same as giving the food itself.</p> <p>Mashed/pureed family foods, by 8 months the baby can begin eating finger foods. Thicken food as the baby grows older.</p> | 3 times a day   | Increase amount gradually to half ( $\frac{1}{2}$ ) a 250ml cup.   | Be patient and actively encourage the baby to eat.   |
| 9-11 months | <p>Give a variety of foods, include milk, sorghum, millet, pigeon peas, groundnuts, cowpeas and green grams, orange-fleshed sweet potatoes. Add small amounts of oil and enrich the food by adding milk and locally available foods e.g. avocado, peanut paste.</p> <p>Give finely chopped family foods, finger foods and sliced foods.</p>   | 4 times a day (3 meals and 1 snack). Snacks may be ripe banana, mango, boiled potato etc. | Give half ( $\frac{1}{2}$ ) a 250ml cup daily of family food.  | Make meal times a relaxed and happy time for the child while encouraging and not forcing e.g. clap hands, make funny faces and demonstrate opening the mouth wide, saying encouraging words. |



| Age          | Types of foods and texture  | Frequency  | Amount of food per meal               | Active feeding   |
|--------------|---|--|---------------------------------------|--|
| 12-23 months | <p>Include at least one food from each food group (animal source, staple, legumes and seeds, vitamin A rich fruit and vegetables. Add small amounts of iodised salt. Give the child 2-3 cups (250ml) of milk. Add small amounts of oil and enrich the food by adding milk and locally available foods e.g. avocado, peanut paste.</p> <p>Cut food into small, soft pieces so that the child can pick, chew and swallow comfortably.</p> | 5 times a day (3 meals and 2 snacks). Snacks may be ripe banana, mango, boiled potato etc. | Give $\frac{3}{4}$ to 1 cup of 250ml. | Make meal times a relaxed and happy time for the child while encouraging and not forcing e.g. clap hands, make funny faces and demonstrate opening the mouth wide, saying encouraging words. |

For non-breastfed children (6-23 months), give 3-4 cups of milk in addition to complementary meals at 6 months. At 6-8 months, feed 1 extra meal and 1-2 cups of milk, and add one snack depending on appetite. From 9 months, provide 1-2 extra meals and 1-2 cups of milk and 2 snacks depending on the appetite.

For children 6-23 months, add 1 sachet of micronutrient powders (MNPs) to one meal every third day. Each child should get at least 10 sachets of MNPs a month and a total of 60 sachets in 6 months<sup>1</sup>

Source **Maternal, infant and young child nutrition: National Counselling Cards**

### 3.2.5. Nutritional requirements for children aged 24-59 months

The nutrient needs of a child increases during this time to meet the demands of rapid growth and development, and increasing activity. Children of this age may have a small appetite and prefer to take beverages (milk and juices). They prefer to talk rather than eat and have trouble remaining seated throughout the entire meal. Children in this age group typically enjoy eating with their fingers, although they can learn to use a spoon and fork. It is also at this time that children start going to pre-school, meaning that they end up eating some of their meals away from home

They are likely to snack on unhealthy snacks, become choosy and easily influenced by peers, media, and changing trends.

### 3.2.6. Key messages

The following messages can be used to help families ensure that children aged 24-59 months are fed properly.

#### 1. Feed the child 2-4 meals and 1-2 healthy snacks in between meals.

- Give at least 1½-2 bowls of 250ml of food per meal every day. Small, frequent meals are advisable.
- Include at least one food from each food group (animal source, staple, legumes and seeds, vitamin A rich fruits and vegetables).



- If no fatty foods are included in the meal, putting a little fat or oil in the meal adds energy and helps to absorb vitamin A.
- Give nutritious snacks such as ripe banana, mango, boiled egg, sweet potatoes or milk in between meals.
- Avoid sugary foods and sweets.
- Increase the nutrient density of foods by adding oilseeds (e.g. groundnuts, soybeans), as these will provide extra energy and are good for growth.
- Give plenty of clean water to drink.
- Give 2-3 cups of milk per day.
- Use iodised salt for family meals sparingly.
- Maintain good hygiene practices (cleanliness so as to avoid diarrhoea and other illnesses).
- Make meal times a relaxed and happy time for the child; encourage but do not force the child to eat.

**2. Encourage children to engage in light physical activities (refer to Chapter 6 for age-specific recommendations).**

### 3.3. Late childhood nutrition (5-9 completed years)

Children in this age group are very active. This stage is characterised by a slow, steady rate of physical growth, but a high rate of cognitive, social and emotional development. Practising healthy eating behaviours during the ages of 5-9 promotes growth, development and health, prevents micronutrient deficiencies and eating disorders, and lays the foundation for lifelong health, including reducing the risk of NCDs.

#### 3.3.1. Nutritional requirements

From the age of seven, a child's weight and height begin to increase more quickly in preparation for adolescence. At this age, children may want to help prepare food and to socialise with peers during meal times. They enjoy snacks and develop strong likes and dislikes of specific foods. This is a time when children are becoming independent from the family, and are at risk of developing negative eating habits. Such habits include eating unhealthy snacks, as a result of food marketing, peer influence and meal skipping. As they continue to spend more time at school, they may have one or even two meals at school. They may be nutritionally vulnerable, depending on their socio economic status and geographical location. Those living in low income settings may have poor access to food, and are likely to develop anaemia and other deficiencies.

#### 3.3.2. Key messages

All key nutrition principles as highlighted in Chapter 2 will apply for this age group and form part of the key messages targeted to their families. Children aged 5-9 years can be provided with basic information on appropriate food choices, based on these Guidelines, to encourage healthy eating habits.

**1. Give the child nutrient dense foods from at least four food groups every day.**

Provide nutrient dense food selected from a variety of at least four food groups.

- Allow the child to choose his/her own portion size from preferred foods, provided they are adequate, wholesome and nutritious.
- Give the child a healthy breakfast to help prevent snacking on foods that are high in fat and sugar. A child who eats breakfast may be more alert in school and better able to learn, perform sports and other physical activities.
- Promote regular de-worming (every six months) to reduce nutrient loss.
- Limit intake of sugary and salty snacks and drinks such as potato crisps, cakes, biscuits, sweetened/coloured water/juice.
- Provide a healthy nutritious meal for the child to carry and/or eat at school, for example, milk, sandwiches, fruits (banana, orange), fresh fruit juices, vegetables (carrots, tomatoes, sweet potatoes, arrow roots), ground nuts and water.
- Schools offering school meals should provide nutritious meals from at least 3-4 food groups, including a staple, a protein rich foods a fruit and/or vegetable. A child at this age should drink plenty of fluids especially water and milk

## **2. Encourage the child to engage in regular outdoors physical activity (refer to chapter 6 for age-specific recommendations).**

### **3.4. Adolescents (10 - 19 years)**

Growth during adolescence is faster than at any other time in an individual's life except for the first year. This period is associated with hormonal, cognitive and emotional change, and is often confounded by lifestyle changes, such as leaving home, changing schools or starting work. It is also the time when peer-influenced, lifetime eating habits are established. Investing in good nutrition during adolescence helps this age group to develop good health that will carry on into their later years.

Eighteen percent of adolescents in Kenya fall pregnant. Because they still require energy and nutrient reserves for their own growth, conception could result in competition for these reserves with their unborn child. Consequently, adolescent mothers could end up suffering from moderate preconception anaemia, and their infants being born with low birth weight.

A large number of adolescents between 14-19 years of age are in boarding schools and may not have control over the foods they are served. They are also vulnerable to peer pressure and media, especially in relation to body image and marketing of food choices/sources. This could result in consumption of excess salt, sugar and/or fats, risky health behaviours such as anorexia nervosa (refusal to eat for fear of gaining weight). They could also get exposed to, and start engaging in habits such as smoking, drugs and alcohol use. Such habits may increase the risk of undernutrition, overnutrition and NCDs.

#### **3.4.1. Nutritional requirements**

Adolescents have the highest energy and protein requirements of any age group. During the adolescent growth spurt, protein needs (relative to body weight) are high and utilisation of protein is dependent on adequacy of energy intake. In cases where the protein intake is sufficient but calorie intake is not, the protein cannot be utilised for growth unless energy requirements are met. Adolescent males have higher energy requirements since they experience greater increases in height, weight and lean body mass than females.

The requirement for certain vitamins and minerals, which play significant roles for tissue growth, cell and bone formation, is higher. Iron requirements also increase dramatically as a result of expansion of the total blood volume, increase in lean body mass and onset of menses in young females. Therefore, adolescents, particularly girls, are vulnerable to iron deficiency anaemia.

## **Energy and Protein Requirements**

During adolescence, there are significant increases in height and weight. Both muscle and fat increase, but girls gain more fat, and boys gain more muscle. The requirement of energy (carbohydrates, healthy fats) and proteins increases considerably during this period. The nutrient needs also change depending on the adolescent's physical activity, so the more active the adolescent is in sports, farming, etc, the higher their energy and protein requirements. It is important to note that the protein requirement of an adolescent living in an economically poor environment will be met for as long as they take adequate energy foods. However, if their energy intake is low, the protein they eat is used to meet energy needs. The adolescent will then risk having low growth rate and muscle mass even if they take adequate protein in their food.

## **Iron requirements**

Iron needs are at their highest during adolescence due to rapid growth with sharp increase in lean body mass, blood volume and red cell mass. In boys, there is a sharp increase in the iron requirements. After the growth spurt and sexual maturation, there is a rapid decrease in growth spurt and need for iron. As a result, there is an opportunity to recover from an iron deficiency that might have developed during this peak growth.

In girls, however, the growth spurt is not as great, but menstruation typically starts about one year after peak growth and some iron is lost during menstruation. The risk for iron deficiency is therefore heightened if iron losses are not restored through adequate iron intake in the diet. Iron requirements in adolescence are greater if there are infectious diseases such as HIV, malaria and parasitic infections that can cause iron loss, and because of low bio-availability of iron from diets.

## **Calcium requirements**

During adolescence, there is increased muscular, skeletal and endocrine development; hence dietary calcium needs are greater during puberty and adolescence than in any other population age group except pregnant women. The mineral quantity in the bone must be optimal during puberty to prevent osteoporosis (risk of fracture/breaking bones in later life).

## **Zinc requirements**

Zinc is important for growth and sexual maturation during puberty. It helps in bone formation and prevents bone loss. Limited intake of zinc-containing foods may affect physical growth as well as development of secondary sex characteristics (beard, breasts, voice change, etc.)

## **Iodine requirements**

With the high rate of teenage pregnancies, iodine is important to support their own growth as well as the needs of the foetus. Iodine deficiency during pregnancy may cause increased miscarriages, still births, birth abnormalities and mental retardation. Severe iodine deficiency in children results in learning disability and lowered achievement.

## Vitamins

The requirements for vitamins are also increased during adolescence. Because of higher energy demands, more vitamin B rich foods are necessary to help release energy from carbohydrates. The increased rate of growth and sexual maturation increases the demand for folic acid and vitamin B-12. With increasing evidence of the role of folic acid in the prevention of birth defects, all adolescent girls should be encouraged to consume the recommended amount of folic acid from supplements in addition to intake of food folate from varied diet. The rapid rate of skeletal growth demands more vitamin D. Vitamins A, C are needed in increased amount for new cell growth.

A large number of adolescents between 14-19 years of age are in boarding schools and may not have control over the foods they are served. They are also vulnerable to peer pressure and media, especially in relation to body image and marketing of food choices/sources. This could result in consumption of excess salt, sugar and/or fats, risky health behaviours such as anorexia nervosa (refusal to eat for fear of gaining weight). They could also get exposed to, and start engaging in habits such as smoking, drugs and alcohol use. Such habits may increase the risk of undernutrition, overnutrition and NCDs.

### 3.4.2. Key messages

All key nutrition principles as highlighted in Chapter 2 will apply for this age group. The following key messages should be used to provide basic information about healthy diets among adolescents aged 10-19 years, unless special conditions exist. Key messages for healthy diets among pregnant adolescents are included in **Section 3.1** on maternal nutrition.

1. Eat at least three nutritious meals every day and two snacks.
2. Eat a variety of foods from at least four food groups. Eat several servings of dairy products, green leafy vegetables and other calcium-rich foods and beverages for the growth of bones, in addition to the other basic foods of starches and proteins.
3. Avoid sticky, sugar-rich and salty snacks that are high in fat to reduce exposure to excess weight gain, tooth decay, diabetes and cardiovascular diseases.
4. For girls, eat iron rich foods due to menstruation, increased blood volume and muscle mass.
5. At home, limit eating in rooms of the house other than the kitchen and dining room.
6. Have “family meals” and keep mealtimes pleasant.
  - Turn off the TV so you can enjoy being together
  - Talk to each other
  - Model polite table manners
7. Encourage the adolescent to make his/her own snacks and meals, like breakfast. Ask him/her to plan some family meals.
8. Help the adolescent to start his/her day with a healthy breakfast which includes foods from at least 3 main food groups. Together with the rest of the family, create and post a list of breakfast ideas as a handy reference. Do the same for snacks and packed lunch ideas. If the adolescent needs energy boost for after school sports activities, remind him/her to pack a healthy snack and water.

9. Keep plenty of calcium-rich foods and beverages on hand (milk and milk products, omena, amaranth seeds, etc.).
10. Encourage iron-rich foods to meet the increased needs for menstruating females (to replace iron loss in blood) and for males (as their muscle mass develops). Good iron sources: beef and pork (choose lean cuts: round and loin), shellfish, skinless poultry, fish, iron-fortified cereals and breads, tofu, legumes, dried fruits, dark green vegetables. Vitamin C (found in many fruits and vegetables) enhances the absorption of iron from plant food sources.
11. Watch for signs of an eating disorder: extreme concern or fear about body weight and shape, refusal to eat, excessive exercising, laxative abuse, bingeing (out of control eating), vomiting after meals. If one has any concerns about the adolescent, they should seek professional help.
12. There should be a positive role model for the adolescent. If the role model (parent, caregiver, older sibling, uncle or aunt) eats and enjoys a well-balanced diet, tries new foods, uses polite table manners, and practices healthy eating habits, chances are that the adolescent will do the same.

The following key messages should be used to encourage schools, and other individuals and institutions that provide services to adolescents, to provide them with healthy diets.

1. Provide nutritious and adequate meals for adolescents at school, especially for those who are in boarding school. Take the nutrient requirements outlined in this section into consideration.
2. Provide nutrition education, counselling and assessment services to ensure that adolescents consume healthy diets, and to prevent and address eating disorders.
3. Screen adolescents to monitor overall growth and development and to detect excess weight gain or loss.
4. Empower adolescents to make informed decisions regarding their food choices and dietary habits by including nutrition education in the school curriculum.
5. Encourage adolescents to participate in designing and implementing nutrition programs that target them, for example, by being peer educators.
6. Support pregnant adolescent girls to eat foods that meet their nutritional requirements.
7. Schools should have sessions where adolescents are taught on food production, so that they understand the link between food and nutrition at an early age.
8. Encourage adolescents to engage in age-appropriate physical activity (refer to chapter 6 for specific recommendations).

### 3.5. Adults (20–59 years)

Usually after the teenage years, growth stops and energy requirements fall, but nutrient requirements continue to vary depending on the age, gender and level of activity of the individual. Depending on the work schedule, adults may eat some meals away from home. This is the age cohort that is most affected by increasing levels of NCDs.

### 3.5.1. Nutritional requirements

Energy requirements do not change greatly between the ages of 20 and 59, except during pregnancy or lactation. The type of work (heavy manual or sedentary) affects the level of energy expenditure and needs. The dietary energy intake of a healthy, well-nourished adult should allow him/her to maintain an adequate BMI at the population's usual level of energy expenditure. At the individual level, a normal range of 18.5 to 24.9 kg/m<sup>2</sup> BMI is generally accepted. Women have the additional requirements of iron and calcium due to menstruation, pregnancy and breastfeeding.

### 3.5.2. Key messages

Adults 20-59 years should follow the key messages outlined in Chapter 2 to maintain a healthy eating pattern while staying within their calorie needs. In addition, the following messages can be used to promote healthy diets among this age group.

#### 1. Build healthy eating patterns.

- Select an eating pattern that meets nutrient needs over time at an appropriate level, depending on energy expenditure.
- Consume meals from at least 3-4 food groups.
- Assess all foods and beverages to determine how they fit within a total healthy eating pattern.
- In cases when meals are taken away from home, carry healthy meals or select from healthy food choices.
- Follow food safety recommendations (highlighted in Chapter 5 of these Guidelines) when preparing and eating foods to reduce the risk of food borne illnesses.

#### 2. Maintain appropriate energy intake to maintain a good health status.

Balance intake of meals that provide energy with energy expenditure to manage weight. For overweight or obese people, this will mean consuming foods that are lower in food energy.

#### 3. Avoid intake of sugar-rich, salty and high fatty foods/ snacks and beverages.

- Limit intake of sugars to 5% of total energy. This is equivalent to 25g (or around 6 level teaspoons).
- Limit the amount of total fat intake to less than 30% of total energy intake.
- Use iodised salt but limit it to less than 5g of salt (equivalent to approximately 1 teaspoon) per day.

#### 4. Engage in some form of physical activity (refer to Chapter 6 for age-specific recommendations).

## 3.6. Older persons (Above 60 years)

With age, physical changes occur and certain health risks may emerge include predisposition to muscle and bone density loss. Depending on their earlier health and nutrition habits, older persons may be more predisposed to chronic illnesses such as osteoporosis, rheumatoid arthritis, hypertension, among others.

Some elderly persons have difficulty getting adequate nutrition because of age or diseases, which impair their ability to chew, swallow, and digest food; and to absorb nutrients. Their nutrient status may also be affected by decreased

production of digestive enzymes, biological ageing and/or changes in the cells of the bowel surface, and drug-nutrient interactions.

Their nutrient status may also be affected by decreased production of digestive enzymes, biological ageing and/or changes in the cells of the bowel surface, and drug-nutrient interactions. Micronutrient deficiencies are common and this can contribute to general poor health or exacerbate some chronic illness.

### 3.6.1. Nutritional requirements

Energy requirements diminish with age but requirements for protein, vitamins and minerals remain largely unchanged. Protein requirements become slightly lower in men, but increase slightly in women after 50 years of age and in some older people due to illness. Conversely, iron requirements are lower in women above 50 years of age, as menstruation has ended. In men of the same age group, iron requirements remain the same as in younger men, but iron absorption from the gut may be reduced. This, coupled with low intakes, can increase the risk of iron deficiency anaemia.

Calcium, vitamin C and D requirements are the same as younger adults. However, the intake of vitamin C is sub-optimal because fruits and vegetables could be too expensive, difficult to prepare and eat, while those who are housebound may not get sufficient vitamin D, which is mainly obtained from the action of sunlight on the skin.

### 3.6.2. Key messages

All key nutrition principles as highlighted in Chapter 2 will apply for this age group. In addition, the following key messages should be used to promote healthy diets among older persons aged above 60.

- 1. To stay healthier and active longer, adhere to a healthy eating plan in line with the guidelines for healthy eating in Chapter 2.**
- 2. Older persons need less energy.**
  - To achieve a lower energy intake, but maintain a high nutrient intake, decrease the portion size of starchy foods, and limit intake of sugar and foods made with sugar, foods with low nutrient content and alcohol.
  - Control the intake of the following foods and food components to lower the risk of NCDs.
  - Reduce intake of sugars to 5% of total energy. This is equivalent to 25g (or around 6 level teaspoons).
  - Reduce the amount of total fat intake, especially saturated fats, to less than 30% of total energy intake.
  - Use less than 5g of salt (equivalent to approximately 1 teaspoon) per day; use iodised salt.
- 3. Engage in some form of physical activity (refer to Chapter 6 for age-specific recommendations).**
  - Use iodised salt but limit it to less than 5g of salt (equivalent to approximately 1 teaspoon) per day.
- 4. Engage in some form of physical activity (refer to Chapter 6 for age-specific recommendations).**



# Chapter 4. Nutritional Status Assessment

Nutrition assessment is used to determine nutritional status. It is an in-depth evaluation of an individual's status in relation to food and nutrient intake, lifestyle, and medical history. Various methods for determining nutritional status are briefly described in this chapter. The Kenya National Clinical Nutrition and Dietetics Reference Manual developed by the Ministry of Health have detailed information on these methods and are a good reference for health workers. The methods include:

1. Anthropometry
2. Biochemical assessment
3. Clinical assessment
4. Dietary assessment
5. Bioelectric Impedance Analysis

## 4.1. Anthropometry

Anthropometry is an inexpensive, non-invasive technique used to assess the size, proportions and composition of the human body. Body measurements such as weight, height and mid-upper arm circumference (MUAC), are used in combination with age and sex, to gauge growth or failure to grow.

### 4.1.1. Anthropometry in adults

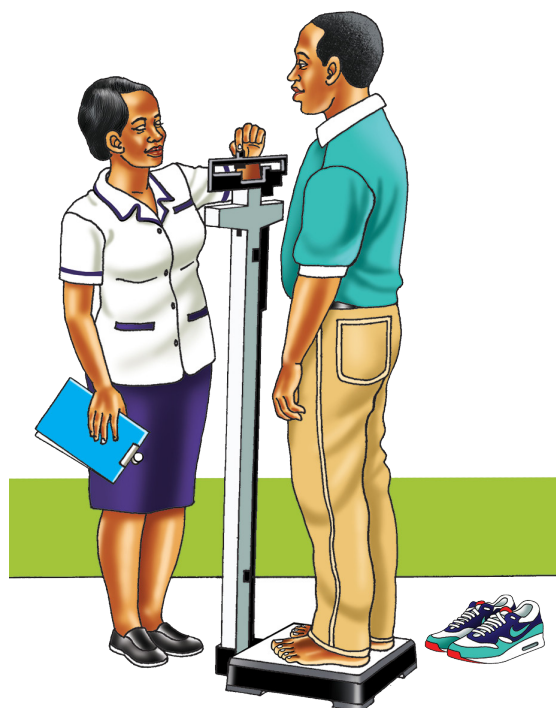
Several anthropometric measurements can be taken for adults. They include Body Mass Index (BMI), waist circumference, hip circumference and MUAC for pregnant women. The methods in this section are comprehensively addressed in the maternal infant and young child nutrition guidelines for health care workers

#### (a) Body mass index

The BMI should be routinely calculated for both healthy and sick adults. BMI is a proxy measure for human body fat based on an individual's weight and height, and is calculated by dividing one's weight in kilograms by height squared in metres. It is an easy and inexpensive method used to screen for weight categories that may lead to health problems. BMI for adults can be calculated, or can be looked up on a BMI chart.

To calculate BMI, the following formula is used:

$$\text{BMI} = \frac{\text{Weight (kg)}}{\text{Height (m)}^2}$$





For example, the BMI for an adult weighing 80kg and with a height of 165cm (1.65m) is calculated as follows:

$$82 \div (1.65)^2 = 30.11$$

BMI is interpreted using the standard weight status categories that are shown in the following table. These categories apply for both men and women of all body types and ages. In this example, the person with a BMI of 30.11 is considered obese class I.

*Table 12 The international classification of BMI*

| Classification    | BMI           |
|-------------------|---------------|
| Underweight       | <18.50        |
| Severe thinness   | <16.00        |
| Moderate thinness | 16.00 - 16.99 |
| Mild thinness     | 17.00 - 18.49 |
| Normal range      | 18.50 - 24.99 |
| Overweight        | ≥25.00        |
| Pre-obese         | 25.00 - 29.99 |
| Obese             | ≥30.00        |
| Obese class I     | 30.00 - 34.99 |
| Obese class II    | 35.00 - 39.99 |
| Obese class III   | ≥40.00        |

**The International Classification of adult BMI (adopted from WHO)**[http://apps.who.int/bmi/index.jsp?introPage=intro\\_3.html](http://apps.who.int/bmi/index.jsp?introPage=intro_3.html)

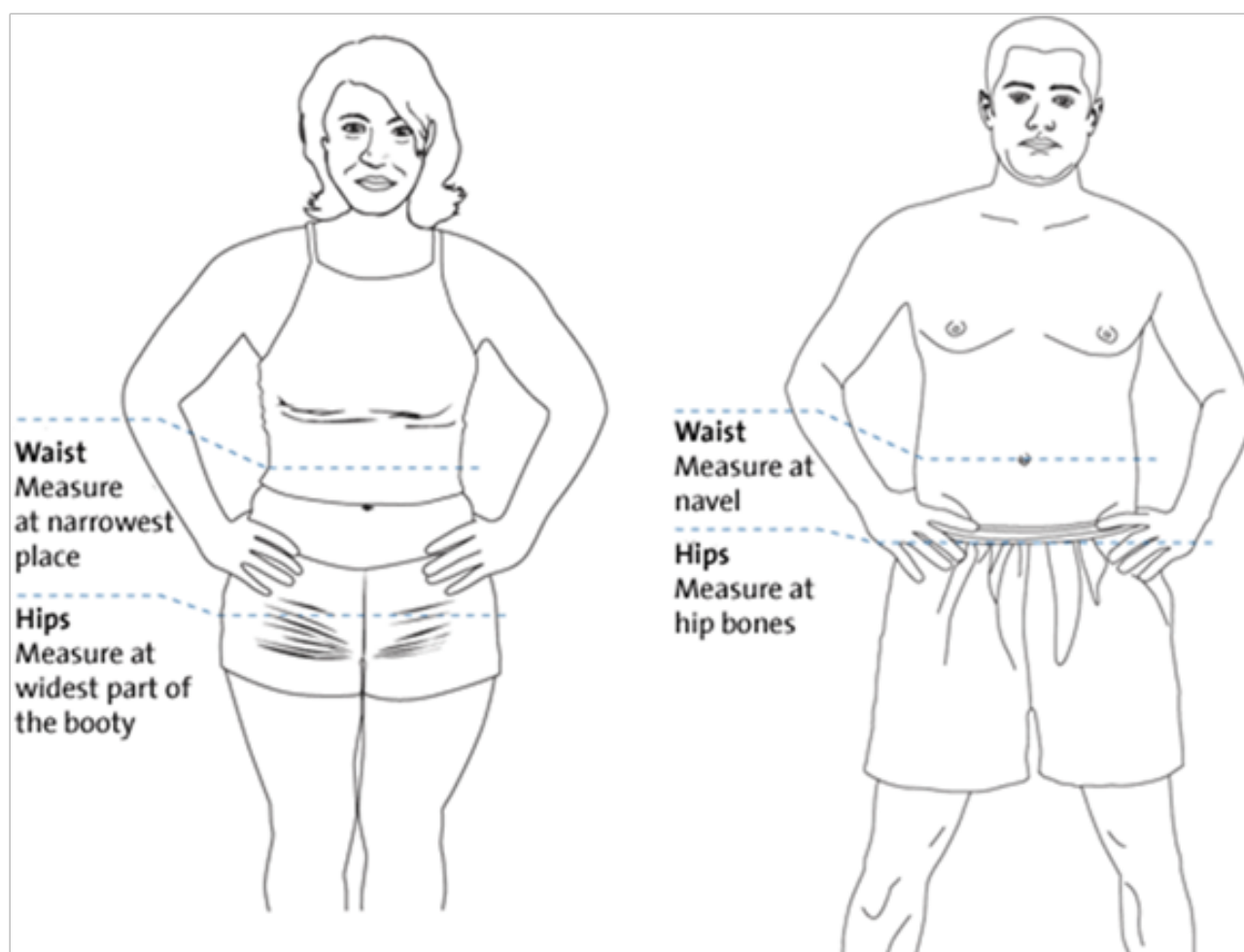
*Figure 1 BMI for Adults*



### (b) Waist Circumference

Waist circumference is used in addition to BMI for a greater prediction of variance in health risk. The larger the waist circumference (high fat deposition), the higher the risk of onset of NCDs such as diabetes and cardiovascular diseases is. Waist circumference is measured midway between the lower rib margin and the iliac crest.

Figure 2 Measuring waist and hip circumference



The table below should be used to determine the cut-off points of waist circumference and the risk of complications.

Table 13 Waist circumference cut off points and risk of complications

|                     | Men     | Women | Risk of Metabolic Complications |
|---------------------|---------|-------|---------------------------------|
| Waist Circumference | > 94 cm | >80cm | Increased Risk                  |
| Waist Circumference | >102 cm | >88cm | Substantially Increased risk    |

Source WHO (2006): Waist Circumference and Waist-Hip Ratio. Report of a WHO Expert Consultation

### (c) Waist-hip ratio

This is the waist circumference divided by the hip circumference. The hip circumference measurement should be taken around the widest portion of the hips. Waist-hip ratio should be used to compliment BMI, to identify individuals at increased risk of obesity-related morbidity due to accumulation of abdominal fat. The larger the waist-hip ratio, the higher the risk of onset of NCDs.

Table 14:Waist hip ratio cut off points and risk of complications

|                 | Men     | Women   | Risk of Metabolic Complications |
|-----------------|---------|---------|---------------------------------|
| Waist hip ratio | ≥0.90cm | ≥0.85cm | Substantially Increased Risk    |

Source WHO (2006): Waist Circumference and Waist-Hip Ratio. Report of a WHO Expert Consultation

## 4.1.2. Anthropometry in children

Height/length, weight and age are compared for children and used to determine important measures of nutritional status. Growth in weight and height is an excellent indicator of a child's nutrition and health. There are three ways that these measures are compared and reported.

### (a) Weight for age

This is a composite indicator used to evaluate the health and nutritional status of children under the age of five. It is the most commonly used indicator, and is especially useful in children under one year, when length measurements cannot be taken accurately. It is used to compare a child's weight with the expected value of a child of the same age from a healthy population.

### (b) Height for age

For this indicator, the height of a child is compared to a "standard" child of the same age to give an indication of whether growth has been normal or not. From the age of one until adolescence, children should gain about 5–7cm in length/height each year.

### (c) Weight for height

This is a measure used to assess the nutritional status of children from birth to five years. The measure identifies the immediate intake of nutrients. Acute malnutrition is generally characterised by a low weight for height index and is referred to as wasting, whereas overnutrition or obesity is generally characterised by a high weight for height index.

### (d) BMI for age

This measure is used to assess BMI for children aged 5-18 years. The measurements used are weight for height with reference to age. A conversion has to be taken into account, as the healthy BMI for children varies according to age and sex. The BMI for age reference charts (separate for boys and girls) are used to determine BMI for age and to categorise the child based on their nutritional status, for example, underweight, normal weight, overweight or obese.

**Body weight** (in kilograms) is a measure of fat, muscle, bone and water. A person stands or sits (child) on a weighing scale and the weight is taken. A person's absolute weight and the degree of weight change over time are important in understanding one's nutritional status.

**Height (children in centimetres and adults in metres)** is measured by standing against a measuring tape or board. For children under the age of two years, the height is taken by laying the child down on a measuring board and measuring the length.

**MUAC (taken in centimetres /millimetres)** is a measurement of the distance around the middle of the upper part of the left arm. It is a rough indicator of the nutritional status of children aged 6-59 months. MUAC is usually used as a screening tool to assess if the child has undernutrition. It can be used as a screening tool in emergency situations, and when height and weight cannot be measured. This measurement is not as useful as regular measurements that are plotted over time, and is not a substitute for regular growth monitoring and promotion.

**Age** is used to interpret the information regarding nutritional status.

## 4.2. Biochemical assessment

Biochemical assessment involves checking the level of nutrients in a person's blood, urine or stool. It is a more objective and precise approach than the community assessment, dietary assessment or clinical assessment. The laboratory tests used for biochemical assessment include:

- Measurement of nutrient concentration in the blood
- Measurement of urinary excretion and metabolites of nutrients
- Detection of abnormal metabolites in blood from a nutrient deficiency
- Measurement of changes in blood constituents or enzyme activities that depend on nutrient intake
- Measurement of 'tissue specific' chemical markers: Biomarkers are substances measured in body tissues or excreta that can act as proxy measures of nutrient intake.

## 4.3. Clinical assessment

Clinical assessment is based on observation of physical signs associated with nutritional status usually on the hair, angles of the mouth, gums, eyes, skin, tongue, muscles and thyroid gland.

Clinical assessment includes checking for visible signs of nutritional deficiencies such as bilateral pitting oedema, emaciation (a sign of wasting, which is loss of muscle and fat tissue as a result of low energy intake and/or nutrient loss from infection), hair loss, and changes in hair colour. It also involves checking for, or asking about symptoms of infection that can increase nutrient needs (e.g., fever) and nutrient loss (e.g., diarrhoea and vomiting), as well as any known medical conditions and medications being taken. For children, clinical assessment may include the history of growth patterns, onset of puberty and a developmental history.

## 4.4. Dietary assessment

Assessing food and fluid intake is an essential part of nutrition assessment. It provides information on dietary quantity and quality, change in appetite, food allergies and intolerance, and reasons for inadequate food intake during or after illness.

The results are compared with recommended intake, such as recommended dietary allowance (RDA) or recommended nutrient intake (RNI). Dietary intake can be assessed through the following methods:

- 24-Hour dietary recall
- Food frequency questionnaire
- Dietary history since early life
- Food diary technique
- Observed food consumption

## 4.5. Bioelectrical Impedance Analysis (BIA)

This is a method for estimating body composition, and in particular body fat. An electric signal passes through water that is present in hydrated muscle tissues but meets with resistance when it hits fat tissue. The resistance, known as impedance,

is measured to calculate an estimate of total body water (TBW). TBW can then be used to estimate the body mass that is fat-free. The difference between this fat-free body mass and the body weight is computed to get the body fat. BIA is not commonly used because the equipment used to assess BIA is expensive.

## Measuring body composition using Bioelectric Impedance Analysis (BIA)

### Groups and individuals in whom BIA is not applicable

- These conditions include:
- Significant body asymmetry as in amputations
- Unilateral hemiparesis, and neuromuscular conditions that produce localized changes in perfusion or tissue atrophy

### Factors impacting BIA results

1. Weight and height
2. Position of the body and limbs (supine position, arms abducted at least 30°, legs abducted at approximately 45°)
3. Consumption of food and beverages (no beverages for at least 12 hours previously, fasted state for at least 2 hours)
4. Moderate to intense level of physical activity/exercise before BIA measurements (last exercise at least 12 hours previously)
5. Medical conditions and medication that have an impact on the fluid and electrolyte balance; infection and cutaneous disease that may alter the electrical transmission between electrode and skin
6. Environmental conditions (e.g. ambient temperature)
7. Individual characteristics (e.g. skin temperature, sex, age and race)
8. Ethnic variation
9. Non-adherence of electrodes, use of wrong electrodes, loosening of cable clip, inter-changing of electrodes

### For the most accurate results, clients should:

1. Not eat for 4 hours prior to testing
2. Not exercise for 12 hours prior to testing
3. Not consume alcohol for 24 hours prior to testing
4. Drink at least 1 quart (approx. 1 litre) of water one hour before the test
5. Not drink caffeine on the day of the test
6. Not wear pantyhose
7. Not use lotion on the hands or legs

## Guidelines for BIA

- Remove their shoes and socks or stockings
- Step on the machine and hold the hand held device stretched out at arm's length
- Input age, sex, height, and weight in the machine
- Measure and record findings

## Optimal body fat ranges

- Women 12%-25%
- Men 5%-20%

### 4.6. Key messages

It is recommended that one or more of these assessment methods be used to assess the health and nutrition status of individuals.

BMI is a useful, cost-effective and non-invasive indicator of body fatness, but is not an accurate measure of obesity and disease risk, because there are other factors that need to be considered. Therefore, it is recommended that BMI be used alongside other measurements.

Growth in weight and height is an excellent indicator of a child's nutrition and health. A child found to have abnormal growth patterns should be referred for nutrition interventions. If a child is growing well, the next step should be to provide appropriate feeding advice for the next age group.

Nutrition assessment of children and adults should be done regularly to promote proactive action to reduce risk factors.

Appropriate and healthy diets and healthy lifestyle practices should be promoted as a means of preventing over- and undernutrition.



# Chapter 5. Food Production, Processing and Preparation

Household production has the potential to reduce the cost of food and increase families' ability to access a diversified diet. Most agricultural produce is highly perishable, but with appropriate food processing and conservation techniques, the shelf-life of some produce can be increased. The way meals are planned, prepared and handled, also plays an important role in ensuring that the nutritional value is retained.

This chapter covers the following topics:

- Food production through home gardens
- Food processing and preservation technologies
- Meal planning and preparation
- Food safety and hygiene

## 5.1. Food production through home gardens

A home garden is any convenient size of plot located in, or near a homestead, and where a variety of crops are grown, and/or small animals such as rabbits, poultry, fish and goats reared, primarily to meet household food needs. Home gardens (also referred to as kitchen gardens) are common in many Kenyan households. Often, they are located close to a source of water, such as a river, pond or swamp. In peri-urban and urban areas, the home garden could use technologies that are adapted to the scarcely available land. Some innovative home gardening technologies are presented in the photograph gallery below.



*Micro-garden*



*Tyre garden*



*Multi-storey garden*

Home gardens provide a relatively cheap alternative source of fresh food and increase the diversity of family diets. Surpluses can be sold to generate an income, with which to buy other food items that the family cannot produce, thus increasing the variety of foods in their meals.

### 5.1.1. Key messages

The following key messages should be used to encourage families to use home gardens to improve their diets. In addition, expert advice should always be sought from agricultural extension workers to identify crops and small livestock that are suitable for the local conditions, and that meet the nutritional requirements of families.

1. Grow crops and keep small livestock that contribute to the nutritional requirements of the household.

2. Grow a variety of foods, especially those that may not be available during the dry season. These include roots and tubers, green leafy vegetables, legumes and fruits.
3. When planning a home garden, consider the family's nutritional requirements and food preferences.
4. Stagger the production of fruits, vegetables and other types of food crops according to their maturity period, so that they can be harvested and consumed throughout the year.
5. Follow good crop and animal production practices as advised by an agricultural extension officer.
6. Seek the services of a qualified veterinary officer for vaccination and treatment regime to control diseases and pests.
7. Protect the home garden from destruction by stray wild and domestic animals to get good harvests.
8. To avoid contamination from car fumes, do not establish the home garden besides busy roads. Avoid watering crops using contaminated water.

## 5.2. Food processing and preservation

Food processing is a set of methods and techniques used to transform raw ingredients into food or to transform foodstuff into other forms for consumption at home, or for use by the food processing industry. Food processing takes the clean, harvested crops or slaughtered and butchered animal products and uses these to produce attractive, marketable and often long-life food products.

### 5.2.1. Food processing

Processing increases food variety, as the products can be stored for a longer time and distributed to areas where the processed foods are unavailable. It also has health and nutrition benefits. It de-activates spoilage and pathogenic microorganisms, and removes toxins, which makes some foods safe to eat. Processing techniques such as fermentation enhance the bioavailability of micronutrients in plant-based diets, and fortification or enrichment add important nutrients to foods.

Food processing has its disadvantages. It could result in the loss of some naturally occurring vitamins, fibres and minerals. Some processed foods contain additives with little nutritive value. Others have high calories and low or no micronutrients; their consumption can lead to higher susceptibility to NCDs. If food processing is not well done, it can lead to food spoilage and to introduction of poisonous substances like aflatoxins. Lastly, processing is costly, and can increase prices of food products.

### 5.2.2. Food preservation

Food preservation refers to techniques used to keep food from spoiling. Common methods of food preservation are explained below.

**Drying** reduces water in food thus preventing or delaying bacterial growth. It can be used to preserve fish, meat, vegetables and cereals.

**Salting and curing:** Salting draws moisture from food such as meat, fish and insects. Sugar is used to preserve fruits. Fruits can be preserved in syrup or cooked in sugar to the point of hardening then stored in jars.



**Fat/oil treatment (potting)** is a traditional way of preserving meat and other cooked foods by setting it in a pot and sealing it with a layer of fat or just covering with a lid/ banana leaves.

**Burial in the ground:** Many root vegetables, such as sweet potatoes, cassava and arrow roots, are very resistant to spoilage and require no other preservation than storage in cool dark conditions e.g. burying.

**Fermentation is** a process where microorganisms (good bacteria) in food changes sugars in the food to acid or alcohol and keep longer. It is used mainly for milk and porridge.

**Freezing:** Can be used to preserve food by storing in refrigerators where power is available. Freezing slows the growth of microorganisms and stops the breakdown of nutrients in food.

**Pickling:** Some foods like cucumbers, fish, olives and onions, are pickled in vinegar or other food acid. The vinegar kills microorganisms

**Smoking:** The food is soaked in a salt solution, which prevents microorganisms from breeding. The food is then dried in wood smoke, which slows the growth of microorganisms. Examples of smoked food are ham, bacon, cheese and fish.

**Sterilisation:** It destroys all microorganisms, but can change the flavour of foods. Ultra-high temperatures are used to preserve milk and cream.

### 5.2.3. Key messages

The following key messages should be used to inform and provide practical support on food processing and preservation.

1. Apply methods of food processing correctly to prevent loss of important micronutrients.
2. Use food materials and ingredients that meet recommended safety and quality standards during processing and preservation.
3. Keep storage areas dry, cool and properly ventilated. Circulation of air around bags and cartons of foods aids the removal of moisture, reduces temperature and eliminates odours. Check food stores regularly for cleanliness, and pest and rodent infestation.
4. Store food using the First in–first out and first expiry-first out rules
5. Store fresh food in a cool place or refrigerator in portions that can be cooked at once. If need be, thaw food in the fridge before cooking.
6. Do not store raw food, especially meat, in contact with cooked food. Keep meat, poultry and fish separate from other foods to avoid contamination with bacteria and other disease-causing agents.
7. Buy perishable food in small quantities unless a refrigerator is available.
8. Eat food fresh after cooking. Keep leftovers in a cool place or refrigerator and reheat at a high temperature before eating.
9. Serve food immediately after cooking. Hot foods should be kept hot, and cold foods cold.
10. Cover stored food carefully to protect them from dust, pests, rodents and other animals.
11. Throw away any food that has gone bad, or is well past its sell-by date.

## 5.3. Meal planning and preparation

Meal planning helps the head of the household make decisions about purchase of affordable, wholesome foods that meet the preferences of family members, while at the same time providing the recommended daily intake of nutrients. Planning also makes shopping easier, helps to manage the budget and save time. The entire family can participate in selecting new dishes, budgeting, cooking and serving, hence building a stronger bond. It can stimulate development of a garden to get a ready source of fresh foods. Meal planning is influenced by many factors, including: seasonality, cost of food, family size, nutrient requirements for family members, fuel cost/access and religious beliefs/taboo.

Annex 2 shows a sample weekly menu, which can be adapted by individual households and modified to suit their local contexts, nutritional requirements and preferences.

### 5.3.1. Cooking methods

The common cooking methods include:

**Boiling:** Food is covered or almost covered by water, and the water is heated to boiling point (100°C). This method is suitable for cooking large joints of meat e.g. beef, leg of mutton, leg of pork, tough chicken; cereals and pulses; vegetables with strong fibre or a course flavour; roots, tubers and bananas.

**Stewing:** Food is cooked gently over low heat in a small quantity of liquid. Stewing may take 1.5-2 hours. This method is suitable for cooking tough cuts of meat, fish, certain fruits and vegetables.

**Steaming:** This is cooking with steam in a container above boiling water. This method minimises nutrient and flavour losses. Steaming can be used to cook fish, tender cuts of meat, vegetables (cabbage, cauliflower, broccoli, pumpkin) and bananas.

**Frying:** Food is cooked in fat or oil. It can either be deep fried or shallow fried. Frying is suitable for small portions of tender food such as steak, pan cakes, doughnuts, mandazi, chips and crisps.

**Braising:** Involves browning meat or vegetables in a small amount of oil or fat in high heat. The food is then slowly cooked under low heat, in a covered utensil, in or on top of the stove, using a small quantity of liquid.

**Poaching:** Food is placed in sufficient hot liquid to barely cover it, and then it is left to simmer. Poaching is suitable for foods that require low temperature or require gentle handling such as fish and eggs. It is a good method as fat is not used and delicate food does not disintegrate.

**Baking:** Food is cooked using dry heat in a closed oven, heated by gas, electricity or charcoal. It is suitable for large joints of meat; whole chicken, mutton, pork, flour mixtures, cakes, bread, cookies, roots and tubers.

**Roasting:** Food is cooked using dry heat in front of, or over a glowing source of heat. This method is suitable for meat, chicken; roots, tubers, bananas and green maize.

**Grilling:** This is cooking by direct heat over red hot coal or under a red hot grill. It is suitable for only small pieces of meat, fish, vegetables (mushrooms, courgettes, red/green peppers and tomatoes).

### 5.3.2. Key messages

The following messages should be used to guide families to prepare meals correctly so as to retain their nutrient content.

1. Cook vegetables for a short time or steam them.
2. Add food to boiling water rather than cold water where applicable, e.g. when cooking vegetables.
3. Whenever possible, use alternative methods of cooking instead of deep frying.
4. Add nutrient absorption enhancers such as oil to meals that include vitamin A rich foods, and foods rich in vitamin C in diets with non-haem iron and calcium.
5. Chop vegetables and fruits just before cooking or eating. Vegetables and fruits should be eaten as fresh as possible.
6. When cooking vegetables, use minimal water and do not drain water from the food after cooking.
7. Peel root vegetables as little as possible e.g. Irish potatoes and carrots.
8. Do not use bicarbonate of soda in vegetables since it destroys vitamins B and C.
9. Presence of inhibitors such as tannins, phytates and oxalates in some, cereals, legumes vegetables are known to reduce iron absorption. Fermentation and germination is recommended for cereals and legumes.
10. Oxalates are also known to inhibit calcium absorption in the body. Therefore, chop up vegetables high in oxalates before cooking.
11. Soya is a good source of protein but its availability is inhibited by trypsin inhibitor. Heat treatment of soya helps destroy the trypsin inhibitor.
12. When cooking pulses, soak them overnight in cold water to soften them, reduce cooking time and increase digestibility while reducing stomach discomforts.
13. Add ground or powder form of the legumes to mixed dishes to make them nutrient dense.

### 5.3.3. Food safety and hygiene

Meals should be prepared and handled in a safe and hygienic way that adheres to recommended food safety and hygiene standards. Food safety and hygiene measures prevent contamination and multiplication of microorganisms in food and in food preparation/storage areas.

#### 1. Keep food preparation areas, serving and eating areas and utensils clean.

- Wash utensils and surfaces that have come into contact with meat, poultry or fish with hot water and soap before preparing other foods.
- If possible, use one chopping board for fresh produce like fruits and vegetables, and another one for raw meat, poultry and sea food.
- Keep rubbish in a covered bin, which is emptied regularly.
- If dish cloths are used, wash and air them daily.
- Use clean dishes and utensils to store, prepare, serve and eat food. Equipment, utensils and other containers should allow easy cleaning, and should not have pitted, grooved or sculpted surfaces.

## **2. Maintain high levels of personal hygiene when handling food.**

- Wash hands with clean water and soap or ashes before, during and after preparing food or eating, and after visiting the toilet. Use a clean cloth or towel to wipe hands while in the kitchen.
- Keep fingernails short and clean.
- Wear clean clothes and clean aprons to protect other clothes.
- Keep hair covered and never comb it where food is being prepared or eaten.
- Cover all wounds with Band-Aids to prevent contamination of food during preparation and handling.
- When sneezing or coughing, cover the mouth and nose with a handkerchief or tissue.
- Do not use cooking spoons to taste food for flavour; avoid licking fingers, or touching the mouth, nose, ear or any part of the body when handling food.
- People suffering from infectious diseases such as diarrhoea should not handle food.
- Wash hands thoroughly after using the toilet and latrine. Keep latrine clean, covered and free from flies when not in use.

## **3. Use clean, safe water for drinking and food preparation.**

- Boil drinking water continuously for three minutes or treat it with an appropriate chemical.
- Store drinking water in a covered container that is cleaned at least once a week. The best container is one with a tap as this prevents dipping of hands and cups into the container.

## **4. Exercise extreme care about foods prepared and sold by vendors in the market place.**

## **5. Cook raw foods, especially poultry, meats, eggs and unpasteurised milk, thoroughly to kill pathogens.**

- Cook all animal products such as meat, poultry, eggs and fish thoroughly; meat should have no red juices.
- Hard-boil eggs; avoid soft-boiled eggs, raw eggs, cracked eggs or any other food containing raw eggs.
- Remove the bruised part of fruit and vegetables to get rid of any mould and bacteria growing there.
- Wash foods, especially vegetables and fruits thoroughly with clean and safe water before cutting or chopping.
- Cover all food to keep pests, dust and other contaminants away.

# Chapter 6. Physical Activity

along with healthy diets, physical activity contributes to health and overall wellbeing. Physical activity undertaken throughout the life cycle reduces the risk of NCDs such as cardiovascular disease, diabetes and cancer and their risk factors such as raised blood pressure, raised blood sugar and overweight. In addition, physical activity is a key determinant of energy expenditure, and thus is fundamental to energy balance and weight control.

This chapter covers:

- The frequency, duration, intensity, type and total amount and benefits of physical activity for different age groups;
- Key messages for achieving the recommended levels of physical activity; and
- Key messages for reducing sedentary behaviour among different age groups.

## 6.1. Physical activity during pregnancy and lactation

### 6.1.1. Benefits of physical activity during pregnancy

During pregnancy, or when caring for a newborn, it can be challenging to find time for physical activity. Motherhood is definitely a busy time, but it is important to make it a priority to take care of oneself both physically and mentally. Moderate-intensity physical activity by healthy pregnant women is beneficial in maintaining appropriate weight gain, promoting cardio-respiratory fitness, increasing muscle tone, energy levels, strength and endurance, and building stamina for labour and delivery. When pregnant women engage in physical activity, their mood and self-image improves; they relax, and sleep better. After delivery, physical activity speeds up recovery, and helps maintain a healthy weight. When combined with eating fewer calories, it helps with weight loss.

### 6.1.2. Key messages

The following key messages should be used to encourage and support all pregnant and lactating women to achieve desired levels of physical activity. Pregnant and lactating women may need to take extra precautions and seek medical advice about the appropriate amounts and types of physical activity for their abilities.

1. Accumulate at least 150 minutes (2 hours and 30 minutes) per week of moderate-intensity aerobic activity, such as brisk walking, swimming, cycling, and lightweight trainings.
2. Avoid activities that require sudden starts or stops, jumping, rapid changes in direction or one that increases the risk of falling or abdominal injury, such as netball, soccer, or basketball. Always use a supportive bra and comfortable shoes.
3. Always warm up muscles before each activity and stretch and cool afterwards.
4. Drink water before, during, and after physical activity to replace body fluids lost through perspiration.
5. Avoid performing any activity that involves lying on the back. Instead, perform the exercises while lying on the side, sitting or standing.

6. If physically active with a history of or risk for preterm labour or foetal growth restriction, reduce physical activity in the second and third trimesters.
7. Seek the support of a partner, family and friends to meet the recommended levels of physical activity
8. If inactive in pre-pregnancy, start off with a few minutes of activity each day, and gradually increase to the frequency and intensity of physical activity to achieve the recommended levels.
9. Terminate physical activity during pregnancy in the case of the following warning signs: vaginal bleeding, dizziness, headache, chest pain, muscle weakness, calf pain or sweating, preterm labour, decreased foetal movement and amniotic fluid leakage.



## 6.2. Physical activity for children (0-59 months)

### 6.2.1. Benefits of physical activity for children (0-59 months)

To foster the development of key developmental milestones in a child, the child needs healthy stimulation through simple play activities. Because people in resource-scarce environments often have limited leisure time, caregivers can be encouraged to meet the children's need for play through every day routine activities, for example, making toys from recycled materials or playing games that help the children to reach out for items, stand, talk and learn.

Table 15 Physical milestones for children up to five years

| PHYSICAL MILESTONES FOR CHILDREN UP TO FIVE YEARS |   |
|---|---|
| Newborn   | Rough, random, uncoordinated, reflexive movement  |
| 3 months  | Head at 90 degree angle, uses arms to prop; visually track through midline  |
| 5 months  | Purposeful grasp; roll over; head lag disappears; reaches for objects; transfer objects from hand to hand; plays with feet; exercises body by stretching, moving; touch genitals, rock on stomach for pleasure  |
| 7 months  | Sits in "tripod"; push head and torso up off the floor; support weight on legs; "raking" with hands   |
| 9 months  | Gets to and from sitting; crawls, pulls to standing; stooping and recovering; finger-thumb opposition; eye-hand coordination, but no hand preference  |
| 12 months   | Walking   |
| 15 months   | More complex motor skills   |
| 2 years   | Learns to climb up stairs first, then down  |
| 3-5 years   | More physically active, and add 3-4 inches in height per year. The can't sit still for long. Tend to be clumsy throwing balls. As they get older, they refine complex skills: hopping, jumping, climbing, running, ride "big wheels" and tricycles. They also improving fine motor skills and eye-hand coordination: cut with scissors, draw shapes |

### 6.2.2. Key messages

The following key messages can guide caretakers to identify and promote play activities that help to stimulate timely achievement of key physical developmental milestones of a child of 0-59 months> These key messages are adapted from WHO/UNICEF's Care for Child Development Package.

1. From birth to one week, provide ways for the baby to see, hear, move arms and legs freely, and touch. Gently soothe, stroke and hold the baby child. Skin-to-skin contact is good.
2. From 1 week to 6 months, provide ways for your child to see, hear, feel, move freely, and touch you. Slowly move colourful things for your child to see and reach for. Sample toys: shaker rattle, big ring on a string
3. At 6-9 months, give the child clean, safe household things to handle, bang, and drop. Sample toys include containers with lids, metal pots and spoons.
4. At 9-12 months, hide a child's favourite toy under a cloth or box and encourage the child to find it; play peek-a-boo games.
5. Between 12 and 24 months, give the child things to stack up, and to put into containers and take out. Sample toys could include nesting and stacking objects, container and clothes clips.
6. Help children aged two years and above to child count, name and compare things. Make simple toys such as objects of different colours and shapes to sort, stick or chalk board, puzzle.



## 6.3. Physical activity for older children and adolescents (5-17 years)

### 6.3.1. Benefits of physical activity to children (5-17 years)

Children are active in an intermittent way; they alternate short periods of activity with short periods of rest. This pattern of activity changes as they grow and develop the skills to play organised games and sports, which enables them to stay active for longer periods.

Physical activity during late childhood and adolescence helps children and adolescents to maintain a healthy body weight, and to improve their fitness, body composition, muscle and skeletal fitness. This in turn reduces the risk of overweight and obesity, which are risk factors for NCDs. Normal-weight adolescents who have relatively high levels of physical activity tend to have less body fat. This strengthens their immunity, builds their self-esteem, reduces symptoms of depression and improves social behaviour and learning. Among inactive, overweight and obese adolescents, doing amounts below the recommended levels will bring more benefits than doing none at all.

### 6.3.2. Key messages

The following key messages should be used to encourage and support children and youth aged 5–17 years to achieve recommended levels of physical activity. The recommendations should be achieved beyond the physical activity accumulated in the course of normal daily non-recreational activities.

Parents and caregivers of children and adolescents with disabilities or medical conditions should consult a health professional to understand the type and amount of physical activity that is suitable for them.



1. Accumulate at least 60 minutes of moderate- to vigorous-intensity physical activity daily.
2. Accumulation refers to meeting the goal of 60 minutes per day by performing activities in multiple shorter bouts spread throughout the day (e.g. 2 bouts of 30 minutes), then adding together the time spent during each of these bouts.
3. Take part in active play, and other physically demanding activities such as dancing, swimming or skateboarding,



games, sports, walking, cycling and physical education and planned exercise in the context of family, school, and community activities.

4. Do activities that match the age, skill level and maturity. These activities should be safe and enjoyable
5. Use safe playground areas at home (estates) and in school.
6. Most of the daily physical activity should be aerobic. Incorporate vigorous-intensity activities, including those that strengthen muscle and bone, at least three times per week.
7. Perform targeted weight-loading activities that simultaneously influence muscular strength three or more days per week. Such activities can be performed as part of playing games, running, turning or jumping.
8. For inactive children and adolescents, start with smaller amounts of physical activity, gradually increasing the duration, frequency and intensity, until the recommended target is achieved.

## 6.4. Physical activity for adults (18-64 years)

### 6.4.1. Benefits of physical activity

As one grows, an active lifestyle becomes even more important for health and overall wellbeing. Adult men and women who are physically active exhibit a higher level of bone health, cardio-respiratory and muscular fitness; and have a healthier body mass and composition, and enhanced strength, power, and intrinsic neuromuscular activation. They are also at lower risk of all-cause mortality, coronary heart disease, cardiovascular disease, high blood pressure, stroke, type 2 diabetes, metabolic syndrome, colon cancer, breast cancer, and depression. Doing amounts below the recommended levels will bring more benefits than doing none at all.

### 6.4.2. Key messages

The following key messages should be used to encourage and support all healthy adults aged 18-64 years to accumulate the recommended levels of physical activity. While they can be applied to adults with disabilities, they may have to be adjusted for each individual based on their exercise capacity and specific health risks or limitations. Individuals with underlying medical conditions should consult a health professional to understand the type and amount of physical activity that is suitable for them.

1. Do at least 150 minutes of moderate-intensity aerobic physical activity throughout the week, or at least 75 minutes of vigorous-intensity aerobic physical activity throughout the week, or an equivalent combination of moderate- and vigorous-intensity activity.
2. Appropriate physical activity includes recreational or leisure time physical activity, transportation (e.g. walking or cycling), occupational (i.e. work), household chores, play, games, sports or planned exercise, in the context of daily, family, and community activities.
3. Accumulation of physical activity can be obtained in short multiple bouts of at least 10 minutes, or one long bout to meet physical activity expenditure goals for weight maintenance.
4. Perform aerobic activity in bouts of at least 10 minutes' duration.

5. For additional health benefits, increase moderate-intensity aerobic physical activity 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.
6. Perform muscle-strengthening activities involving major muscle groups two or more days a week.
7. If physically inactive, gradually increase the duration, frequency and finally intensity as a target to achieving the recommended levels.

## 6.5. Physical activity for older persons (65 years old and above)

### 6.5.1. Benefits of physical activity

As people age, they tend to have lower exercise capacities than younger persons. This group needs a physical activity plan that is of lower absolute intensity and amount (but similar in relative intensity and amount). Adults aged 65 years and above who are physically active have a higher level of cardio-respiratory and muscular fitness, better bone health and healthier body mass and composition, than those who are not. They also have lower rates of all-cause mortality, coronary heart disease, high blood pressure, stroke, type 2 diabetes, colon cancer, and breast cancer.

Being physically active is also associated with higher levels of functional health, a lower risk of falling, and better cognitive function. These benefits are observed in adults in the older age range, with or without existing NCDs.

### 6.5.2. Key messages

These key messages should be used to encourage and support older persons to accumulate the recommended levels of physical activity. They apply to healthy adults aged 65 years and above and those with chronic NCDs.

Individuals with specific health conditions should take extra precautions and seek medical advice before engaging in physical activity. Those with disabilities should adjust the recommendations to their individual capacity and specific health risks or limitations.

1. Do at least 150 minutes of moderate-intensity aerobic physical activity throughout the week, or at least 75 minutes of vigorous-intensity aerobic physical activity throughout the week, or an equivalent combination of moderate- and vigorous-intensity activity.
2. Physical activity appropriate for this age group includes, transportation (e.g. walking or cycling), occupational (if the person is still engaged in work), household chores, play, games, sports or planned exercise, in the context of daily, family, and community activities.
3. Perform aerobic activity in bouts of at least 10 minutes duration.
4. For additional health benefits, increase moderate- intensity aerobic physical activity 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.
5. Do muscle-strengthening activities involving major muscle groups, on two or more



days a week.

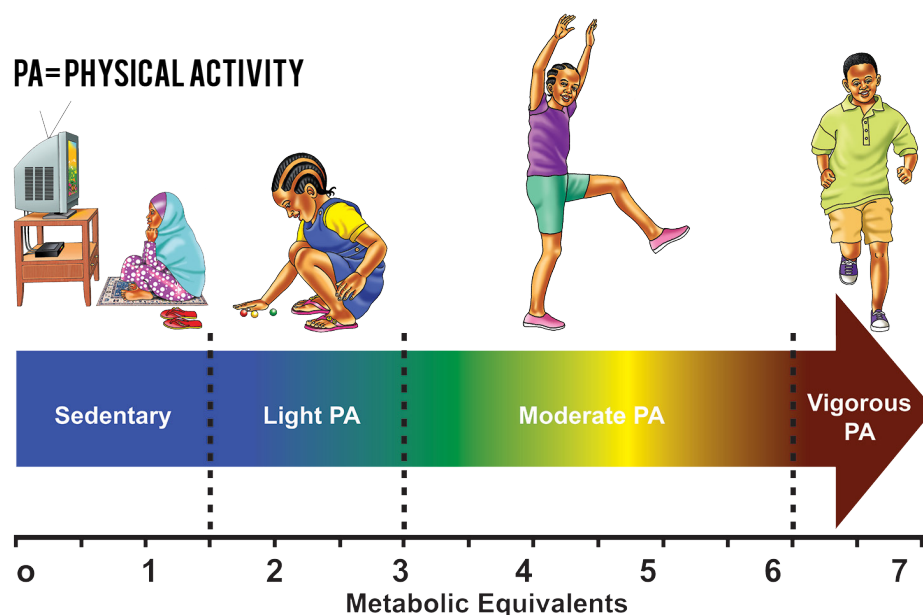
6. If unable to do the recommended amounts of physical activity due to health conditions, physical disability or poor mobility, be as physically active as abilities and conditions allow.
7. If physically inactive, start gradually, increasing the duration and frequency of moderate-intensity activity before considering increasing the intensity to vigorous-intensity activity.

## 6.6. Reducing sedentary behaviour among children and adolescents

There is a difference between a person who is sedentary and a person who is physically inactive. Being 'physically inactive' means that a person is not doing enough physical activity, and as a result, not meeting the recommended physical activity targets. However, being 'sedentary' means sitting or lying down for long periods. Sedentary behaviour refers to any waking activity characterised by energy expenditure that is less or equal to 1.5 metabolic equivalents and a sitting or reclining posture.

Sedentary activities include: sitting for long periods; using motorised transportation (such as a bus or a car); watching television; playing passive video games; and playing on the computer.

**Hence, a person can do enough physical activity to meet the recommended levels and still be considered sedentary if they spend a large amount of their day sitting or lying down at work, at home, for study, for travel or during their leisure time.**



Children and adolescents can spend approximately nine hours daily on the screen (TV, computer, iPod, play stations and cell phones). In infants and children below the age of four, increased sedentary time is associated with detrimental effects on aspects of cognitive and psychosocial development and with adverse effects on body composition. In older children and adolescents it may lead to overweight and obesity that may last a lifetime. Reducing sedentary behaviour promotes growth and development, improves social and speech development, builds immunity, and reduces risks of NCDs in later life.

### 6.6.1. Reducing sedentary behaviour among infants and young children (0-4 years)

The following key messages should be used to encourage and support caregivers to minimise the time infants (aged less than 1 year), toddlers (aged 1-2 years) and preschoolers (aged 3-4 years) spend being sedentary during waking hours.

1. Minimise infant prolonged sitting or being restrained (e.g., stroller, high chair, play pens, baby walker) for more than 1 hour at a time.
2. Do not allow screen time (e.g., TV, computer, electronic games) for infants below 2 years.
3. For those between 2-4 years, limit screen time to less than one hour per day.
4. Provide toys that encourage infants and children to move around the house or compound such as toy cars, bicycle and kites among others.
5. Encourage singing baby songs and dancing.

### 6.6.2. Reducing sedentary behaviour among older children (5-11 years)

The following key messages should be used to encourage and support caregivers to minimise the sedentary behaviour in children aged 5-11 years. They should be used alongside the guidelines for achieving recommended levels of physical activity.

1. Encourage children to engage in activities that enable them accumulate the recommended levels of physical activity.
2. Limit recreational screen time (television, computer, video games, among others) to no more than 2 hours per day. For those with screen time levels in excess of two hours per day, progressively reduce screen time as a stepping-stone to meeting the recommended physical activity levels.
3. Discourage television sets and other screens in the children's bedroom.
4. Whenever possible, substitute motorised transport with walking or cycling.
5. In school, ensure children go for health breaks and participate in physical education lessons.
6. Encourage other types of fun that include both physical and social activities such as clubs.

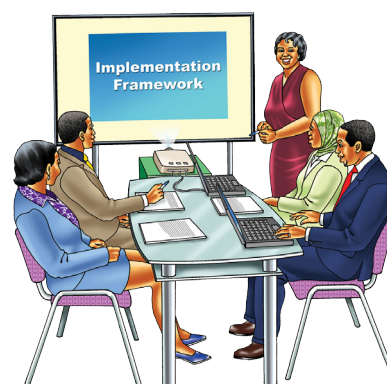
### 6.6.3. Reducing sedentary behaviour among older children (12-17 years)

The following key messages should be used to encourage and support caregivers to minimise the time children aged 12-17 years. They should be used alongside the guidelines for achieving recommended levels of physical activity.

1. Encourage adolescents to engage in activities that enable them accumulate the recommended levels of physical activity.
2. Limiting recreational screen time to no more than 1- 2 hours per day. Remove television sets and other screens from the bedroom.
3. Promote the use of transport related physical activity such as walking, roller skating and cycling to and from places.
4. Encourage involvement in social activities such as volunteer work and community service.
5. Encourage other types of fun that include both physical and social activities such as joining sports team or clubs.

# Chapter 7. Implementation Framework

The successful implementation of the **National Guidelines for Healthy Diets and Physical Activity** will require multi-sectoral engagement and commitment. This chapter outlines the implementation framework that will facilitate the operationalisation of the Guidelines. It outlines the roles and responsibilities of stakeholders and the coordination mechanism, capacity development and resource mobilisation requirements, and indicators to gauge the progress towards meeting the targets outlined in the Guidelines.



## 7.1. Advocacy communication and social mobilisation

**Advocacy** is the act of supporting a cause or issue to achieve a desired result; or an action directed at changing policies, positions, or programs and resource allocation decisions within political, economic, and social systems and institutions.

**Communication** is a process by which information is exchanged between individuals through a common system of symbols, signs, or behaviour. Communication activities make use of some form of media or channel of communication (e.g. mass media, social media, community media, and interpersonal communication). Communication is a two-way process, with “participation” and “dialogue” as key elements.

**Social mobilisation** is a process that engages, unites and motivates a wide range of partners and allies at national and local levels to raise awareness of, and demand for a particular development objective through dialogue.

**The Advocacy, communication and Social Mobilisation (ACSM) strategy** will be instrumental in supporting the dissemination and implementation of the healthy diets guidelines among stakeholders at different levels (policy makers, service providers and community). The table below outlines the target audience and channels of key ACSM activities

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Table 16 Target audience and channels for key ACSM activities

| Strategy            | Target audience   | Channels and materials to use  |
|---------------------|---|--|
| Advocacy            | Top government leaders, political leaders, legislators, policy and decision makers, county level leaders, development and implementing partners | Sensitisation meetings; policy briefs; consultative forums   |
| Communication       | Top government leaders, political leaders, legislators, policy and decision makers, county level leaders  | Sensitisation; workshops/training; dissemination meetings  |
|                     | Government service providers at national and county levels (health, education, agriculture, among others)                                       | Sensitisation meetings; training workshops; CMEs/OJT; mass media (audio, visual, print)  |
|                     | Implementing partners, Civil Society Organizations, religious leaders   | Sensitisation meetings; training workshops; mass media (audio, visual, print)  |
|                     | Media houses  | Media sensitisation; training workshops; field visits for documentation; media briefs; media kits; press briefings   |
|                     | Private sector  | Sensitisation meetings; training workshops; mass media (audio, visual, print)  |
|                     | Academia  | Stakeholder meetings and conferences; sensitisation and dissemination meetings; training workshops   |
|                     | Community members   | Mass media (audio, visual, print); social Media (mobile, etc.); interpersonal communication (one-on-one); traditional media (song, dance, drama); sensitisation meetings; training workshops; Information, Education and Communication (IEC) materials |
| Social Mobilisation | Pregnant and lactating mothers  | Mother-to-mother support groups; IEC materials; mass media, Interpersonal Communication, On-ground activations e.g. road shows   |
|                     | Early childhood (0-5 year old): Caregivers, ECD teachers  | IPC; mass media; IEC materials; training workshops   |
|                     | Late childhood (5-9 year old): Caregivers, children (5-9 years) and teachers  | IPC; support groups; IEC materials; mass media; social media (mobile, Facebook, Twitter, WhatsApp); school events (music and drama festival); essay writing, regular play/sports activities; inter-class/school/house events                           |
|                     | Adolescent children (10-19)   | Social media (mobile, Facebook, etc.); mass media; school health clubs; youth centres; school events (music and drama festival); essay writing; regular play/sports activities, Inter-class /school/ house events                                      |
|                     | Adults (20-59)  | Mass media (audio, visual, print); social media (mobile, Facebook, etc.); support groups; social gatherings; community dialogue sessions; IPC; training workshops; sensitisation meetings; adult education classes; vocational trainings               |



| Strategy | Target audience     | Channels and materials to use  |
|----------|---------------------|--|
|          | Older persons (60+) | Support groups; social media; mass media (print, audio, print); IPC (home visits, etc.); social gatherings (churches, chamas etc.) |

## 7.2 RESOURCE MOBILISATION

Resource mobilisation is the process by which an organization acquires and manages the financial, human and logistical resources it needs to fulfil its mission. Resource mobilisation in this case refers to a process of raising different types of support either in cash or in-kind to support the implementation of the National Guidelines for Healthy Diets.

### 7.2.1. Triangle of resource mobilisation

Resource mobilisation involves three key elements, namely resources, **resource providers and resource mobilisation mechanisms**. Resource mobilisation mechanisms include submitting funding demands, organizing special events or requests for donation. National and county governments will contribute to resource mobilisation by developing costed County Nutrition Action Plans and Annual Work Plans (AWP) which highlight the resource requirements for implementing the guidelines. Resource providers include multilateral institutions, bilateral institutions, International non-governmental organizations (NGOs), government departments, and community members.

**The table below shows the level of resource mobilisation, target activities, resources and resource providers.**

*Table 17 Resource mobilisation, target activities, resources and resource providers*

| Level of mobilisation | Target activities  | Resource provider                                   |
|-----------------------|--|---|
| National              | Guidelines development, review and printing                          | National Government and partners                    |
|                       | Guidelines dissemination   | National Government and Partners                    |
|                       | ACSM: Formative research, IEC material development and dissemination | National Government and partners                    |
|                       | Capacity development   | National Government and partners                    |
|                       | Monitoring and evaluation  | National Government and partners                    |
| County                | ACSM: IEC messages and material dissemination                        | National Government, County government and partners |
|                       | Capacity development   | National Government, County government and partners |
|                       | Implementation of guidelines   | County government and partners                      |
|                       | Monitoring and evaluation  | County government and partners                      |

## 7.3 CAPACITY DEVELOPMENT

The nutrition capacity of people, of systems and structures including proper governance structures are necessary to ensure the implementation of the National Guidelines for Healthy Diets. Through the guidance of the Kenya National Nutrition Capacity Framework (KNNCF), competencies in the four main capacity development thematic areas should be

enhanced for appropriate implementation of the National Guidelines for Healthy Diets and Physical Activity. These are:

- Systemic (i.e. policy and regulatory capacity)
- Organizational capacity
- Technical capacity
- Community capacity.

### 7.3.1 Systemic capacity for health diets

These guidelines have been developed in line with other policies, laws regulations and standards for healthy diets in Kenya. To ensure their successful implementation:

- The nutrition workforce capacity to understand and implement these policies, laws, regulations and standards will be enhanced.
- The knowledge and understanding of these guidelines among county government and other implementers will be promoted to increase the impact, coverage and pace of interventions outlined herein.
- Efforts will be made to ensure that county level governments allocate resources to the implementation of these guidelines.
- The guidelines will be disseminated at the national, county level and during stakeholder forums.
- The implementers will be equipped with resource mobilisation, planning and budgeting skills, without which, efforts to promote healthy diets and physical activity will be undermined and frustrated.

### 7.3.2 Organizational capacity

The competencies required by nutrition professionals at organizational level and the areas of focus required for improved organizational capacity are key for the successful implementation of these guidelines. Organisational capacity development recognises the need for well-established infrastructure, tools and equipment in addition to skills enhancement. For instance the skills for nutrition assessment can be compromised with the absence of relevant anthropometry equipment and proper logistics, thereby negatively affecting the success of healthy diet activities.

To ensure successful implementation;

- Competencies of implementers of the guidelines to coordinate activities, manage staff and resources, as well as offer supervisory services, will be enhanced.
- Technical oversight and capacity development for coordination within NGOs, government line ministries, private sector organizations, regulatory bodies and UN systems and other stakeholders addressing the various nutrition interventions will be required.
- Capacity development initiatives that can be considered include: on job training; mentorship programs; and continuous professional development.
- A lot of effort has been geared towards capacity development for nutrition-specific interventions; capacity for nutrition-sensitive actions for healthy diets will require increased attention.
- Other key capacities within the organizational pillar include: data collection methodologies in relation to healthy diets; how to use this data for decision making; developing suitable indicators; and capacity to conduct high quality research in healthy diets.

### 7.3.3 Technical capacity

The proficiency and competency level attained by professionals through formal training is critical for the successful implementation of these guidelines.



Therefore,

- Components of the guidelines and the recommendations should be included in reviews of the curriculum for members of the nutrition workforce i.e. nutritionists, nurses, clinical officers, public health officers, agricultural extension workers, social workers and other relevant cadres.
- Kenya Nutritionists and Dieticians Institute plays a vital role in lobbying for this consideration. In addition, any training or disseminations done either at the county or national level should strive for participation of the academia.
- The national level should build capacities of the counties through establishment of Training of Trainers (TOTs) and development of training materials (facilitators' manuals and participants guide).
- The government and NGOs should incorporate healthy diets trainings into ongoing related trainings.
- Other components need to be mainstreamed within existing related programs, such as the Maternal, Infant and Young Child Nutrition and adolescents programs.
- The individuals trained in the area of healthy diets will be recorded in the Ministry of Health (MOH) training database, which will be updated continuously.
- Efforts will be made to include healthy diets indicators into the existing performance contracting process at both levels of the government.

### 7.3.4 Community capacity

Community-related capacity considers the level of awareness of communities; their ability to access, demand and utilise health services and existing linkages between communities and health institutions at different levels. It is paramount that communities are actively involved in capacity development efforts. When communities are aware of the nutrition services that they ought to receive, they will prompt the health facilities and local health authorities at national and sub-national levels to capacitate health staff and link them with community systems to provide required services.

#### **The following is important to promote community capacity;**

- Creation of an enabling environment, e.g., through the formation, running and sustainability of nutrition-based groups such as the Mother-to-Mother Support Groups, father to father support groups, community health volunteers, community health and extension workers etc. These groups form part of the community systems that demand nutrition services from the service providers. The mothers/fathers educate and support each other by sharing a range of experiences on health diets among other nutrition issues.
- Considerations will be made to build community capacities towards healthier families and stronger communities.
- Capacity building of community health extension workers, agricultural extension workers and community health volunteers should use already developed curriculums, such as the community nutrition module. Additional components from the National Guidelines for Healthy Diets will be incorporated into these modules whenever deemed necessary.
- The role of community health workers will need to be enhanced, especially in the wake of the growing health staff shortage and high turnover rates. In addition, counties will have to endeavour to employ nutritionists to work at the community level, in accordance with the human resource norms and standards.
- Channels to impart knowledge and skills to community health workers will include training, field days, farm demonstrations, farmer field schools and farmer business schools, dialogue days and action days.
- Champions for healthy diets at the community level will be identified and equipped with the basic knowledge to assist them advocate for these activities effectively.

In conclusion, having discussed all forms of capacity development required for healthy diets, it is important to note that no one capacity development initiative will suffice. The different elements are intertwined, related and require the right mix and balance for greater nutritional impact.

## 7.4. Coordination

Coordination mechanisms will involve identification and mapping of different actors, and intersectoral integration to prevent duplication and overlap during implementation of programs. As policies and plans are made more coherent, and programs more cost-effective, it is expected that more resources will be made available.

### 7.4.1. Coordination at the national level

The overall coordination of the implementation of these Guidelines will be done by the department in charge of coordinating nutrition activities at the national level. A steering committee with terms of reference will play an advisory role while a technical working group will coordinate all the strategies and interventions for healthy diets. The national office should be in constant communication with the counties to get updates, information of their needs and feedback on implementation of the Guidelines.

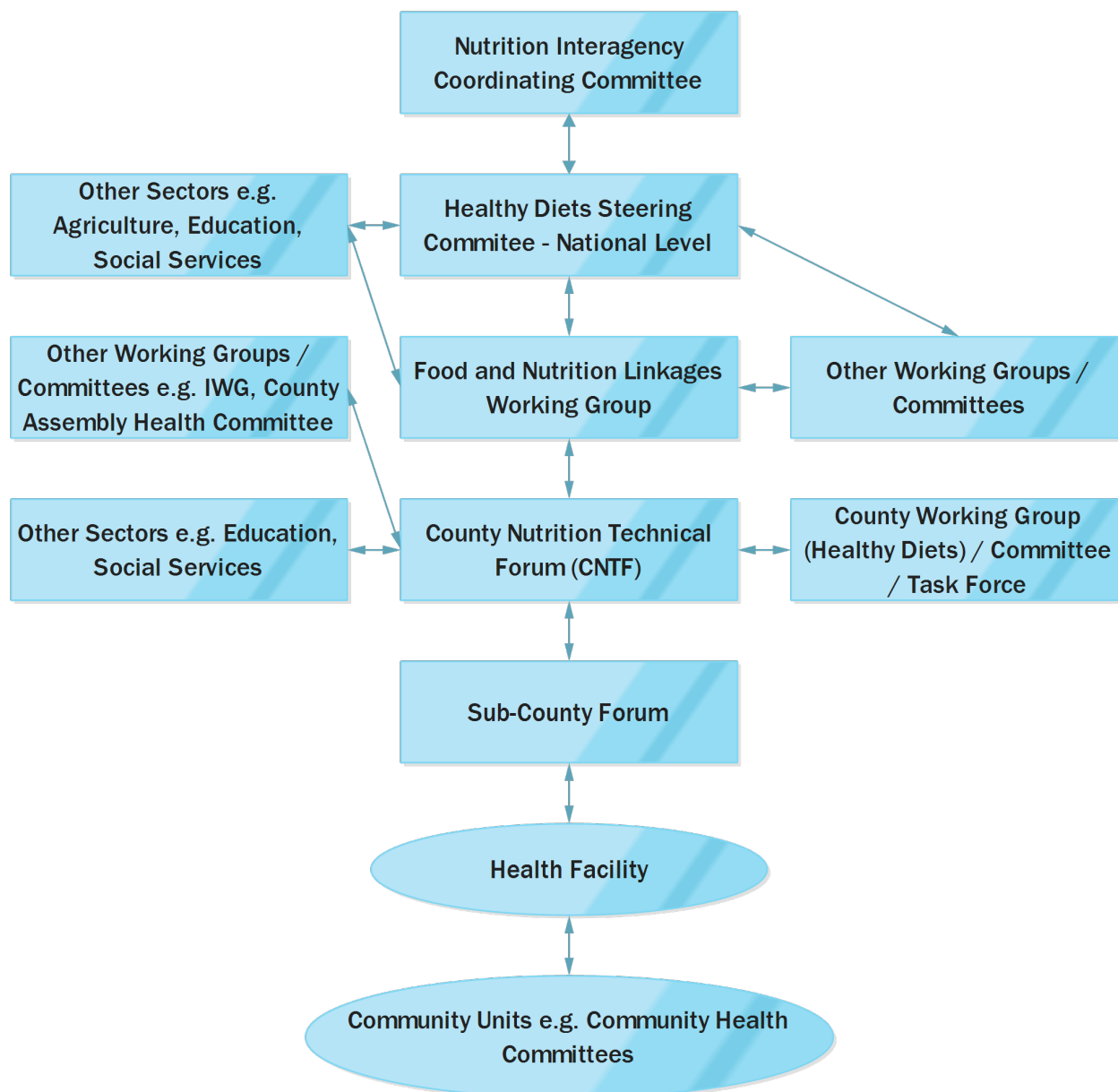
#### **Functions of the healthy diets steering committee include and are not limited to:**

- Liaising with county management to identify strengths and challenges in implementing healthy diets
- Providing guidance and direction on issues pertaining to healthy diets
- Defining the scope of healthy diets programs
- Ensuring that any issue arising that affects the program are addressed and resolved
- Functions of the working group include and are not limited to:
  - Advocating and networking with relevant ministries, stakeholders, county and national government
  - Developing and contributing to standards, guidelines and materials
  - Developing capacity on healthy diets
  - Mobilising resources for implementation of the planned activities

### 7.4.2. Coordination at county level

Counties shall form forums such as the County Nutrition Technical Forum that will coordinate the implementation of the Guidelines. They will also look out for opportunities for multi-sectoral coordination, such as formation of a task force under the County Steering Group or the Food Security and Nutrition Policy implementation structure to ensure sustainability of healthy diets programmes. These forums should be used as platforms for information sharing, joint planning (development of common plans), implementation, monitoring and evaluation. The counties will coordinate implementation of the Guidelines at the sub-county health facilities and community; and will maintain constant communication with the national nutrition office for updates and feedback.

Figure 3 Coordination framework



## 7.5. Roles and responsibilities

### (a) Ministry of Health

The following divisions and units will have specific roles and responsibilities as outlined below:

#### (b) Human Nutrition and Dietetics Unit

- Coordinating, formulating and disseminating relevant documents e.g. guidelines, strategies, policies, training curriculums and IEC materials
- Coordinating capacity building
- Monitoring and evaluation, and report writing
- Supporting county governments to establish similar mechanisms

- Reporting on the national and global nutrition indicators
- Coordinating partners in implementation of the Guidelines
- Mobilising resources
- Developing legislation and regulation on advertising, promotion and sponsorship of food beverages

### **(c) Division of Noncommunicable diseases**

- Supporting the development and implementation of national policies, standards and guidelines that promote production and consumption of healthy diets
- Supporting the development and implementation of health-related legislations and regulations on salt, saturated and trans fatty acids and refined sugar content of processed foods; as well as packaging, labelling, advertising, promotion, marketing and sponsorship of food products and beverages
- Developing and implementing public awareness programs on healthy diets during the life cycle, in the framework of national and county strategic plans, and regulations
- Mobilising resources

### **(d) Community Health and Development Unit**

- Supporting the development and implementation of national policies, standards and guidelines that promote production and consumption of healthy diets in the communities
- Mainstreaming promotion of healthy diets in community modules and communication materials
- Supporting national and county teams' capacity to build and implement nutrition interventions on healthy diets in community health structures

### **(e) Health Promotion Unit**

- Providing technical guidance in the development of IEC materials relevant to the target population
- Providing technical guidance in pre-testing messages on healthy diets
- Supporting promotion, advocacy and behaviour change communication on healthy diets

### **(f) Division of Legislation and Regulatory Services**

- Ensuring that the developed guidelines and standards are in line with the national health policy
- Guiding the development of regulations and legislations on healthy diets

### **(g) Division of Environmental Hygiene**

- Enforcing regulations on food safety and hygiene
- Market level surveillance

### **(h) Implementing partners**

- The implementers are agencies/institutions, both national and local, that are involved in supporting or implementing specific sections of these Guidelines. These partners will be involved in:
- Supporting resource mobilisation efforts
- Supporting MOH in implementing the Guidelines
- Supporting the development of key messages on healthy diets
- Advocacy and communication

### **(i) Ministry of Agriculture**

- Sensitising the community on farm planning, production and consumption of healthy diets

- Promoting of production and consumption of traditional healthy foods
- Strengthening and promoting local food processing and preservation to allow sustainable availability
- Providing technical guidance on setting up home gardens, use of local recipes, value addition
- Providing technical guidance on setting up income generating activities to promote food security
- Promoting urban agriculture
- Promoting food diversification
- Promoting and supporting modern technology for food security
- Integrating healthy diets in their existing programs

#### **(j) Ministry of Education**

- Developing and implementing guidelines, strategies and standards for school meals and nutrition
- Integrating guidelines on healthy lifestyles in the education curriculum
- Establishing and strengthening health clubs in schools
- Supporting nutrition assessment for children attending schools
- Supporting the school feeding programs to meet recommended nutritional requirements for pupils/students attending school
- Establishing programs that will help learners make better food choices

#### **(k) Ministry of Water and Irrigation**

- Providing clean and safe water
- Facilitating accessibility of clean and safe water
- Strengthening the utilisation of land through irrigation to promote food security

#### **(l) Ministry of East African Community, Labour and Social Protection**

- Promoting the setting up of income generating activities at the community level in order to improve household food security
- Ensuring that OVCs, PWDs and older persons are cushioned to facilitate access to healthy diets

#### **(m) Ministry of sports**

- Promoting and developing sports facilities
- Developing and coordinating games and sports
- Promoting and encouraging diversification of sports

#### **(n) Development partners**

- Supporting resource mobilisation
- Supporting implementation, monitoring and evaluation processes
- Supporting GOK/MOH to keep track on global indicators for healthy diets
- Advocating for the provision of healthy diets for all Kenyans

#### **(o) Academia and research institutions**

- Providing technical expertise to analyse and synthesise available national studies, and make appropriate recommendations for scaling nutrition actions on healthy diets
- Establishing national and regional knowledge and information sharing platforms for public health nutrition and food security stakeholders
- Facilitating linkages between research and science and policy making to improve programming

- Facilitating ongoing capacity building for health professionals on the National Guidelines for Healthy Diets and Physical Activity

#### (p) Media

- Public awareness and social marketing of consumption of healthy diets
- Ensuring responsible food and beverage advertising, marketing, promotion and sponsorship
- Supporting mass media campaigns

#### (q) Private sector

- Through Public-Private Partnership, private sector will play a role in:
- Manufacturing healthy food products
- Fortifying selected foods like wheat and maize flours, sugar, salt, oils and fats with micronutrients as per existing standards
- Engaging in responsible food labelling
- Communicating factual information that will not mislead consumers about their products
- Engaging in and strengthening responsible marketing of food products
- Engaging in advocacy and communication of health messages to the consumers
- Self-regulating to avoid conflict of interest during program implementation

#### (r) County Health Department

- Adapting national policies to the local context for implementation
- Planning and coordinating activities recommended by these Guidelines in the counties
- Mobilising resources to support implementation of the Guidelines
- Disseminating the Guidelines through trainings, sensitisation meetings, advocacy meetings
- Engaging in advocacy and communication of health messages
- Supervising for quality control and strengthening of good practices
- Monitoring and evaluation of the healthy diets indicators
- Procuring necessary resources needed for implementing these Guidelines e.g. anthropometry tools
- Coordinating stakeholders implementing these Guidelines
- Integrating activities of healthy diets program interventions with other programs e.g. HIV, TB, WASH etc.
- Continuous medical education on the healthy diets and on job training on standard operating procedures for healthy diets and physical activity.

## 7.6 Monitoring and Evaluation

**Monitoring** is regular observation and recording of activities in a project or programme to establish the extent to which input deliveries, work schedules, other required actions and targeted outputs are proceeding according to plan, so that timely action can be taken to correct any deficiencies detected. **Evaluation** is the process of determining, systematically and objectively, the relevance, effectiveness, efficiency and impact of activities in light of specified objectives. Evaluation typically includes measures both at the beginning, midway and at the end of a program.

**Monitoring and evaluation** systems comprise inputs, processes, outputs, outcome and impact in a sequential manner. Inputs refer to resources invested in the program and will include financial, technological and human resources. Processes are activities carried out to achieve the program objectives. Monitoring of these activities will show what has been done and how well and timely it has been conducted based on the work plans.

**Outputs** are direct products or services of the activities of programme, policy or initiative. Outputs may be in three forms: **numbers of activities** conducted in each functional area such as training; service output which measures adequacy of service delivery systems in terms of access, quality of care or program image; and **service utilisation** that measures the extent to which the services are being used.

**Outcomes** refer to the observable change at population level that is directly attributable to the outputs of an organization, Programme, policy or initiative. There are two types of outcomes namely:

(a) **Effects** - which is short to medium range (e.g., 2-5 years) change in behaviour promoted by program

(b) **Impact** - which are changes that occur over the long-term

**Monitoring, evaluation** and reporting are key functions that should be carried out continuously to review progress towards implementing activities and the impact of the National Guidelines for Healthy Diets. Monitoring and evaluation will be guided by the National Nutrition Monitoring and Evaluation Framework and will be integrated in the existing infrastructure that collects, collates and analyses survey and surveillance; and service delivery data from various Service Delivery Points in the country. It will also include data collection by other stakeholders e.g. through the school health program, community health workers among others. Tables 12 and 13 present indicators that will be used to monitor implementation and effects of the healthy diets program.

**Monitoring and Evaluation** results will be shared regularly through the existing structures or forums to inform if program adjustments or changes to planned activities are required. Best practices will be documented and disseminated, as they provide opportunities for acquiring knowledge about what works and continuous learning about how to improve and adapt strategies through feedback, reflection and analysis. This process will provide an opportunity to facilitate the implementation of larger-scale, sustained, and more effective interventions.

### **Textbox: Determination of best practices**

***By definition, a “Best Practice” can be anything that works to produce results without using inordinate resources in full or in part, and can be useful in providing lessons learned. A “Best Practice” needs not meet all the above criteria, but should meet at least the “effectiveness”, “efficiency” and “relevance” criteria in addition to one or more of the other criteria.***

Identifying “Best Practices” involves evidence-based judgement arising from prior analysis using the following set of criteria:

**Effectiveness:** This measures the contribution of the best practice to meeting the set objectives. The practice must work and achieve results that are measurable.

**Efficiency:** The proposed practice should produce results with a reasonable level of resources and time.

**Relevance:** The proposed practice should address priority health problems.

**Ethical soundness:** The practice must respect the current rules of ethics for dealing with human populations.

**Sustainability:** The proposed practice must be implementable over a long period of time without any massive injection of additional resources.



**Possibility of duplication:** The proposed practice, as carried out, should be replicable elsewhere.

**Involvement of partnership:** The proposed practice should involve satisfactory collaboration between several stakeholders.

**Community involvement:** The proposed practice must involve participation of the communities to ensure ownership and sustainability.

**Political commitment:** The proposed practice must have support from the relevant national or local authorities.

### Output and process indicators

**Key output indicators for these guidelines will include among others:**

1. Number of copies of healthy diets guidelines printed and disseminated to counties
2. Number of IEC materials printed and distributed
3. Number of trainings held on healthy diets and physical activity
4. Number of health workers trained on healthy diets and physical activity
5. Number of sensitised stakeholders
6. Number of institutions that have adopted the Guidelines for Healthy Diets and Physical Activity
7. Number of health messages on healthy diets disseminated to consumers
8. Number of people reached with healthy lifestyles messages in institutions implementing the diet and lifestyle program.
9. Number of schools conducting growth monitoring and promotion.
10. Number of school going children whose growth is monitored
11. Prevalence of under- and overnutrition in the different population groups

*Table 18 Indicator matrix for the National Guidelines for Healthy Diets - output and process indicators*

| Indicator to measure  | Data source/ means of verification | Frequency of data collection |
|---|------------------------------------|------------------------------|
| Costed activities for healthy diets included in the national and county annual work plans       | National and county AWP            | Once                         |
| Number of coordination meetings for healthy diets held at the national level                    | Minutes                            | Quarterly                    |
| Number of coordination meetings for healthy diets held at county level                          | Minutes                            | Quarterly                    |
| A training package developed for healthy diets  | Training package                   | Once                         |
| Number of health workers and home economists and other relevant cadres trained on healthy diets | Training reports                   | As per scheduled activities  |

| Indicator to measure  | Data source/ means of verification                | Frequency of data collection |
|---|---|------------------------------|
| Number of stakeholders sensitised on the guidelines for healthy diets: (national and county managers, line ministries, partners, private sector etc.) | Sensitisation reports                             | Quarterly                    |
| Number of IEC materials on healthy diets and physical activity developed, printed and distributed   | Distribution list<br>Procurement documents        | Quarterly                    |
| Number of advocacy meetings for healthy diets held  | Minutes<br>Activity reports                       | Quarterly                    |
| Number of messages on healthy diets aired on mass media   | Media reports                                     | Monthly                      |
| Number of topics related to healthy diets discussed on social media   | Social media reports                              | Monthly                      |
| Number of field days held with messages to promote healthy diets  | Activity reports                                  | Quarterly                    |
| Proportion of adult population screened for BMI   | Health registers and reports<br>Population survey | Monthly<br>Biannually        |
| Proportion of adult population assessed for waist-hip ratio   | Health registers<br>Population survey             | Monthly<br>Biannually        |
| Proportion of school going children assessed for nutritional status (BMI for age)   | Assessment reports                                | Quarterly                    |
| Number of institutions implementing the healthy diets and lifestyle package   | Assessment reports<br>Institution visit reports   | Annually<br>Annually         |
| Number of forums for curriculum review with nutrition representation  | Minutes<br>Reports                                | Quarterly                    |
| Number of forums for school health policy with nutrition representation   | Minutes<br>Reports                                | Quarterly                    |
| Number of schools conducting growth monitoring and promotion for children less than 5 years   | CHANIS reports                                    | Monthly                      |
| Number/proportion of people reached with healthy diets messages   | Population surveys                                | Biannual                     |

**Table 19 Indicator matrix for the National Guidelines for Healthy Diets - outcome indicators**

| Indicator to measure  | Data requirements                               |   | Data source  | Means of verification  | When to collect the data | Comments/ notes |
|---|---|---|--|------------------------|--------------------------|-----------------|
|   | Numerator                                       | Denominator                             |  |                        |                          |                 |
| <b>Immediate outcome indicators</b>   |   |   |  |                        |                          |                 |
| Proportion of health workers/ CHVs who are knowledgeable on healthy diets   | Number assessed with correct answers            | Number assessed                         | Population Surveys                                 | Survey reports         | 5 years                  |                 |
| Proportion of the target population who are knowledgeable on health diets   | Number assessed with correct answers            | Number assessed                         | Population Surveys                                 | Survey reports         | 5 years                  |                 |
| Proportion of health workers/ CHVs with positive attitude on healthy diets  | Number assessed with correct answers            | Number assessed                         | Population Surveys                                 | Survey reports         | 5 years                  |                 |
| Proportion of the target population with positive attitude on healthy diets | Number assessed with correct answers            | Number assessed                         | Population Surveys                                 | Survey reports         | 5 years                  |                 |
| <b>Intermediate outcome indicators</b>                                      |   |   |  |                        |                          |                 |
| Proportion of school children <15 years dewormed                            | Number of children <15 dewormed                 | Total number of children < 15 in school | School health register<br>Population level surveys | School health register | Bi annually              | Routine data    |
| Proportion of population consuming diversified diets                        | Number of households consuming diversified diet | Total number of households              | Dietary recalls                                    | Survey data            | Biannually<br>KIBHS      |                 |

| Indicator to measure   | Data requirements   |                             | Data source             | Means of verification | When to collect the data | Comments/ notes   |
|--|---|-----------------------------|-------------------------|-----------------------|--------------------------|---|
|  | Numerator   | Denominator                 |                         |                       |                          |   |
| Proportion of infants 0–5 months of age who are fed exclusively with breast milk                                     | Infant 0–5 months of age who received only breast milk during the previous day              | Infant 0–5 months of age    | Surveys and assessments | Survey reports        | Biannually               | Age groups are described in intervals of months completed. For example infants 0 to 5 months of age have completed five months but are less than 6 months (or 183 days old) |
| Minimum dietary diversity: Proportion of children 6–23 months of age who receive foods from four or more food groups | Children 6–23 months of age who received foods from ≥ 4 food groups during the previous day | Children 6–23 months of age | Surveys and assessments | Survey reports        | Biannually               |   |

| Indicator to measure   | Data requirements  |  | Data source             | Means of verification | When to collect the data | Comments/ notes |
|--|--|--|-------------------------|-----------------------|--------------------------|-----------------|
|  | Numerator  | Denominator  |                         |                       |                          |                 |
| Minimum meal frequency:<br>Proportion of breastfed and non-breastfed children 6–23 months of age, who receive solid, semi-solid, or soft foods (but also including milk feeds for non-breastfed children) the minimum number of times or more. | Breastfed children 6–23 months of age who received solid, semi-solid or soft foods the minimum number of times or more during the previous day<br><br>Or<br><br>Non-breastfed children 6–23 months of age who received solid, semi-solid or soft foods or milk feeds the minimum number of times or more during the previous day | Breastfed children 6–23 months of age<br><br><br><br><br><br><br>Non-breastfed children 6–23 months of age | Surveys and assessments | Survey reports        | Biannually               |                 |

| Indicator to measure   | Data requirements   |  | Data source             | Means of verification | When to collect the data | Comments/ notes                               |
|--|---|--|-------------------------|-----------------------|--------------------------|---|
|  | Numerator   | Denominator  |                         |                       |                          |   |
| Minimum acceptable diet: Proportion of children 6–23 months of age who receive a minimum acceptable diet (apart from breast milk). | Breastfed children 6–23 months of age who had at least the minimum dietary diversity and the minimum meal frequency during the previous day<br><br>Non-breastfed children 6–23 months of age who received at least two milk feedings and had at least the minimum dietary diversity not including milk feeds and the minimum meal frequency during the previous day | Breastfed children 6–23 months of age<br><br>Non-breastfed children 6–23 months of age | Surveys and assessments | Survey reports        | Biannually               |   |
| <b>Ultimate/Impact indicators</b>  |   |  |                         |                       |                          |   |
| Proportion of children <5 years who are underweight  | Number of children < 5 years whose weight for age is below minus two standard deviations (-2 SD)  | Total number of children assessed  | DHIS Surveys            | Survey reports        | 5 years                  | In some areas data will be available annually |

| Indicator to measure  | Data requirements  |                                   | Data source  | Means of verification                    | When to collect the data | Comments/ notes                               |
|---|--|-----------------------------------|--|--|--------------------------|---|
|   | Numerator  | Denominator                       |  |  |                          |   |
| Proportion of children < 5 years who are stunted ( height for age)              | Number of children < 5 years whose height for age Z-score is below minus two standard deviations (-2 SD) | Total number of children assessed | Surveys  | Survey reports                           | 5 years                  | In some areas data will be available annually |
| Proportion of children <5 years who are wasted*                                 | Number of children < 5years with Z-scores below minus two standard deviations (-2 SD)                    | Total number of children assessed | Surveys  | Survey reports                           | 5 years                  |   |
| Proportion of children who are obese and / or overweight                        | Number of children who are obese   | Total number of children screened | School health register<br>Population level surveys | School health register                   | Quarterly                | Survey  |
| Proportion of adolescents, adults and elderly who are obese and / or overweight | Number of adolescents, adults and elderly assessed who are obese   | Total number of assessed          | Population level surveys                           | School Health Register<br>Survey reports | Annually<br>5years       | Survey  |



| Indicator to measure  | Data requirements  |                          | Data source                       | Means of verification                      | When to collect the data      | Comments/ notes |
|---|--|--------------------------|-----------------------------------|--|-------------------------------|-----------------|
|   | Numerator  | Denominator              |                                   |  |                               |                 |
| Proportion of adolescents, adults and elderly who under weight  | Number of adolescents, adults and elderly assessed who are underweight                 | Total number of assessed | Population level surveys          | School Health Register<br>Survey reports   | Annually<br>5years            | Survey          |
| Proportion of adolescents, adults and elderly who have micronutrient (e.g. iron vitamin A, zinc, folate) deficiencies | Number of adolescents, adults and elderly assessed who have micronutrient deficiencies | Total number of assessed | Population level surveys          | Survey reports                             | 5 years                       | Survey          |
| Proportion of pregnant women with anaemia   | Number of pregnant women assessed who have anaemia                                     | Total number of assessed | Routine Population level surveys  | Survey reports                             | Monthly<br>Annually<br>5years | Survey          |
| Nutrition included in the school health policy and strategy   |  |                          | School health policy and strategy |  |                               |                 |
| Nutrition included in basic education   |  |                          | Assessment reports                | Nutrition included in the basic curriculum | 5 years                       |                 |

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## ANNEXES

### Annex 1 Serving sizes of foods in food groups

| Food group                                 | Serving /unit size (one portion may contain more than one serving)  | Equivalent amount weight / volume |
|--|---|-----------------------------------|
| Grains<br>Roots<br>Tubers<br>Starchy fruit | <ul style="list-style-type: none"> <li>½ cup ugali (maize, millet or sorghum)</li> <li>½ cup cooked rice</li> <li>1 chapatti 6 inches diameter</li> <li>½ cup cooked pasta</li> <li>1 slice bread</li> <li>½ cup porridge</li> <li>½ cup cooked arrowroot</li> <li>½ cup cooked sweet potatoes</li> <li>½ cup cooked Irish potatoes</li> <li>⅓ cup cassava</li> <li>½ cup cooked bananas</li> </ul> | 30g dry weight                    |
| Milk                                       | <ul style="list-style-type: none"> <li>1 cup milk (fresh or fermented)</li> <li>1 cup yoghurt</li> </ul>  | 250 ml                            |
| Pulses (beans, peas, lentils)              | <ul style="list-style-type: none"> <li>½ cup cooked dried beans</li> <li>½ cup cooked dried peas</li> <li>½ cup cooked dried lentils</li> </ul>   | 125 ml                            |
| Meat, fish, chicken, eggs                  | <ul style="list-style-type: none"> <li>Fish (palm size)</li> <li>Piece of chicken (drumstick/ thigh, or a breast) of chicken</li> <li>Meat, size of three fingers</li> <li>½ cup fingerlings (omena)</li> </ul>   | 30g                               |
| Vegetables                                 | <ul style="list-style-type: none"> <li>½ cup cooked vegetables</li> <li>1 cup raw leafy vegetables</li> </ul>   | 80g                               |
| Fruit                                      | <ul style="list-style-type: none"> <li>1 small apple, peach, orange or pear.</li> <li>¾ cup diced fruit</li> </ul>  | 80–120g                           |
| Oil<br>Nuts<br>Seeds                       | <ul style="list-style-type: none"> <li>1 tsp margarine or oil</li> <li>1/8 of a medium size avocado</li> <li>1 tbsp. shredded coconut</li> <li>10 large peanuts, small palmful/measure in tablespoon</li> </ul>   | 5g                                |
| Sugar                                      | 1 tsp   | 5 g                               |

Source Kenya National Clinical Nutrition and Dietetics Reference Manual, 2010

## Annex 2 Sample weekly menu

### SAMPLE WEEKLY MENU

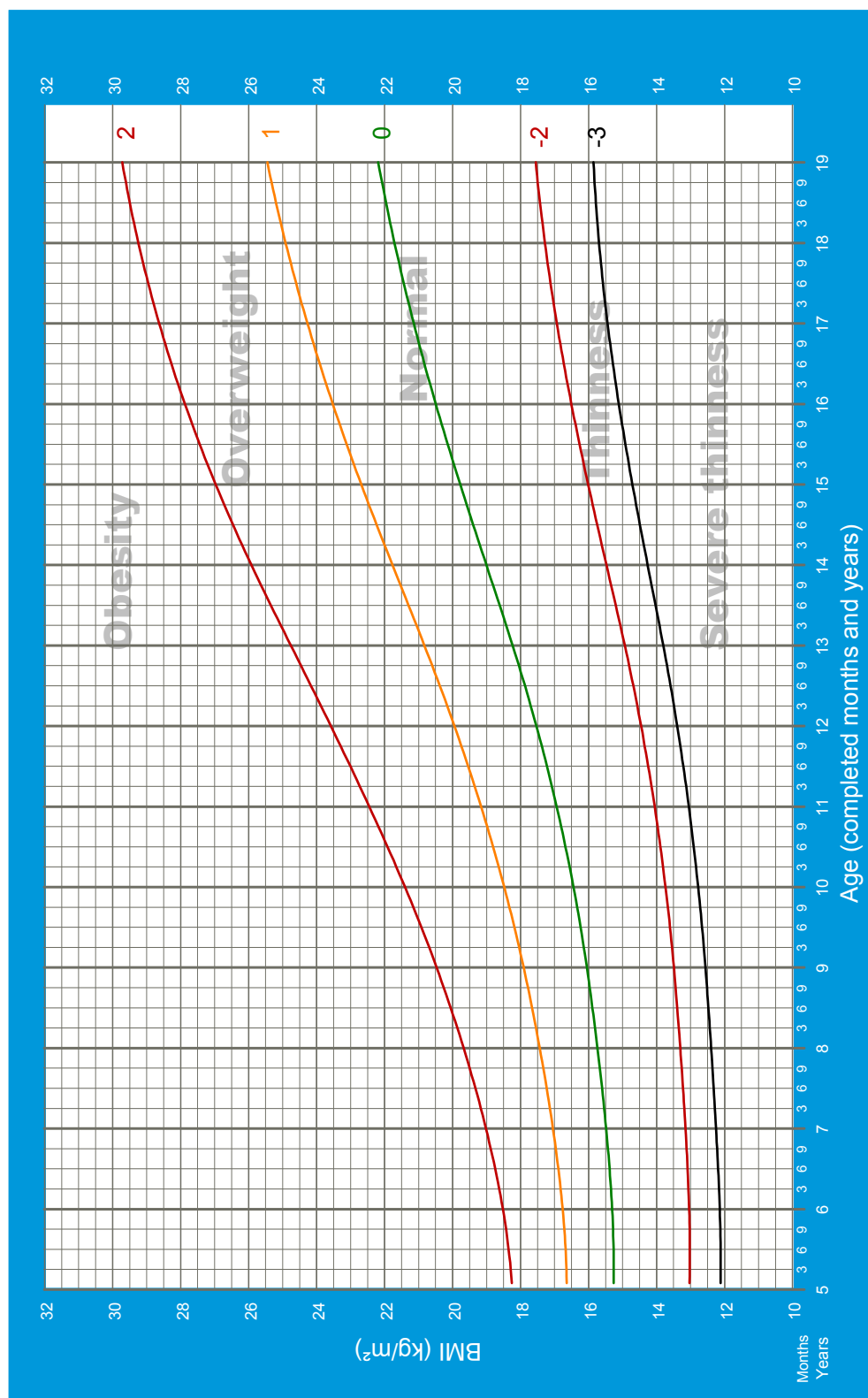
| DAY       | BREAKFAST  | LUNCH   | SUPER  |
|-----------|--|---|--|
| SUNDAY    | Tea with milk, Sweet Potato Cake, Mango juice, roasted peanuts | Whole meal ugali, fried fish, Steamed traditional vegetables in season, Sliced tomatoes, Orange juice | Whole wheat chapati, Ndengu stew, Buttered carrots, Water melon slice              |
| MONDAY    | Fermented millet porridge, Scrambled egg, Pawpaw slice, milk   | Mokimo, Meat ball in sauce, Steamed Cabbage, Slice of pineapple                                       | Ugali, Bean stew French fries, Roast chicken, Mixed vegetable stew, Fruit cocktail |
| TUESDAY   | Soya tea, Arrow roots, Baked beans, Passion fruit              | Vegetable Rice, Egg curry, Steamed Spinach, Mixed Fruit Salad   | Stewed Matoke, Soya meat, Steamed Amaranth, Melon slice                            |
| WEDNESDAY | Tea with milk, Whole French toast, Avocado milk shake          | Githeri, Tossed carrots and snow peas, Fruity Banana in Yoghurt                                       | Mashed Potatoes, Chicken Stew, Steamed broccoli and carrots, mango                 |
| THURSDAY  | Tea with milk, Mushroom Samosas, Fruit punch                   | Boiled cassava, Ndengu stew, Steamed spinach, Orange juice  | , Fried managu, Pineapple slice  |
| FRIDAY    | Roasted half ripe bananas, Milk, Mango juice                   | Pigeon peas Pilau, Kachumbari, Passion juice  | Boiled Sweet potato, Beef stew, Steamed Amaranth, Sliced pawpaw                    |
| SATURDAY  | Soya mandazi, Tea with milk, Banana                            | Banana bhajias, Fried Beef, Creamed traditional vegetables, Cocktail Tropical fruit juice             | Rice, Njahi Stew, Mixed Vegetable Stew, Banana-Orange Shake                        |

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## Annex 3 - BMI for Age reference charts

### BMI-for-age BOYS

5 to 19 years (z-scores)



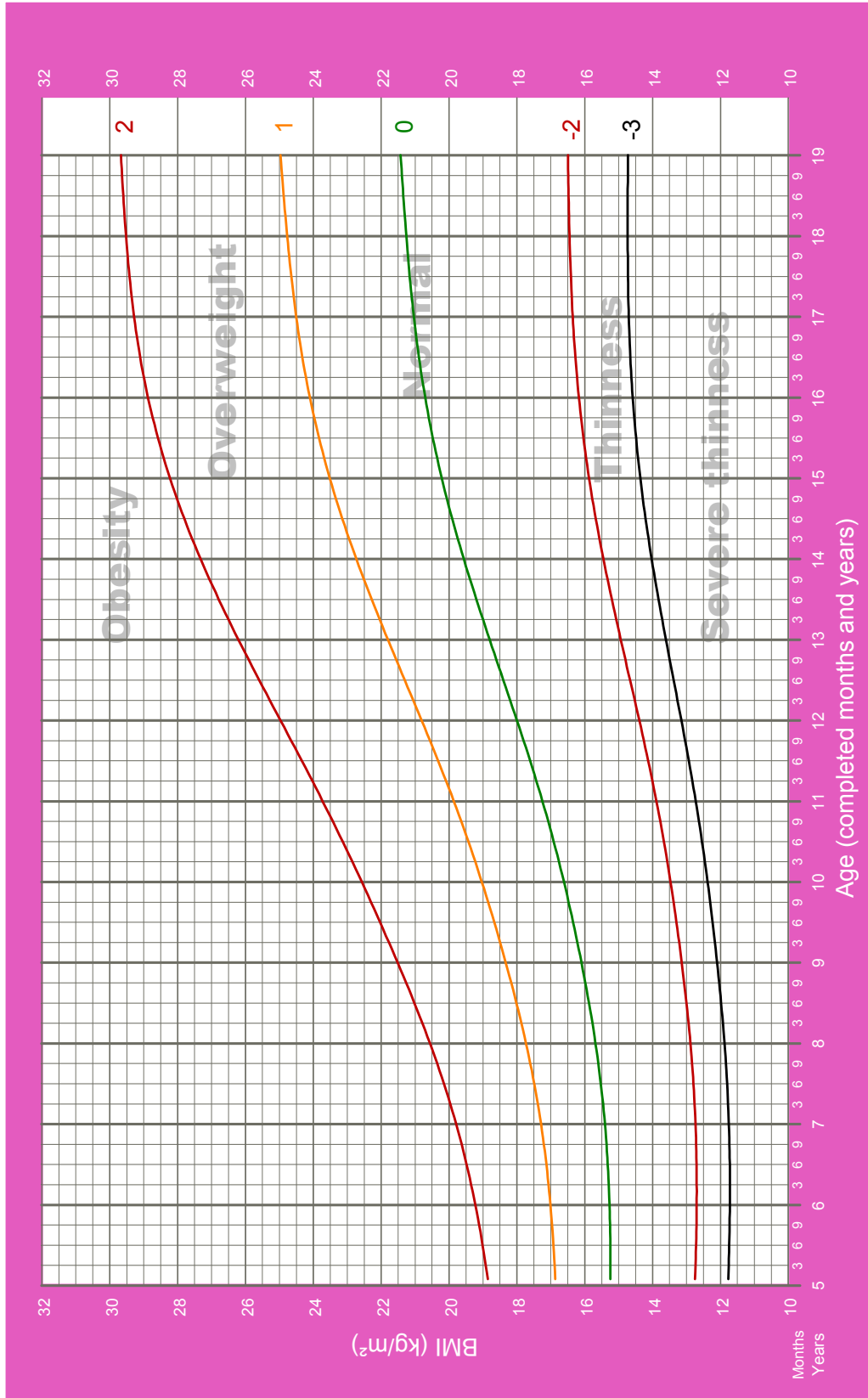
2007 WHO Reference



## Annex 4 - BMI for Age reference charts

### BMI-for-age GIRLS

5 to 19 years (z-scores)



2007 WHO Reference

## Annex 5 - BMI look - up table for children 5-17 years

| Height (cm) | 85–114 cm tall |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
|-------------|----------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
|             | 7.7            | 8.5  | 9.2  | 10.0 | 10.8 | 11.5 | 12.3 | 13.1 | 13.9 | 14.6 | 15.4 | 16.2 | 16.9 | 17.7 | 18.5 | 19.2 | 20.0 | 20.8 | 21.5 | 22.3 | 23.1 | 23.9 | 24.6 | 25.4 | 26.2 | 26.9 | 27.7 | 28.5 |
| 114         | 7.8            | 8.6  | 9.4  | 10.2 | 11.0 | 11.7 | 12.5 | 13.3 | 14.1 | 14.9 | 15.7 | 16.4 | 17.2 | 18.0 | 18.8 | 19.6 | 20.4 | 21.1 | 21.9 | 22.7 | 23.5 | 24.3 | 25.1 | 25.8 | 26.6 | 27.4 | 28.2 | 29.0 |
| 113         | 8.0            | 8.8  | 9.6  | 10.4 | 11.2 | 12.0 | 12.8 | 13.6 | 14.3 | 15.1 | 15.9 | 16.7 | 17.5 | 18.3 | 19.1 | 19.9 | 20.7 | 21.5 | 22.3 | 23.1 | 23.9 | 24.7 | 25.5 | 26.3 | 27.1 | 27.9 | 28.7 | 29.5 |
| 112         | 8.1            | 8.9  | 9.7  | 10.6 | 8.0  | 12.2 | 13.0 | 13.8 | 14.6 | 15.4 | 16.2 | 17.0 | 17.9 | 18.7 | 19.5 | 20.3 | 21.1 | 21.9 | 22.7 | 23.5 | 24.3 | 25.2 | 26.0 | 26.8 | 27.6 | 28.4 | 29.2 | 30.0 |
| 111         | 8.3            | 9.1  | 9.9  | 10.7 | 11.6 | 12.4 | 13.2 | 14.0 | 14.9 | 15.7 | 16.5 | 17.4 | 18.2 | 19.0 | 19.8 | 20.7 | 21.5 | 22.3 | 23.1 | 24.0 | 24.8 | 25.6 | 26.4 | 27.3 | 28.1 | 28.9 | 29.8 | 30.6 |
| 110         | 8.4            | 9.3  | 10.1 | 10.9 | 11.8 | 12.6 | 13.5 | 14.3 | 15.2 | 16.0 | 16.8 | 17.7 | 18.5 | 19.4 | 20.2 | 21.0 | 21.9 | 22.7 | 23.6 | 24.4 | 25.3 | 26.1 | 26.9 | 27.8 | 28.6 | 29.5 | 30.3 | 31.1 |
| 109         | 8.6            | 9.4  | 10.3 | 11.1 | 12.0 | 12.9 | 13.7 | 14.6 | 15.4 | 16.3 | 17.1 | 18.0 | 18.9 | 19.7 | 20.6 | 21.4 | 22.3 | 23.1 | 24.0 | 24.9 | 25.7 | 26.6 | 27.4 | 28.3 | 29.1 | 30.0 | 30.9 | 31.7 |
| 108         | 8.7            | 9.6  | 10.5 | 11.4 | 12.2 | 13.1 | 14.0 | 14.8 | 15.7 | 16.6 | 17.5 | 18.3 | 19.2 | 20.1 | 21.0 | 21.8 | 22.7 | 23.6 | 24.5 | 25.3 | 26.2 | 27.1 | 28.0 | 28.8 | 29.7 | 30.6 | 31.4 | 32.3 |
| 107         | 8.9            | 9.8  | 10.7 | 11.6 | 12.5 | 13.3 | 14.2 | 15.1 | 16.0 | 16.9 | 17.8 | 18.7 | 19.6 | 20.5 | 21.4 | 22.2 | 23.1 | 24.0 | 24.9 | 25.8 | 26.7 | 27.6 | 28.5 | 29.4 | 30.3 | 31.1 | 32.0 | 32.9 |
| 106         | 9.1            | 10.0 | 10.9 | 11.8 | 12.7 | 13.6 | 14.5 | 15.4 | 16.3 | 17.2 | 18.1 | 19.0 | 20.0 | 20.9 | 21.8 | 22.7 | 23.6 | 24.5 | 25.4 | 26.3 | 27.2 | 28.1 | 29.0 | 29.9 | 30.8 | 31.7 | 32.7 | 33.6 |
| 105         | 9.2            | 10.2 | 11.1 | 12.0 | 12.9 | 13.9 | 14.8 | 15.7 | 16.6 | 17.6 | 18.5 | 19.4 | 20.3 | 21.3 | 22.2 | 23.1 | 24.0 | 25.0 | 25.9 | 26.8 | 27.7 | 28.7 | 29.6 | 30.5 | 31.4 | 32.4 | 33.3 | 34.2 |
| 104         | 9.4            | 10.4 | 11.3 | 12.3 | 13.2 | 14.1 | 15.1 | 16.0 | 17.0 | 17.9 | 18.9 | 19.8 | 20.7 | 21.7 | 22.6 | 23.6 | 24.5 | 25.5 | 26.4 | 27.3 | 28.3 | 29.2 | 30.2 | 31.1 | 32.0 | 33.0 | 33.9 | 34.9 |
| 103         | 9.6            | 10.6 | 11.5 | 12.5 | 13.5 | 14.4 | 15.4 | 16.3 | 17.3 | 18.3 | 19.2 | 20.2 | 21.1 | 22.1 | 23.1 | 24.0 | 25.0 | 26.0 | 26.9 | 27.9 | 28.8 | 29.8 | 30.8 | 31.7 | 32.7 | 33.6 | 34.6 | 35.6 |
| 102         | 9.8            | 10.8 | 11.8 | 12.7 | 13.7 | 14.7 | 15.7 | 16.7 | 17.6 | 18.6 | 19.6 | 20.6 | 21.6 | 22.5 | 23.5 | 24.5 | 25.5 | 26.5 | 27.4 | 28.4 | 29.4 | 30.4 | 31.4 | 32.3 | 33.3 | 34.3 | 35.3 | 36.3 |
| 101         | 10.0           | 11.0 | 12.0 | 13.0 | 14.0 | 15.0 | 16.0 | 17.3 | 18.0 | 19.0 | 20.0 | 21.0 | 22.0 | 23.0 | 24.0 | 25.0 | 26.0 | 27.0 | 28.0 | 29.0 | 30.0 | 31.0 | 32.0 | 33.0 | 34.0 | 35.0 | 36.0 | 37.0 |
| 100         | 10.2           | 11.2 | 12.2 | 13.3 | 14.3 | 15.3 | 16.3 | 17.7 | 18.4 | 19.4 | 20.4 | 21.4 | 22.4 | 23.5 | 24.5 | 25.5 | 26.5 | 27.5 | 28.6 | 29.6 | 30.6 | 31.6 | 32.6 | 33.7 | 34.7 | 35.7 | 36.7 | 37.8 |
| 99          | 10.4           | 11.5 | 12.5 | 13.5 | 14.6 | 15.6 | 16.7 | 18.1 | 18.7 | 19.8 | 20.8 | 21.9 | 22.9 | 23.9 | 25.0 | 26.0 | 27.1 | 28.1 | 29.2 | 30.2 | 31.2 | 32.3 | 33.3 | 34.4 | 35.4 | 36.4 | 37.5 | 38.5 |
| 98          | 10.6           | 11.7 | 12.8 | 13.8 | 14.9 | 15.9 | 17.0 | 18.4 | 19.1 | 20.2 | 21.3 | 22.3 | 23.4 | 24.4 | 25.5 | 26.6 | 27.6 | 28.7 | 29.8 | 30.8 | 31.9 | 32.9 | 34.0 | 35.1 | 36.1 | 37.2 | 38.3 | 39.3 |
| 97          | 10.9           | 11.9 | 13.0 | 14.1 | 15.2 | 16.3 | 17.4 | 18.8 | 19.5 | 20.6 | 21.7 | 22.8 | 23.9 | 25.0 | 26.0 | 27.1 | 28.2 | 29.3 | 30.4 | 31.5 | 32.6 | 33.6 | 34.7 | 35.8 | 36.9 | 38.0 | 39.1 | 40.1 |
| 96          | 11.1           | 12.2 | 13.3 | 14.4 | 15.5 | 16.6 | 17.7 | 19.2 | 19.9 | 21.1 | 22.2 | 23.3 | 24.4 | 25.5 | 26.6 | 27.7 | 28.8 | 29.9 | 31.0 | 32.1 | 33.2 | 34.3 | 35.5 | 36.6 | 37.7 | 38.8 | 39.9 | 41.0 |
| 95          | 11.3           | 12.4 | 13.6 | 14.7 | 15.8 | 17.0 | 18.1 | 19.7 | 20.4 | 21.5 | 22.6 | 23.8 | 24.9 | 26.0 | 27.2 | 28.3 | 29.4 | 30.6 | 31.7 | 32.8 | 34.0 | 35.1 | 36.2 | 37.3 | 38.5 | 39.6 | 40.7 | 41.9 |
| 94          | 11.6           | 12.7 | 13.9 | 15.0 | 16.2 | 17.3 | 18.5 | 12.6 | 20.8 | 22.0 | 23.1 | 24.3 | 25.4 | 26.6 | 27.7 | 28.9 | 30.1 | 31.2 | 32.4 | 33.5 | 34.7 | 35.8 | 37.0 | 38.2 | 39.3 | 40.5 | 41.6 | 42.8 |
| 93          | 11.8           | 13.0 | 14.2 | 15.4 | 16.5 | 17.7 | 18.9 | 20.1 | 21.3 | 22.4 | 23.6 | 24.8 | 26.0 | 27.2 | 28.4 | 29.5 | 30.7 | 31.9 | 33.1 | 34.3 | 35.4 | 36.6 | 37.8 | 39.0 | 40.2 | 41.4 | 42.5 | 43.7 |
| 92          | 12.1           | 13.3 | 14.5 | 15.7 | 16.9 | 18.1 | 19.3 | 20.5 | 21.7 | 22.9 | 24.2 | 25.4 | 26.6 | 27.8 | 29.0 | 30.2 | 31.4 | 32.6 | 33.8 | 35.0 | 36.2 | 37.4 | 38.6 | 39.9 | 41.1 | 42.3 | 43.5 | 44.7 |
| 91          | 12.3           | 13.6 | 14.8 | 16.0 | 17.3 | 18.5 | 19.8 | 21.0 | 22.2 | 23.5 | 24.7 | 25.9 | 27.2 | 28.4 | 29.6 | 30.9 | 32.1 | 33.3 | 34.6 | 35.8 | 37.0 | 38.3 | 39.5 | 40.7 | 42.0 | 43.2 | 44.4 | 45.7 |
| 90          | 12.6           | 13.9 | 15.1 | 16.4 | 17.7 | 18.9 | 20.2 | 21.5 | 22.7 | 24.0 | 25.2 | 26.5 | 27.8 | 29.0 | 30.3 | 31.6 | 32.8 | 34.1 | 35.3 | 36.6 | 37.9 | 39.1 | 40.4 | 41.7 | 42.9 | 44.2 | 45.4 | 46.7 |
| 89          | 12.9           | 14.2 | 15.5 | 16.8 | 18.1 | 19.4 | 20.7 | 22.0 | 23.2 | 24.5 | 25.8 | 27.1 | 28.4 | 29.7 | 31.0 | 32.3 | 33.6 | 34.9 | 36.2 | 37.4 | 38.7 | 40.0 | 41.3 | 42.6 | 43.9 | 45.2 | 46.5 | 47.8 |
| 88          | 13.2           | 14.5 | 15.9 | 17.2 | 18.5 | 19.8 | 21.1 | 22.5 | 23.8 | 25.1 | 26.4 | 27.7 | 29.1 | 30.4 | 31.7 | 33.0 | 34.4 | 35.7 | 37.0 | 38.3 | 39.6 | 41.0 | 42.3 | 43.6 | 44.9 | 46.2 | 47.6 | 48.9 |
| 87          | 13.5           | 14.9 | 16.2 | 17.6 | 18.9 | 20.3 | 21.6 | 23.0 | 24.3 | 25.7 | 27.0 | 28.4 | 29.7 | 31.1 | 32.4 | 33.8 | 35.2 | 36.5 | 37.9 | 39.2 | 40.6 | 41.9 | 43.3 | 44.6 | 46.0 | 47.3 | 48.7 | 50.0 |
| 86          | 13.8           | 15.2 | 16.6 | 18.0 | 19.4 | 20.8 | 22.1 | 23.5 | 24.9 | 26.3 | 27.7 | 29.1 | 30.4 | 31.8 | 33.2 | 34.6 | 36.0 | 37.4 | 38.8 | 40.1 | 41.5 | 42.9 | 44.3 | 45.7 | 47.1 | 48.4 | 49.8 | 51.2 |
| 85          | 14.0           | 15.4 | 16.8 | 18.2 | 19.6 | 21.0 | 22.4 | 23.8 | 25.2 | 26.6 | 28.0 | 29.4 | 30.8 | 32.2 | 33.6 | 35.0 | 36.4 | 37.8 | 39.2 | 40.6 | 42.0 | 43.4 | 44.8 | 46.2 | 47.6 | 49.0 | 50.4 | 51.8 |
| Weight (kg) | 10             | 11   | 12   | 13   | 14   | 15   | 16   | 17   | 18   | 19   | 20   | 21   | 22   | 23   | 24   | 25   | 26   | 27   | 28   | 29   | 30   | 31   | 32   | 33   | 34   | 35   | 36   | 37   |



| 145–175 cm tall         |     |     |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
|-------------------------|-----|-----|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| 20 <sup>th</sup> Height | 6.2 | 6.5 | 6.9  | 7.2  | 7.5  | 7.8  | 8.2  | 8.5  | 8.8  | 9.1  | 9.5  | 9.8  | 10.1 | 10.4 | 10.8 | 11.1 | 11.4 | 11.8 | 12.1 | 12.4 | 12.7 | 13.1 | 13.4 | 13.7 | 14.0 | 14.4 | 14.7 | 15.0 | 15.3 | 15.7 | 16.0 | 16.3 | 16.7 | 17.0 |      |
| 174                     | 6.3 | 6.6 | 6.9  | 7.3  | 7.6  | 7.9  | 8.3  | 8.6  | 8.9  | 9.2  | 9.6  | 9.9  | 10.2 | 10.6 | 10.9 | 11.2 | 11.6 | 11.9 | 12.2 | 12.6 | 12.9 | 13.2 | 13.5 | 13.9 | 14.2 | 14.5 | 14.9 | 15.2 | 15.5 | 15.9 | 16.2 | 16.5 | 16.8 | 17.2 |      |
| 173                     | 6.3 | 6.7 | 7.0  | 7.4  | 7.7  | 8.0  | 8.4  | 8.7  | 9.0  | 9.4  | 9.7  | 10.0 | 10.4 | 10.7 | 11.0 | 11.4 | 11.7 | 12.0 | 12.4 | 12.7 | 13.0 | 13.4 | 13.7 | 14.0 | 14.4 | 14.7 | 15.0 | 15.4 | 15.7 | 16.0 | 16.4 | 16.7 | 17.0 | 17.4 |      |
| 172                     | 6.4 | 6.8 | 7.1  | 7.4  | 7.8  | 8.1  | 8.5  | 8.8  | 9.1  | 9.5  | 9.8  | 10.1 | 10.5 | 10.8 | 11.2 | 11.5 | 11.8 | 12.2 | 12.5 | 12.8 | 13.2 | 13.5 | 13.9 | 14.2 | 14.5 | 14.9 | 15.2 | 15.5 | 15.9 | 16.2 | 16.6 | 16.9 | 17.2 | 17.6 |      |
| 171                     | 6.5 | 6.8 | 7.2  | 7.5  | 7.9  | 8.2  | 8.5  | 8.9  | 9.2  | 9.6  | 9.9  | 10.3 | 10.6 | 10.9 | 11.3 | 11.6 | 12.0 | 12.3 | 12.7 | 13.0 | 13.3 | 13.7 | 14.0 | 14.4 | 14.7 | 15.0 | 15.4 | 15.7 | 16.1 | 16.4 | 16.8 | 17.1 | 17.4 | 17.8 |      |
| 170                     | 6.6 | 6.9 | 7.3  | 7.6  | 8.0  | 8.3  | 8.7  | 9.0  | 9.3  | 9.7  | 10.0 | 10.4 | 10.7 | 11.1 | 11.4 | 11.8 | 12.1 | 12.5 | 12.8 | 13.1 | 13.5 | 13.8 | 14.2 | 14.5 | 14.9 | 15.2 | 15.6 | 15.9 | 16.3 | 16.6 | 17.0 | 17.3 | 17.6 | 18.0 |      |
| 169                     | 6.7 | 7.0 | 7.4  | 7.7  | 8.1  | 8.4  | 8.8  | 9.1  | 9.5  | 9.8  | 10.2 | 10.5 | 10.9 | 11.2 | 11.6 | 11.9 | 12.3 | 12.6 | 13.0 | 13.3 | 13.7 | 14.0 | 14.4 | 14.7 | 15.1 | 15.4 | 15.8 | 16.1 | 16.5 | 16.8 | 17.2 | 17.5 | 17.9 | 18.2 |      |
| 168                     | 6.7 | 7.1 | 7.4  | 7.8  | 8.1  | 8.5  | 8.9  | 9.2  | 9.6  | 9.9  | 10.3 | 10.6 | 11.0 | 11.3 | 11.7 | 12.0 | 12.4 | 12.8 | 13.1 | 13.5 | 13.8 | 14.2 | 14.5 | 14.9 | 15.2 | 15.6 | 15.9 | 16.3 | 16.7 | 17.0 | 17.4 | 17.7 | 18.1 | 18.4 |      |
| 167                     | 6.8 | 7.2 | 7.5  | 7.9  | 8.2  | 8.6  | 9.0  | 9.3  | 9.7  | 10.0 | 10.4 | 10.8 | 11.1 | 11.5 | 11.8 | 12.2 | 12.5 | 12.9 | 13.3 | 13.6 | 14.0 | 14.3 | 14.7 | 15.1 | 15.4 | 15.8 | 16.1 | 16.5 | 16.9 | 17.2 | 17.6 | 17.9 | 18.3 | 18.6 |      |
| 166                     | 6.9 | 7.3 | 7.6  | 8.0  | 8.3  | 8.7  | 9.1  | 9.4  | 9.8  | 10.2 | 10.5 | 10.9 | 11.2 | 11.6 | 12.0 | 12.3 | 12.7 | 13.1 | 13.4 | 13.8 | 14.2 | 14.5 | 14.9 | 15.2 | 15.6 | 16.0 | 16.3 | 16.7 | 17.1 | 17.4 | 17.8 | 18.1 | 18.5 | 18.9 |      |
| 165                     | 7.0 | 7.3 | 7.7  | 8.1  | 8.4  | 8.8  | 9.2  | 9.6  | 9.9  | 10.3 | 10.7 | 11.0 | 11.4 | 11.8 | 12.1 | 12.5 | 12.9 | 13.2 | 13.6 | 14.0 | 14.3 | 14.7 | 15.1 | 15.4 | 15.8 | 16.2 | 16.5 | 16.9 | 17.3 | 17.6 | 18.0 | 18.4 | 18.7 | 19.1 |      |
| 164                     | 7.1 | 7.4 | 7.8  | 8.2  | 8.6  | 8.9  | 9.3  | 9.7  | 10.0 | 10.4 | 10.8 | 11.2 | 11.5 | 11.9 | 12.3 | 12.6 | 13.0 | 13.4 | 13.8 | 14.1 | 14.5 | 14.9 | 15.2 | 15.6 | 16.0 | 16.4 | 16.7 | 17.1 | 17.5 | 17.8 | 18.2 | 18.6 | 19.0 | 19.3 |      |
| 163                     | 7.2 | 7.5 | 7.9  | 8.3  | 8.7  | 9.0  | 9.4  | 9.8  | 10.2 | 10.5 | 10.9 | 11.3 | 11.7 | 12.0 | 12.4 | 12.8 | 13.2 | 13.5 | 13.9 | 14.3 | 14.7 | 15.1 | 15.4 | 15.8 | 16.2 | 16.6 | 16.9 | 17.3 | 17.7 | 18.1 | 18.4 | 18.8 | 19.2 | 19.6 |      |
| 162                     | 7.2 | 7.6 | 8.0  | 8.4  | 8.8  | 9.1  | 9.5  | 9.9  | 10.3 | 10.7 | 11.1 | 11.4 | 11.8 | 12.2 | 12.6 | 13.0 | 13.3 | 13.7 | 14.1 | 14.5 | 14.9 | 15.2 | 15.6 | 16.0 | 16.4 | 16.8 | 17.2 | 17.6 | 18.0 | 18.4 | 18.8 | 19.1 | 19.5 | 19.9 | 20.3 |
| 161                     | 7.3 | 7.7 | 8.1  | 8.5  | 8.9  | 9.3  | 9.6  | 10.0 | 10.4 | 10.8 | 11.2 | 11.6 | 12.0 | 12.3 | 12.7 | 13.1 | 13.5 | 13.9 | 14.3 | 14.7 | 15.0 | 15.4 | 15.8 | 16.2 | 16.6 | 17.0 | 17.4 | 17.7 | 18.1 | 18.5 | 18.9 | 19.3 | 19.7 | 20.1 |      |
| 160                     | 7.4 | 7.8 | 8.2  | 8.6  | 9.0  | 9.4  | 9.8  | 10.2 | 10.5 | 10.9 | 11.3 | 11.7 | 12.1 | 12.5 | 12.9 | 13.3 | 13.7 | 14.1 | 14.5 | 14.8 | 15.2 | 15.6 | 16.0 | 16.4 | 16.8 | 17.2 | 17.6 | 18.0 | 18.4 | 18.8 | 19.1 | 19.5 | 19.9 | 20.3 |      |
| 159                     | 7.5 | 7.9 | 8.3  | 8.7  | 9.1  | 9.5  | 9.9  | 10.3 | 10.7 | 11.1 | 11.5 | 11.9 | 12.3 | 12.7 | 13.1 | 13.4 | 13.8 | 14.2 | 14.6 | 15.0 | 15.4 | 15.8 | 16.2 | 16.6 | 17.0 | 17.4 | 17.8 | 18.2 | 18.6 | 19.0 | 19.4 | 19.8 | 20.2 | 20.6 |      |
| 158                     | 7.6 | 8.0 | 8.4  | 8.8  | 9.2  | 9.6  | 10.0 | 10.4 | 10.8 | 11.2 | 11.6 | 12.0 | 12.4 | 12.8 | 13.2 | 13.6 | 14.0 | 14.4 | 14.8 | 15.2 | 15.6 | 16.0 | 16.4 | 16.8 | 17.2 | 17.6 | 18.0 | 18.4 | 18.8 | 19.2 | 19.6 | 20.0 | 20.4 | 20.8 |      |
| 157                     | 7.7 | 8.1 | 8.5  | 8.9  | 9.3  | 9.7  | 10.1 | 10.5 | 11.0 | 11.4 | 11.8 | 12.2 | 12.6 | 13.0 | 13.4 | 13.8 | 14.2 | 14.6 | 15.0 | 15.4 | 15.8 | 16.2 | 16.6 | 17.0 | 17.4 | 17.9 | 18.3 | 18.7 | 19.1 | 19.5 | 19.9 | 20.3 | 20.7 | 21.1 |      |
| 156                     | 7.8 | 8.2 | 8.6  | 9.0  | 9.5  | 9.9  | 10.3 | 10.7 | 11.1 | 11.5 | 11.9 | 12.3 | 12.7 | 13.1 | 13.6 | 14.0 | 14.4 | 14.8 | 15.2 | 15.6 | 16.0 | 16.4 | 16.8 | 17.3 | 17.7 | 18.1 | 18.5 | 18.9 | 19.3 | 19.7 | 20.1 | 20.5 | 21.0 | 21.4 |      |
| 155                     | 7.9 | 8.3 | 8.7  | 9.2  | 9.6  | 10.0 | 10.4 | 10.8 | 11.2 | 11.7 | 12.1 | 12.5 | 12.9 | 13.3 | 13.7 | 14.2 | 14.6 | 15.0 | 15.4 | 15.8 | 16.2 | 16.6 | 17.1 | 17.5 | 17.9 | 18.3 | 18.7 | 19.1 | 19.6 | 20.0 | 20.4 | 20.8 | 21.2 | 21.6 |      |
| 154                     | 8.0 | 8.4 | 8.9  | 9.3  | 9.7  | 10.1 | 10.5 | 11.0 | 11.4 | 11.8 | 12.2 | 12.6 | 13.1 | 13.5 | 13.9 | 14.3 | 14.8 | 15.2 | 15.6 | 16.0 | 16.4 | 16.9 | 17.3 | 17.7 | 18.1 | 18.6 | 19.0 | 19.4 | 19.8 | 20.2 | 20.7 | 21.1 | 21.5 | 21.9 |      |
| 153                     | 8.1 | 8.5 | 9.0  | 9.4  | 9.8  | 10.3 | 10.7 | 11.1 | 11.5 | 12.0 | 12.4 | 12.8 | 13.2 | 13.7 | 14.1 | 14.5 | 15.0 | 15.4 | 15.8 | 16.2 | 16.7 | 17.1 | 17.5 | 17.9 | 18.4 | 18.8 | 19.2 | 19.7 | 20.1 | 20.5 | 20.9 | 21.4 | 21.8 | 22.2 |      |
| 152                     | 8.2 | 8.7 | 9.1  | 9.5  | 10.0 | 10.4 | 10.8 | 11.3 | 11.7 | 12.1 | 12.6 | 13.0 | 13.4 | 13.9 | 14.3 | 14.7 | 15.1 | 15.6 | 16.0 | 16.4 | 16.9 | 17.3 | 17.7 | 18.2 | 18.6 | 19.0 | 19.5 | 19.9 | 20.3 | 20.8 | 21.2 | 21.6 | 22.1 | 22.5 |      |
| 151                     | 8.3 | 8.8 | 9.2  | 9.6  | 10.1 | 10.5 | 11.0 | 11.4 | 11.8 | 12.3 | 12.7 | 13.2 | 13.6 | 14.0 | 14.5 | 14.9 | 15.4 | 15.8 | 16.2 | 16.7 | 17.1 | 17.5 | 18.0 | 18.4 | 18.9 | 19.3 | 19.7 | 20.2 | 20.6 | 21.1 | 21.5 | 21.9 | 22.4 | 22.8 |      |
| 150                     | 8.4 | 8.9 | 9.3  | 9.8  | 10.2 | 10.7 | 11.1 | 11.6 | 12.0 | 12.4 | 12.9 | 13.3 | 13.8 | 14.2 | 14.7 | 15.1 | 15.6 | 16.0 | 16.4 | 16.9 | 17.3 | 17.8 | 18.2 | 18.7 | 19.1 | 19.6 | 20.0 | 20.4 | 20.9 | 21.3 | 21.8 | 22.2 | 22.7 | 23.1 |      |
| 149                     | 8.6 | 9.0 | 9.5  | 9.9  | 10.4 | 10.8 | 11.3 | 11.7 | 12.2 | 12.6 | 13.1 | 13.5 | 14.0 | 14.4 | 14.9 | 15.3 | 15.8 | 16.2 | 16.7 | 17.1 | 17.6 | 18.0 | 18.5 | 18.9 | 19.4 | 19.8 | 20.3 | 20.7 | 21.2 | 21.6 | 22.1 | 22.5 | 23.0 | 23.4 |      |
| 148                     | 8.7 | 9.1 | 9.6  | 10.0 | 10.5 | 11.0 | 11.4 | 11.9 | 12.3 | 12.8 | 13.2 | 13.7 | 14.2 | 14.6 | 15.1 | 15.5 | 16.0 | 16.4 | 16.9 | 17.3 | 17.8 | 18.3 | 18.7 | 19.2 | 19.6 | 20.1 | 20.5 | 21.0 | 21.5 | 21.9 | 22.4 | 22.8 | 23.3 | 23.7 |      |
| 147                     | 8.8 | 9.3 | 9.7  | 10.2 | 10.6 | 11.1 | 11.6 | 12.0 | 12.5 | 13.0 | 13.4 | 13.9 | 14.3 | 14.8 | 15.3 | 15.7 | 16.2 | 16.7 | 17.1 | 17.6 | 18.0 | 18.5 | 19.0 | 19.4 | 19.9 | 20.4 | 20.8 | 21.3 | 21.8 | 22.2 | 22.7 | 23.1 | 23.6 | 24.1 |      |
| 146                     | 8.9 | 9.4 | 9.9  | 10.3 | 10.8 | 11.3 | 11.7 | 12.2 | 12.7 | 13.1 | 13.6 | 14.1 | 14.5 | 15.0 | 15.5 | 16.0 | 16.4 | 16.9 | 17.4 | 17.8 | 18.3 | 18.8 | 19.2 | 19.7 | 20.2 | 20.6 | 21.1 | 21.6 | 22.0 | 22.5 | 23.0 | 23.5 | 23.9 | 24.4 |      |
| 145                     | 9.0 | 9.5 | 10.0 | 10.5 | 10.9 | 11.4 | 11.9 | 12.4 | 12.8 | 13.3 | 13.8 | 14.3 | 14.7 | 15.2 | 15.7 | 16.2 | 16.6 | 17.1 | 17.6 | 18.1 | 18.5 | 19.0 | 19.5 | 20.0 | 20.5 | 20.9 | 21.4 | 21.9 | 22.4 | 22.8 | 23.3 | 23.8 | 24.3 | 24.7 |      |
| Weight (kg)             | 19  | 20  | 21   | 22   | 23   | 24   | 25   | 26   | 27   | 28   | 29   | 30   | 31   | 32   | 33   | 34   | 35   | 36   | 37   | 38   | 39   | 40   | 41   | 42   | 43   | 44   | 45   | 46   | 47   | 48   | 49   | 50   | 51   | 52   |      |

## 176–200 cm tall

|             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
|-------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| 200         | 11.3 | 11.5 | 11.8 | 12.0 | 12.3 | 12.5 | 12.8 | 13.0 | 13.3 | 13.5 | 13.8 | 14.0 | 14.3 | 14.5 | 14.8 | 15.0 | 15.3 | 15.5 | 15.8 | 16.0 | 16.3 | 16.5 | 16.8 | 17.0 | 17.3 | 17.5 | 17.8 | 18.0 | 18.3 | 18.5 | 18.8 | 19.0 | 19.3 | 19.5 | 19.8 | 20.0 | 20.3 |
| 199         | 11.4 | 11.6 | 11.9 | 12.1 | 12.4 | 12.6 | 12.9 | 13.1 | 13.4 | 13.6 | 13.9 | 14.1 | 14.4 | 14.6 | 14.9 | 15.2 | 15.4 | 15.7 | 15.9 | 16.2 | 16.4 | 16.7 | 16.9 | 17.2 | 17.4 | 17.7 | 17.9 | 18.2 | 18.4 | 18.7 | 18.9 | 19.2 | 19.4 | 19.7 | 19.9 | 20.2 | 20.5 |
| 198         | 11.5 | 11.7 | 12.0 | 12.2 | 12.5 | 12.8 | 13.0 | 13.3 | 13.5 | 13.8 | 14.0 | 14.3 | 14.5 | 14.8 | 15.0 | 15.3 | 15.6 | 15.8 | 16.1 | 16.3 | 16.6 | 16.8 | 17.1 | 17.3 | 17.6 | 17.9 | 18.1 | 18.4 | 18.6 | 18.9 | 19.1 | 19.4 | 19.6 | 19.9 | 20.2 | 20.4 | 20.7 |
| 197         | 11.6 | 11.9 | 12.1 | 12.4 | 12.6 | 12.9 | 13.1 | 13.4 | 13.7 | 13.9 | 14.2 | 14.4 | 14.7 | 14.9 | 15.2 | 15.5 | 15.7 | 16.0 | 16.2 | 16.5 | 16.7 | 17.0 | 17.3 | 17.5 | 17.8 | 18.0 | 18.3 | 18.6 | 18.8 | 19.1 | 19.3 | 19.6 | 19.8 | 20.1 | 20.4 | 20.6 | 20.9 |
| 196         | 11.7 | 12.0 | 12.2 | 12.5 | 12.8 | 13.0 | 13.3 | 13.5 | 13.8 | 14.1 | 14.3 | 14.6 | 14.8 | 15.1 | 15.4 | 15.6 | 15.9 | 16.1 | 16.4 | 16.7 | 16.9 | 17.2 | 17.4 | 17.7 | 18.0 | 18.2 | 18.5 | 18.7 | 19.0 | 19.3 | 19.5 | 19.8 | 20.0 | 20.3 | 20.6 | 20.8 | 21.1 |
| 195         | 11.8 | 12.1 | 12.4 | 12.6 | 12.9 | 13.1 | 13.4 | 13.7 | 13.9 | 14.2 | 14.5 | 14.7 | 15.0 | 15.3 | 15.5 | 15.8 | 16.0 | 16.3 | 16.6 | 16.8 | 17.1 | 17.4 | 17.6 | 17.9 | 18.1 | 18.4 | 18.7 | 18.9 | 19.2 | 19.5 | 19.7 | 20.0 | 20.2 | 20.5 | 20.8 | 21.0 | 21.3 |
| 194         | 12.0 | 12.2 | 12.5 | 12.8 | 13.0 | 13.3 | 13.6 | 13.8 | 14.1 | 14.3 | 14.6 | 14.9 | 15.1 | 15.4 | 15.7 | 15.9 | 16.2 | 16.5 | 16.7 | 17.0 | 17.3 | 17.5 | 17.8 | 18.1 | 18.3 | 18.6 | 18.9 | 19.1 | 19.4 | 19.7 | 19.9 | 20.2 | 20.5 | 20.7 | 21.0 | 21.3 | 21.5 |
| 193         | 12.1 | 12.3 | 12.6 | 12.9 | 13.2 | 13.4 | 13.7 | 14.0 | 14.2 | 14.5 | 14.8 | 15.0 | 15.3 | 15.6 | 15.8 | 16.1 | 16.4 | 16.6 | 16.9 | 17.2 | 17.5 | 17.7 | 18.0 | 18.3 | 18.5 | 18.8 | 19.1 | 19.3 | 19.6 | 19.9 | 20.1 | 20.4 | 20.7 | 20.9 | 21.2 | 21.5 | 21.7 |
| 192         | 12.2 | 12.5 | 12.7 | 13.0 | 13.3 | 13.6 | 13.8 | 14.1 | 14.4 | 14.6 | 14.9 | 15.2 | 15.5 | 15.7 | 16.0 | 16.3 | 16.5 | 16.8 | 17.1 | 17.4 | 17.6 | 17.9 | 18.2 | 18.4 | 18.7 | 19.0 | 19.3 | 19.5 | 19.8 | 20.1 | 20.3 | 20.6 | 20.9 | 21.2 | 21.4 | 21.7 | 22.0 |
| 191         | 12.3 | 12.6 | 12.9 | 13.2 | 13.4 | 13.7 | 14.0 | 14.3 | 14.5 | 14.8 | 15.1 | 15.4 | 15.6 | 15.9 | 16.2 | 16.4 | 16.7 | 17.0 | 17.3 | 17.5 | 17.8 | 18.1 | 18.4 | 18.6 | 18.9 | 19.2 | 19.5 | 19.7 | 20.0 | 20.3 | 20.6 | 20.8 | 21.1 | 21.4 | 21.7 | 21.9 | 22.2 |
| 190         | 12.5 | 12.7 | 13.0 | 13.3 | 13.6 | 13.9 | 14.1 | 14.4 | 14.7 | 15.0 | 15.2 | 15.5 | 15.8 | 16.1 | 16.3 | 16.6 | 16.9 | 17.2 | 17.5 | 17.7 | 18.0 | 18.3 | 18.6 | 18.8 | 19.1 | 19.4 | 19.7 | 19.9 | 20.2 | 20.5 | 20.8 | 21.1 | 21.3 | 21.6 | 21.9 | 22.2 | 22.4 |
| 189         | 12.6 | 12.9 | 13.2 | 13.4 | 13.7 | 14.0 | 14.3 | 14.6 | 14.8 | 15.1 | 15.4 | 15.7 | 16.0 | 16.2 | 16.5 | 16.8 | 17.1 | 17.4 | 17.6 | 17.9 | 18.2 | 18.5 | 18.8 | 19.0 | 19.3 | 19.6 | 19.9 | 20.2 | 20.4 | 20.7 | 21.0 | 21.3 | 21.6 | 21.8 | 22.1 | 22.4 | 22.7 |
| 188         | 12.7 | 13.0 | 13.3 | 13.6 | 13.9 | 14.1 | 14.4 | 14.7 | 15.0 | 15.3 | 15.6 | 15.8 | 16.1 | 16.4 | 16.7 | 17.0 | 17.3 | 17.5 | 17.8 | 18.1 | 18.4 | 18.7 | 19.0 | 19.2 | 19.5 | 19.8 | 20.1 | 20.4 | 20.7 | 20.9 | 21.2 | 21.5 | 21.8 | 22.1 | 22.4 | 22.6 | 22.9 |
| 187         | 12.9 | 13.2 | 13.4 | 13.7 | 14.0 | 14.3 | 14.6 | 14.9 | 15.2 | 15.4 | 15.7 | 16.0 | 16.3 | 16.6 | 16.9 | 17.2 | 17.4 | 17.7 | 18.0 | 18.3 | 18.6 | 18.9 | 19.2 | 19.4 | 19.7 | 20.0 | 20.3 | 20.6 | 20.9 | 21.2 | 21.4 | 21.7 | 22.0 | 22.3 | 22.6 | 22.9 | 23.2 |
| 186         | 13.0 | 13.3 | 13.6 | 13.9 | 14.2 | 14.5 | 14.7 | 15.0 | 15.3 | 15.6 | 15.9 | 16.2 | 16.5 | 16.8 | 17.1 | 17.3 | 17.6 | 17.9 | 18.2 | 18.5 | 18.8 | 19.1 | 19.4 | 19.7 | 19.9 | 20.2 | 20.5 | 20.8 | 21.1 | 21.4 | 21.7 | 22.0 | 22.3 | 22.5 | 22.8 | 23.1 | 23.4 |
| 185         | 13.1 | 13.4 | 13.7 | 14.0 | 14.3 | 14.6 | 14.9 | 15.2 | 15.5 | 15.8 | 16.1 | 16.4 | 16.7 | 16.9 | 17.2 | 17.5 | 17.8 | 18.1 | 18.4 | 18.7 | 19.0 | 19.3 | 19.6 | 19.9 | 20.2 | 20.5 | 20.7 | 21.0 | 21.3 | 21.6 | 21.9 | 22.2 | 22.5 | 22.8 | 23.1 | 23.4 | 23.7 |
| 184         | 13.3 | 13.6 | 13.9 | 14.2 | 14.5 | 14.8 | 15.1 | 15.4 | 15.7 | 15.9 | 16.2 | 16.5 | 16.8 | 17.1 | 17.4 | 17.7 | 18.0 | 18.3 | 18.6 | 18.9 | 19.2 | 19.5 | 19.8 | 20.1 | 20.4 | 20.7 | 21.0 | 21.3 | 21.6 | 21.9 | 22.2 | 22.4 | 22.7 | 23.0 | 23.3 | 23.6 | 23.9 |
| 183         | 13.4 | 13.7 | 14.0 | 14.3 | 14.6 | 14.9 | 15.2 | 15.5 | 15.8 | 16.1 | 16.4 | 16.7 | 17.0 | 17.3 | 17.6 | 17.9 | 18.2 | 18.5 | 18.8 | 19.1 | 19.4 | 19.7 | 20.0 | 20.3 | 20.6 | 20.9 | 21.2 | 21.5 | 21.8 | 22.1 | 22.4 | 22.7 | 23.0 | 23.3 | 23.6 | 23.9 | 24.2 |
| 182         | 13.6 | 13.9 | 14.2 | 14.5 | 14.8 | 15.1 | 15.4 | 15.7 | 16.0 | 16.3 | 16.6 | 16.9 | 17.2 | 17.5 | 17.8 | 18.1 | 18.4 | 18.7 | 19.0 | 19.3 | 19.6 | 19.9 | 20.2 | 20.5 | 20.8 | 21.1 | 21.4 | 21.7 | 22.0 | 22.3 | 22.6 | 22.9 | 23.2 | 23.5 | 23.8 | 24.2 | 24.5 |
| 181         | 13.7 | 14.0 | 14.3 | 14.7 | 15.0 | 15.3 | 15.6 | 15.9 | 16.2 | 16.5 | 16.8 | 17.1 | 17.4 | 17.7 | 18.0 | 18.3 | 18.6 | 18.9 | 19.2 | 19.5 | 19.8 | 20.1 | 20.5 | 20.8 | 21.1 | 21.4 | 21.7 | 22.0 | 22.3 | 22.6 | 22.9 | 23.2 | 23.5 | 23.8 | 24.1 | 24.4 | 24.7 |
| 180         | 13.9 | 14.2 | 14.5 | 14.8 | 15.1 | 15.4 | 15.7 | 16.0 | 16.4 | 16.7 | 17.0 | 17.3 | 17.6 | 17.9 | 18.2 | 18.5 | 18.8 | 19.1 | 19.4 | 19.8 | 20.1 | 20.4 | 20.7 | 21.0 | 21.3 | 21.6 | 21.9 | 22.2 | 22.5 | 22.8 | 23.1 | 23.5 | 23.8 | 24.1 | 24.4 | 24.7 | 25.0 |
| 179         | 14.0 | 14.4 | 14.7 | 15.0 | 15.3 | 15.6 | 15.9 | 16.2 | 16.5 | 16.9 | 17.2 | 17.5 | 17.8 | 18.1 | 18.4 | 18.7 | 19.0 | 19.4 | 19.7 | 20.0 | 20.3 | 20.6 | 20.9 | 21.2 | 21.5 | 21.8 | 22.2 | 22.5 | 22.8 | 23.1 | 23.4 | 23.7 | 24.0 | 24.3 | 24.7 | 25.0 | 25.3 |
| 178         | 14.2 | 14.5 | 14.8 | 15.1 | 15.5 | 15.8 | 16.1 | 16.4 | 16.7 | 17.0 | 17.4 | 17.7 | 18.0 | 18.3 | 18.6 | 18.9 | 19.3 | 19.6 | 19.9 | 20.2 | 20.5 | 20.8 | 21.1 | 21.5 | 21.8 | 22.1 | 22.4 | 22.7 | 23.0 | 23.4 | 23.7 | 24.0 | 24.3 | 24.6 | 24.9 | 25.2 | 25.6 |
| 177         | 14.4 | 14.7 | 15.0 | 15.3 | 15.6 | 16.0 | 16.3 | 16.6 | 16.9 | 17.2 | 17.6 | 17.9 | 18.2 | 18.5 | 18.8 | 19.2 | 19.5 | 19.8 | 20.1 | 20.4 | 20.7 | 21.1 | 21.4 | 21.7 | 22.0 | 22.3 | 22.7 | 23.0 | 23.3 | 23.6 | 23.9 | 24.3 | 24.6 | 24.9 | 25.2 | 25.5 | 25.9 |
| 176         | 14.5 | 14.9 | 15.2 | 15.5 | 15.8 | 16.1 | 16.5 | 16.8 | 17.1 | 17.4 | 17.8 | 18.1 | 18.4 | 18.7 | 19.0 | 19.4 | 19.7 | 20.0 | 20.3 | 20.7 | 21.0 | 21.3 | 21.6 | 22.0 | 22.3 | 22.6 | 22.9 | 23.2 | 23.6 | 23.9 | 24.2 | 24.5 | 24.9 | 25.2 | 25.5 | 25.8 | 26.1 |
| Weight (kg) | 45   | 46   | 47   | 48   | 49   | 50   | 51   | 52   | 53   | 54   | 55   | 56   | 57   | 58   | 59   | 60   | 61   | 62   | 63   | 64   | 65   | 66   | 67   | 68   | 69   | 70   | 71   | 72   | 73   | 74   | 75   | 76   | 77   | 78   | 79   | 80   | 81   |

## Annex 6 - Addressing problems that hinder consumption of health foods by older persons

### Textbox: Addressing problems that hinder consumption of healthy foods by older persons

Older persons encounter additional problems that may influence their nutrition status and their ability to consume healthy and nutritious foods. These problems should be addressed as outlined below.

- *Diminished sensory ability i.e. taste and smell:* In addition to choosing foods with a strong taste, such as ginger, curry or chilli, it is recommended that food is flavoured using herbs and spices, tomatoes, and other flavouring such as lemon juice.
- *Poor eye sight may result in older persons adding too much salt at table as they do not see it on their food, and do not taste it.* They should be encouraged not to add salt to food at the table.
- *Constipation:* Can be addressed by eating plenty of beans, fruit and vegetables, whole meal bread and cereals; and drinking plenty of fluids, preferably up to eight cups every day. This problem could also be addressed through physical activity.
- *Loss of interest in food:* Older persons should eat with other people, and make meals interesting by choosing a variety of foods, and making meal times special by laying the table and presenting food in an attractive way.
- *Poor appetite:* Fats and sugars provide energy and enhance the taste of food. Oil or margarine can be added to vegetables, and full-fat milk enriched by adding dried milk powder. Older persons should be encouraged to eat small meals but at frequent intervals.
- *Difficulty in chewing and swallowing:* Older persons should eat soft foods that have been cooked thoroughly. They should also seek medical advice.

