WFP
World Food Programme

REPUBLIC OF KENYA

Mainstreaming Human Nutrition
in Resource Management in the Arid and Semiarid Areas

FIELD PRACTITIONERS GUIDE NO. 4

WFP Rural Resilience Programme

August 2018

Mainstreaming Human Nutrition
in Resource Management in the Arid and Semiarid Areas

FIELD PRACTITIONERS GUIDE NO. 4

WFP Rural Resilience Programme

August 2018

Mainstreaming Human Nutrition in Resource Management in the Arid and Semiarid Areas

Field Practitioners Guide No. 4

Citation:

WFP, 2018. Mainstreaming Human Nutrition in Resource Management in the Arid and Semiarid Areas. Field Practitioners Guide No. 4. Rural Resilience Programme, World Food Programme, Nairobi.

This Field Guide was compiled by Florence M. Kyallo

Cover Page Photo: A meal comprising ugali, meat, green vegetables and a banana

Research and publication was supported by:

World Food Programme,
Rural Resilience Programme,
Nairobi

Published by: World Food Programme, Nairobi

Foreword

Kenya's agricultural sector is evolving each day, driven by among others; the gathering momentum of the devolved system of Government, the need to transform agriculture from subsistence to agri-business, a growing population with increasingly complex consumer demands, as well as innovations emerging from farmer trials, the information superhighway, innovations, research and technology.

At the same time, Kenya's agriculture responds to and is affected by international protocols, among these, the Sustainable Development Goals (SDG) whose clarion call is *"Leaving no-one behind".* This motto, when applied in the Kenyan context literally calls for special attention to be accorded to the arid and semi-arid lands (ASALs), which constitute 83 percent of Kenya's land area. It is in the ASALs where agriculture faces special challenges associated with aridity, erratic weather, lack of water, and rudimentary technologies in how water is managed. In essence, the *ASALs should not be left behind!*

The Government of Kenya (GoK) is committed to implementing development initiatives that lead to food and nutrition security, national wealth creation and wellbeing, while also contributing to the achievement of the SDGs. In particular, the Ministry of Agriculture, Livestock, Fisheries and Irrigation (MoALF&I) is implementing programmes, projects and activities at national and county levels, which ultimately contribute to achieving the SDG-2: End Hunger, achieve food security and improved nutrition, and promote sustainable agriculture, whilst simultaneously contributing to a number of other SDGs (especially SDGs 1, 5, 6, 12, 13 and15). This will be achieved by infusing science, innovation and technology in smallholder agriculture, especially in the ASALs, where the knowledge gaps are greatest.

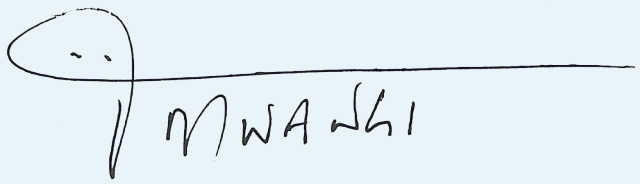
Aware of the complex nature and challenges that face agricultural development in the ASALs, the Ministry has been working with various development partners, among them the World Food Programme (WFP) towards supporting livelihoods in the ASALs. In particular, the WFP has in the past contributed to food relief efforts. However, as we implement the Agriculture Sector Transformation and Growth Strategy (ASTGS) and the BIG 4 on food and nutrition security, focus is now changing to support the most food-insecure communities (Flagship 6 of ASTGS) in the arid and semi-arid lands to become resilient and

adapt to shocks such as drought and climate change, by becoming food producers rather than recipients of food aid.

This focus sees ASALs as having resources which include the human, natural, social and financial capitals. Resilience building therefore takes cognizance of the inherent potential and through complementary efforts with partners, implements activities on the ground. This relies heavily on support and collaboration with County Governments, the private sector, development partners, non-state actors and all stakeholders. These partnerships are necessary to facilitate infrastructure development, community mobilization, implementation of income generating activities; skills development among land users and decision makers and to enhance best practice in resource management and agricultural production.

In our continued efforts to build knowledge, reach the decision makers, extension workers and farmers on solutions and interventions that upgrade agriculture in the ASALs, these set of Technical Manuals and Field Guides developed by WFP in collaboration with MoALF&I brings on board innovations, technologies and best practices that will help upscale agricultural productivity and improve rural livelihoods. I expect the materials to be shared widely and utilized so that the knowledge in them is turned into action, thereby benefitting farmers, communities and the country.

Lastly, I wish to reaffirm the commitment of the Ministry in supporting good practices and innovations that improve rural resilience and upgrade agricultural production in the ASALs, and indeed in all parts of the country where sustainable agriculture is practiced, as we continue the journey of making Kenya food and nutrition secure.



Hon. Mwangi Kiunjuiri, MGH, EGH

Cabinet Secretary, Ministry of

Agriculture, Livestock, Fisheries

and Irrigation

Table of Contents

Definition of Terms

Breastfeeding: Feeding an infant or young child with breast milk, either directly from the breast or expressed.

Exclusive breastfeeding: giving only breastmilk (including colostrum, and nothing else) from the time they are born until they are 6 months

Food: any substance we eat that is derived from plants or animals, and that nourishes the body. Food contains substances that help the body perform many functions (energy, nutrients and other health promoting components).

Food insecurity*:* Limited or uncertain availability of nutritionally adequate and safe foods or limited or uncertain ability to acquire acceptable foods in socially acceptable.

Food Preservation: any of a number of methods by which food is kept from spoilage after harvest or slaughter.

Food processing: the action of performing a series of mechanical or chemical operations on food in order to change or preserve it

Food security: Exists when all people, at all times, have physical and economic access to sufficient, safe and nutritious food for a healthy and active life.

Food security: exists when all people at all times have access to adequate quality food to meet their needs for a productive and healthy lives

Healthy Diet: Diet that provides an adequate amount and variety of nutritious safe foods to cover (but not exceed) a person's energy and nutrient needs.

Nutrition security: access by all people at all times to the adequate utilization and absorption of nutrients in food, in order to be able to live a healthy and active life. The three determinants of nutrition security are: access to adequate food; care and feeding practices; sanitation and health

Nutrition: the process by which food is taken in and utilized by the body.

Abbreviations and Acronyms

ASAL	Arid and Semiarid Lands
BMI	Body Mass Index
FAO	Food and Agricultute Organization of the UN
FFA	Food For Assets
GOK	Government of Kenya
IQ	Intelligence quotient
KDHS	Kenya Demographic Health Survey
MAM	Moderate Acute Malnutrition
MUAC	Mid Upper Arm Circumference
NCD	Non-Communicable Diseases
NCHS	National Centre Health Survey
SAM	Severe Acute Malnutrition
SD	Standard Deviation
UNICEF	United Nations Children' Fund
WFH	Weight for Height
WFP	World Food Programme
WHO	World Health Organization

1 Introduction

Nutrition is both an indicator and a determinant of development. Good nutrition contributes to progress in all sectors including health, education, employment, empowerment of women and the reduction of inequalities and poverty. Although Kenya has recorded remarkable improvement in nutrition status in the last decade, food and nutrition security in the arid and semiarid (ASAL) regions continues to be a challenge, with acute malnutrition persistently high. According to the latest national data (KDHS, 2014), stunting rates in the regions ranges from 15.6% in Garissa County to 45.8% in Kitui County as shown in Table 1. In addition, The integration of nutrition in rural resilience programmes in these regions has potential to impact on the various factors contributing to malnutrition in these regions. In addition, development of suitable value chains improves income while empowering the communities, including youth and women.

Table 1: Prevalence of malnutrition in ASAL counties in Kenya

County	Stunting (<5 years)	Wasting (<5 years)	Underweight (<5 years)	Underweight (women)	Overweight/ Obesity (women)
Laikipia	26.9	4.4	13.9	14.2	34.4
Meru	25.2	2.9	8.1	7.7	31.6
Makueni	25.1	2.1	10.2	10.1	30.0
Kajiado	18.2	3.0	8.1	7.7	31.6
Narok	32.9	2.4	11.6	9.7	25.7
Taita Taveta	23.8	7.2	7.8	4.5	45.0
Kwale	29.7	4.4	11.8	16.3	27.8
Kilifi	39.1	4.1	16.9	10.9	20.4
Lamu	30.8	4.5	13.6	13.9	37.2
Nyeri	15.1	2.4	2.5	3.6	49.2
Embu	26.8	3.0	11.1	12.8	33.5
Kitui	45.8	3.4	19.7	9.5	31.0
Tharaka Nithi	32.9	3.3	10.8	10.9	25.2
West Pokot	45.9	14.3	38.5	23.2	10.6
Turkana	23.9	22.9	34.0	45.0	4.7

County	Stunting (<5 years)	Wasting (<5 years)	Underweight (<5 years)	Underweight (women)	Overweight/ Obesity (women)
Marsabit	26.5	16.3	30.1	27.0	17.6
Garissa	15.6	11.4	13.1	33.3	17.7
Wajir	26.4	14.2	21.1	28.3	25.0
Isiolo	19.1	9.1	12.9	24.4	25.2
Samburu	30.1	13.6	28.9	41.0	18.4
Baringo	29.5	6.9	20.2	25.1	23.2
Mandera	36.1	14.8	24.9	23.5	15.2
Tana River	28.1	5.7	18.6	29.1	19.7
Kenya	**26.0**	**4.0**	**11.0**	**8.9**	**32.8**

1.1 About the Guide

This guide looks at the practice of good nutrition, hygiene and sanitation. It relates to practices at household level, including an understanding of the nutrients in food, what is malnutrition, healthy diets for various members of the community, food handling, storage and preservation, and appropriate food preparation. It also includes components of appropriate water and sanitation practices. Using this guide, facilitators guide participants on how to make good healthy choices with the limited resources available at household level.

1.2 Objectives

1. To describe the basic principles of nutrition
2. To describe the principles of healthy diets
3. To discuss nutrition security at household and community level
4. To discuss hygiene and sanitation at household and community level
5. To discuss nutritional needs of different population groups

2 Basic Principles of Nutrition

2.1 Functions of Food

1) Food provides energy and nutrients
2) Food has a social function
3) Food has a psychological function

Nutrients are substances that provide:

- Energy for activity, growth, and all functions of the body such as breathing, digesting food, and keeping warm
- Materials for the growth and repair of the body, and for the body to resist and fight disease

2.2 Types of nutrients

1) Macronutrients
   - Carbohydrates
   - Proteins
   - Fats/oils

2) Micronutrients
   - Vitamins
   - Minerals

The body needs both macronutrients and micronutrients. Foods consumed must therefore provide both types of nutrients

2.3 The food groups

Food is categorized into different food groups depending on the nutrients they contain. Every individual and household should consider these food groups when choosing family meals. The food guide pyramid in Figure 1 shows the different food groups and the recommended consumption amounts per day.

Figure 1: The Food Guide Pyramid

Starchy foods

These are foods that provide carbohydrates and energy.

Cereals and pasta: maize, rice, millet, sorghum, oats, wheat, *ugali*, porridge, *chapati*, *mandaazi*, bread, pasta and breakfast cereal

Roots and tubers: potato, sweet potato, yam, arrowroot and cassava *Plantains*

Legumes and pulses, nuts and seeds: Beans, peas and lentils, oilseeds and nuts such as cahewnuts,

Beans, peas and lentils, oilseeds and nuts,

Meat, fish, poultry, edible insects and animal protein products

Flesh: fish, sea food, poultry, meat (beef, goat, sheep) and eggs. Traditionally dried meat and fish such as *ng'atoosa* (traditionally dried fish among the Turkana)

Milk and Milk products

Fresh milk, milk powder, fermented milk, mala, yoghurt, cheese. Traditionally fermented milk products such as *Mursik* (Kalenjin), *soyo* (Pokot) and *Edodo* (Turkana).

Vegetables and fruits

Vegetables: carrots, pumpkin and butter nuts; orange-fleshed sweet potato, red sweet bell pepper, spinach, kales, cowpea leaves, *managu*, *terere*, sweet potato leaves, pumpkin leaves, spider weed.

Fruits: Mango, papaya, Guava, avocado, pineapples, green plums, green grapes, apples, gooseberries *(nathi)*, oranges, lemons, limes, tamarind, loquats, zambarao *(jamna)*, ripe bananas, custard apples, peaches, thorn melon, melons, pomegranates and wild fruits.

Fats, oils, salt and sugar

Examples are deepfried foods and fatty meat. Sugar and sugary foods such as sweets, sodas, cakes and biscuits.

2.4 Malnutrition

Malnutrition is any condition caused by an excess or deficiency of energy or nutrient intake or by an imbalance of nutrients. It is as a result of an imbalance between dietary intake and requirements. There are two types of malnutrition: **undernutrition** and **overnutrition**

1) Undernutrition develops when one is not getting enough food or not getting enough nutrients from the foods we consumed. Malnutrition can also be caused by disease, especially if one is sick for a long period of time or one gets sick frequently. Most diseases affect feeding, and one may not eat enough during the period they are sick, leading to undernutrition.

Types of undernutrition

a) Acute malnutrition:
   - Severe Acute malnutrition (SAM)
   - Moderate Acute malnutrition (MAM)

b) Chronic malnutrition (Stunting)

c) Underweight

d) Micronutrient deficiencies: examples are cretinism, goiter, spina bifida, beriberi, anaemia, night blindness

2) Overnutrition: results from excessive intake of foods that are high in energy, leading to overweight and obesity. Overweight and obese individuals can also be deficient in micronutrients.

2.4.1 How to identify different types of malnutrition

Acute malnutrition

Acute malnutrition is caused by a decrease in food consumption and/or illness resulting in bilateral pitting oedema or sudden weight loss. It is defined by the presence of bilateral pitting oedema or by wasting.

It is categorised into moderate acute malnutrition and severe acute malnutrition.

1) ***Severe acute malnutrition (SAM)*** is defined by the presence of bilateral pitting oedema or severe wasting. A child with SAM is highly vulnerable and is at high risk of dying.
2) ***Moderate acute malnutrition (MAM*)** is defined by moderate wasting.

How to recognize marasmus

A child with marasmus has lost fat and muscle and will weigh less than other children of similar height.

www.epainassist.com/nutritional-disorder/marasmus
Illustration of a child with Marasmus

Kwashiorkor

Figure 2: Acute malnutrition

A child with marasmus may have more than one of the following clinical symptoms

- Severe weight loss and wasting
- On the back, the ribs and shoulder bones are easily seen
- Limbs emaciated
- Skin under the upper arm is hanging
- May have good appetite
- With correct treatment, good prognosis
- Thin appearance: 'old man's face'
- In severe wasting, the skin around the buttocks has a 'baggy pants appearance'

Indicator for marasmus: MUAC<110mm; Weight for Height Z score <-3SD;

How to recognize kwashiorkor

A child with kwashiorkor is at very high risk of death. The following are the clinical signs:

- 'Moon face' due to fluid retention
- Loss of appetite
- Brittle thinning hair that easily plucks off
- Hair colour change
- Face may seem swollen
- Apathy, little energy, child does not want to play
- Child is irritable, cries easily
- Dermatitis: flaky skin or patches of abnormally light or dark skin (in severe cases)

Indicator for kwashiorkor: Bi-lateral pitting oedema on both feet

How to recognize marasmic kwashiorkor

A child with marasmic kwashiorkor has the following characteristics

- Bilateral pitting oedema
- Severe wasting

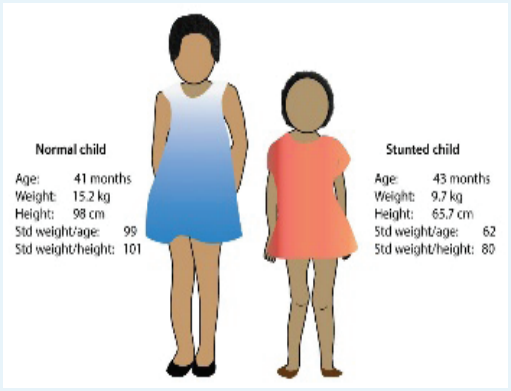
Indicator for marasmic kwashiorkor: Bilateral pitting oedema and Severe Wasting

Underweight

An underweight child is one whose weight is low compared to the average weight of a healthy child of the same age and sex Table 3.

Indicator: Weight-for-age Zscore <-2SD.

Source: Nutrition training Manual
Underweight



Picture by Munene Mati
Stunting

Figure 3: Underweight and stunting

Stunting

A stunted child is one whose height is low compared to the average height of a healthy child of the same age and sex (Figure 3). Often, the child may also be underweight. Stunting is an indicator that the child is failing to thrive, and it develops as a result of chronic inadequate dietary intake early in life. To treat a patient with chronic malnutrition requires a long-term interventions that consider household food insecurity in the long run, homecare practices (feeding and hygiene practices) and issues related to public health.

Indicator for stunting: Height for age Z Score <-2SD

Overweight/obesity

Overweight develops as a result of excess intake of calories. Overweight is defined as a Body Mass Index (BMI)≥25.0kg/m^2, while obesity is defined as a BMI >30kg/m^2. Overweight and obesity are associated with an increased risk of non-communicable diseases including diabetes Type 2, hypertension, some cancers among others.

2.4.2 Causes of malnutrition

The causes of malnutrition, are categorized from the individual level to the policy level as immediate, underlying and basic causes as shown in Figure 4.

Immediate causes of malnutrition: At the individual level, the immediate cause of malnutrition is inadequate dietary intake and/or frequent illness.

Underlying causes of malnutrition: These include household food insecurity, inadequate maternal and childcare, poor access to healthcare and healthy environment.

Basic causes of malnutrition: The availability and control of resources (human, economic and organisational) at the various levels of society are a result of *political* factors, *cultural* factors, *environmental* factors, and *social* factors. Any one or a combination of these can be a basic cause of malnutrition. Examples of cultural factors that lead to malnutrition are: sharing of food among children, which may lead to young children not consuming enough; withholding food during sickness and early introduction of other foods.

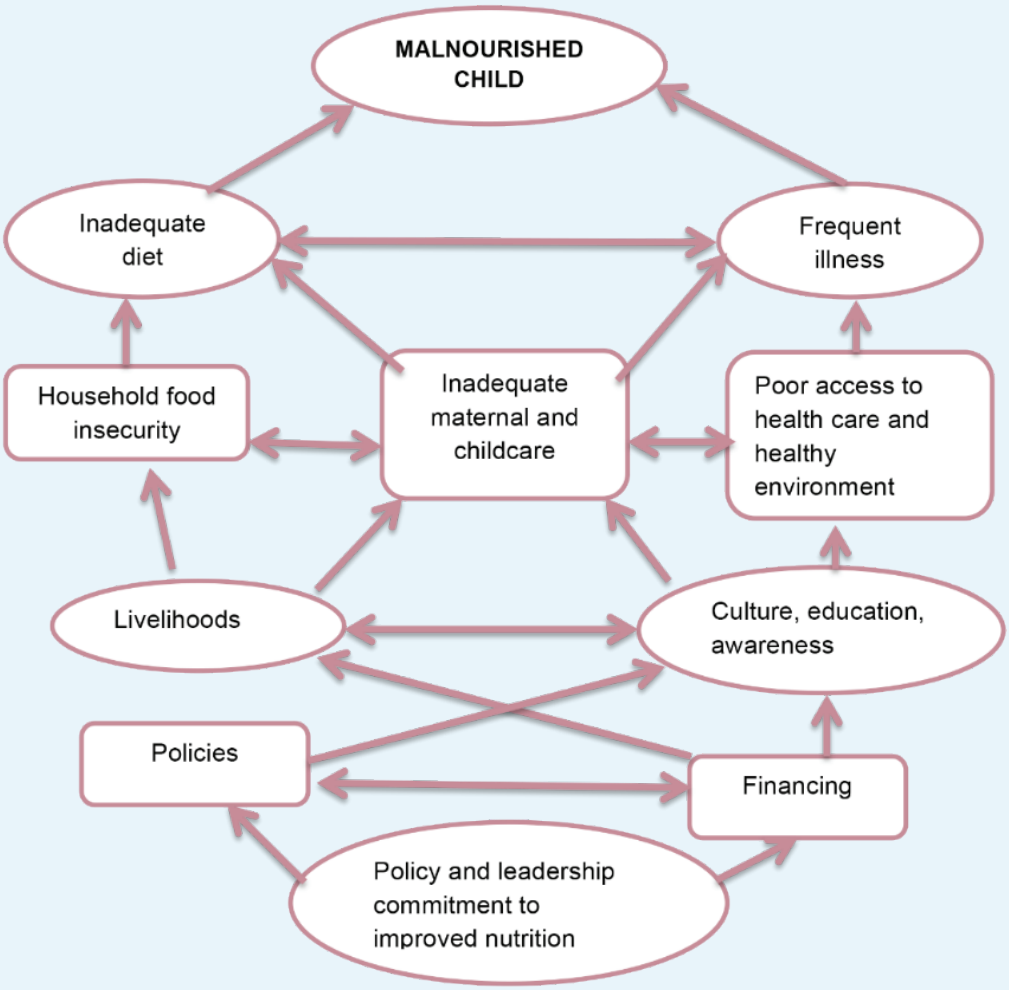


Figure 4: Causes of malnutrition

2.4.3 Consequences of malnutrition

Malnutrition has both short and long term consequences.

1. Single largest cause of child deaths. Undernutrition contributes to at least 35% of child deaths globally
2. Lost human capital. Undernourished children grow to have poorer cognitive development, lower school attainment and IQ, are less productive and earn less as adults. They are also more likely to have undernourished children, resulting in the vicious cycle of undernutrition and perpetuating poverty.

3. Lost economic growth. Undernutrition costs an estimated 2-3% of GDP in many low-income countries.
4. Life long irreversible damage occurs during the “first 1,000 days”. Protein, vitamin and mineral deficiencies experienced during pregnancy and the first two years of life have severe and often irreversible consequences to a child’s development.
5. Undernutrition also diminishes an adult worker’s productivity by exacerbating disease or through chronic fatigue and reduced work capacity in the case of iron deficiency anemia.

3 Nutrition Security at Household Level

3.1 Considerations when planning healthy family meals

Individuals who consume a variety of foods from different food groups are less likely to suffer from nutrient deficiencies since different foods are rich in a variety of nutrients. Households are encouraged to use locally available foods which are fresher and cheaper, and to ensure the following are achieved in family meals:

***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. An example of plates consisting of foods from 4 food groups is shown in Figure 5.

***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.

***Balance*:** This involves using enough, but not too much of each type of food. The recommended proportions are: Carbohydrates – 55% to 60%, Protein – 10% to 15%, and Fat – 25% to 30%. This ensures intake of adequate energy without overeating.

***Calorie (energy) control*:** Meals should not include too much or too little energy giving foods. However, foods for children should be high in healthy fats in order to meet their increased requirements.

***Nutrient density*:** A nutrient-dense meal contains vitamins, minerals, complex carbohydrates, lean protein, and healthy fats, and is relatively low in calories.

***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. Examples of foods that contain high amounts of fat and sugar are cakes, potato chips, soda etc

***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.

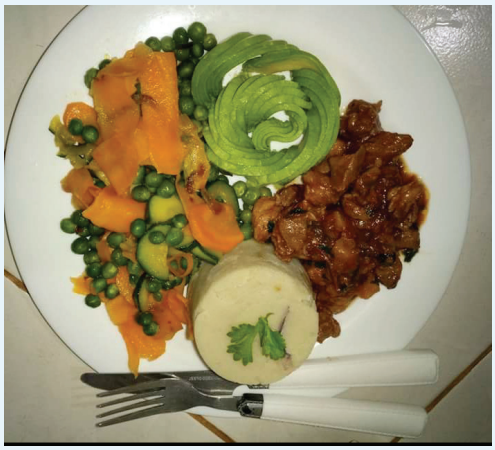


Figure 5: Examples of meals with a minimum of 4 food groups and approximately correct portion sizes

Key Messages

- Eat a variety of foods from different food groups every day. Include whole or unprocessed starchy foods as part of meals.
- Eat plenty of green leafy vegetables, red and yellow vegetables and fruits every day; and include a variety of other vegetables and fruit.
- Eat beans, peas, lentils, cowpeas, pigeon peas, soya, nuts and edible seeds regularly (at least four times a week).
- Eat lean meat, fish and seafood, poultry, insects or eggs at least twice a week
- Drink fresh milk, fermented milk or yoghurt every day.
- Use oil or fat in moderation in meals; Use fortified oil.
- Include foods that contain healthy fats in the diet: coconut oil, avocado, groundnuts
- If you use sugar, use it sparingly: Limit the consumption of sweetened foods and drinks.
- Use iodised salt, but use it sparingly
- Drink plenty of safe water: at least 8 glasses per day.

3.2 Planning healthy diets for the family

- Include foods from at least four food groups in each meal to

ensure variety (dietary diversity)
- Utilise locally available foods whenever possible
- Ensure family members consume foods produced at home for example eggs, chicken, milk (before any sales are made)
- Avoid selling family farm produce (and leaving the family with insufficient amounts)
- Meals should be adequate to meet needs for each family member
- Use enough (balance) of each food
- Ensure calorie content of food is neither too much or too little especially for children
- Choose nutrient dense meals
- Consume energy dense (*empty calorie foods*) in moderation
- Ensure safety in food production, preparation and storage
- Consume minimally processed
- Endevour to produce some food at the household level (kitchen garden for vegetables for example indigenous vegetables, kales, spinach; keeping chicken or other birds such as guinea fowls).

4 Food Safety: Food Preparation, Storage and Preservation

4.1 Safety during food preparation

- Wash hands with soap and clean water before preparing any food
- Ensure all cooking utensils and cutting boards are clean
- Avoid cross contamination: keep raw meat, fish and poultry and their juices away from other foods
- Ensure all meat, poultry, fish, pork, lamb, veal are throughly cooked

Foods that must be cooked

- All flesh foods (meat, chicken, fish, pork); all animal based foods such as eggs and milk
- Most vegetables: spinach, kales,

Foods that can be consumed in raw form

- Fruits such as mangoes, pineapples, guavas, pawpaws.
- Vegetables such as lettuce and carrots.

4.2 Healthy Cooking methods

4.2.1 Why food is cooked

- To prevent spoilage: The high temperatures (usually 40° C) rapidly reduces the growth of bacteria, making food safe for consumption.
- To soften it: meat, cereals, pulses and vegetables
- To improve palatability and quality: Appearance, flavour, texture and taste
- To introduce variety: preparing different dishes with the same ingredients e,g. egg can be boiled, scrambled, poached or fried.
- To increase food consumption
- To increase availability of nutrients: example a cooked egg is more nutritious than a raw egg.

4.2.2 Steaming

Steaming is cooking food by steam (moist heat) under varying degrees of pressure (Figure 6).

Figure 6: Steamed vegetables

Options for steaming food:

a) Low pressure steaming: food is cooked by direct or indirect contact with the steam:
   - direct: food is placed in a steamer or in a pan of boiling water
   - Indirect: food is placed between two plates over a pan of boiling water

b) High pressure steaming: food is cooked in an equipment (e.g. pressure cooker) which does not allow steam to escape; steam pressure builds up, the temperature increases and cooking time is reduced.

Examples of foods which might be cooked by steaming

- fish
- meat
- vegetables

Advantages of steaming

- High retention of nutrients
- Makes some foods softer and easier to digest
- Cooking is rapid because steam is forced through the food
- Lower risk of overcooking food
- Labour-saving
- Saves fuel
- Vegetables retain colour, flavour
- Natural juices from the steamed food (e.g. fish) can be retained for later use with other dishes

Disadvantages of steaming

- Method is slow
- Foods may not appear attractive

4.2.3 Boiling

Definition: cooking foods in a liquid (e.g. water, milk) at boiling point.

Examples of foods that can be boiled:

- Legumes (e.g. beans, cowpeas, pigeon peas, green grammes)
- Cereals (whole or flour): e.g. maize, sorghum, millet, rice
- Meat and fish
- Pasta
- Tubers: potatoes, sweet potatoes arrow roots
- Vegetables: carrots, green peas

Options for boiling food

- The liquid is boiled first, then the food is placed into the boiling liquid, reboiled, then the heat is reduced so that the food boils slowly
- The food is mixed with a cold liquid, covered and brought to the boil. The heat is reduced, so that the food boils slowly

Advantages of boiling

- Tough, hard foods (e.g. legumes, dry cereals, meat) become softer and digestible
- Appropriate when cooking large quantities of food
- Saves on fuel
- The boiling liquid is nutritious and tasty and can be consumed or saved for use with other dishes
- labor saving since it requires little attention

- safe and simple
- nutrients are retained if boiling time is short for vegetables

Disadvantages of boiling

- Nutrients are lost (water soluble vitamins), when cooking liquid is discarded
- Nutrients loss (water soluble vitamins), when boiling time is prolonged especially for vegetables
- Food may not look attractive
- Method can be slow

4.2.4 Stewing

Definition: a long, slow cooking method where food is cut into pieces and cooked in minimum amount of water or stock. To add flavor, one may add onions, parsley (*dhania*), ginger, garlic (*kitunguu saumu*), peppers and any other preferred spices. The food is served together with the stew (cooking liquid).

Method: Mainly in a covered pot/pan placed over the fire, preferably under low heat

Examples of foods which might be cooked by stewing

- fish
- meat
- poultry
- vegetables
- potatoes

Advantages of stewing

- Retention of nutrients
- Juices form the food are consumed together with the food as stew
- Makes food tender and easier to consume, especially for children and other family members
- When done slowly under low heat evaporation is reduced
- Saves on fuel
- Saves on labour, especially when foods are boiled in bulk

Disadvantages of stewing

- Method can be very slow
- Nutrient are lost if cooking water is discarded

4.2.5 Poaching

Definition: cooking food in the required amount of liquid at just below boiling point.

Options for poaching

- Shallow poaching: foods such as fish and chicken are cooked in minimum amount of water, with the water kept at a temperature close to boiling, but does not reach boiling point
- Deep poaching: foods (e.g.) eggs are placed into simmering water and cooked gently. Alternatively, food is cooked in enough water to cover it, boiled and then simmered

Examples of foods which might be cooked by poaching

- eggs
- fish
- fruits (fresh or dried)
- poultry (chicken, duck)

Advantages of poaching

- Poached food is easily digestible.
- Nutrients are retained
- Foods are healthy because no fat/oil is added during cooking
- Food (e.eg.) is less likely to overcook

Disadvantages of poaching

- Skill is required for poaching food
- It is suitable only for a limited number of foods

4.2.6 Baking

Definition: is cooking food by dry heat in an oven

Options for baking

- Dry baking: the baking process utilizes the water in the food and there is no water added e.g cakes.
- Increased humidity baking: a bowl of water is placed in the oven to increase the water content of the food and to improve eating quality (e.g. bread).

Examples of foods which might be cooked by baking:

- meat
- chicken

- vegetables (potatoes)
- apples
- some fruits
- cakes
- bread

Advantages of baking

- A wide range of savoury and sweet foods can be produced.
- Bakery products are appealing to the eye and to the mouth.
- Bulk cooking can be achieved with uniformity of colour and degree of cooking.
- Baking ovens have effective manual or automatic controls
- Straightforward access for loading and removal of items.

Disadvantages of baking

- a) Requires regular attention
- b) Expensive energy

4.3 Post-harvest handling for maintaining food safety and nutrition

4.3.1 Recommendations for harvesting fruits and vegetables

- Wash your hands before harvesting
- Harvest fruit and vegetable at the correct stage of maturity
- Choose the coolest time of day to harvest fruit and fruit vegetables like tomatoes and peppers. Choose mid-morning for leafy vegetables, when the leaves contain less water.
- Avoid injuring the crop; bruised vegetables and fruits, spoil faster, Place the harvested produce in the shade (e.g. under a tree).
- Sort the crop according to the size, quality and maturity
- Harvest fruits and vegetables into clean containers
- Pack ripe fruit separately from unripe fruit; putting them together will cause the whole harvest to ripen.
- Pick fruit such as tomatoes, apples and oranges with a small stem.
- Pack the sorted produce carefully into baskets, boxes or crates

lined with soft material such as soft, dry grass, newspaper, banana leaves or dry sand.
- Avoid squashing the produce when packing it.
- Do not harvest fruits and vegetables that have been recently treated with pesticides

4.3.2 Food storage

The general recommendations for postharvest handling of different types of foods are shown in Table 3.

Table 3: General recommendations for handling of different types of foods

Perishability	Recommended handling
Highly perishable food E.g. milk, meat, poultry and fish	-Consume within two days, if no preservation is done
Semi-perishable foods E.g. fresh fruits and vegetables.	-Avoid prolonged storage -Store at low temperature away from direct sunlight (in a shade, or well aerated room)
Non-perishable foods e.g. cereals	-Dry grain thoroughly before storage -Ensure low storage temperature to avoid spoilage -May also store in tightly closed containers, or in treated storage bags

4.3.3 Post-harvest handling for maintaining food safety and nutrition

Recommendations for harvesting dry foods

- Harvest cereals and legumes when they are dry
- Avoid leaving dry maize unharvested for too long since it may be attached by pests such as weevils
- Harvest and transport grain into clean, dry containers
- Dry grain on concrete or canvas, and not bare soil

Preserving food

Saving for tomorrow what is not needed today

Food preservation is an action or method of designed to maintain foods at a desired level of quality. Food preservation aims to:

- destroy micro-organisms responsible for causing food spoilage
- reduce the water (moisture) content from food
- alter the temperature, humidity and other conditions that favour the growth of food microorganisms, and thereby retarding microbial growth and replication (thus delaying food spoilage).

Advantages of preserving food

- Increases household food security
- Creates employment opportunities and a sustainable income.
- Improve family nutrition because families are able to consume fruits and vegetables even during the dry season
- Improves dietary diversity during the dry season
- Improves the bargaining power of farmers : farmers do not have to sell at very low prices during the harvest time.

4.3.4 Preservation techniques for use at household level

Sun Drying

Which foods can be dried?

- Fruits: e.g. pawpaw, bananas
- Vegetables: e.g. Cowpea leaves, cassava leaves, tomatoes, sweet potato leaves, carrots, traditional vegetables, cabbage
- Roots and tubers: e.g. cassava, sweet potatoes, yams

Figure 7 shows some fruits and vegetables drying in the sun

Options for drying food

- Sundrying: The food material is dried directly under the sun (Figure 7)
- Solar drying: Food material is not exposed directly to sun

Precautions when drying fruits and vegetables

- Ensure cleanliness and hygiene throughout the process
- Exclude all sick persons from processing food
- Cover all cuts or wounds with waterproof dressing
- Discard any mouldy, raw material



Photos by Florence Kyallo

Figure 7: Examples of drying fruits and vegetables

Steps in drying fruits and vegetables

Step 1: Selection

- Select only ripe, good-quality fruits and vegetables
- Select fruits and vegetables individually
- Discard any rotten, diseased or damaged fruits and vegetables
- Remember, processing cannot improve poor-quality fruits or vegetables.

Step 2: Washing

- Treat the water for cleaning with a household bleach solution[1]
- Clean all working surfaces before handling fruits or vegetables
- Wear clean plastic gloves
- Wash and scrub each selected fruit and vegetable individually
- Avoid bruising the fruits and vegetables during washing
- Place cleaned fruits and vegetables in a clean container

Step 3: Blanching (for vegetables)

- Boil water in a cooking pan
- Plunge the cleaned vegetables in the boiling water for 1-2 minutes

1 The recommended ration is 50 parts of water to 1 part bleaching solution

- Immediately transfer into a container of cold water
- Remove the vegetables and spread them out for the water to drip

Step 4: Peeling

- Wash hands thoroughly with clean water and unperfumed soap
- Keep peeling area separate from where raw materials are washed
- Clean the peeling area thoroughly
- Clean all peeling knives and working surfaces in fresh bleach solution before use.
- Peel only washed fruit
- Peel carefully to remove as minimum flesh as possible
- Remove peels and seeds from the peeing area as soon as possible since they attract flies

Step 5: Cutting and slicing

- Clean all cutting knives and working surfaces
- Thickness of fruit pieces depends upon the kind of fruit being dried.
- Thicker slices take longer to dry than thinner pieces.
- Very thin pieces may stick to the drying trays making it difficult to remove.
- Thicker pieces may not dry fully and may subsequently deteriorate after packing.
- Aim for uniform cutting and slicing: these are more attractive than unevenly cut pieces
- Place sliced fruit in clean bowels
- Dip sliced fruit in salt or lemon solution to prevent oxidation

Step 6: Spreading on drying trays

- The trays should be thoroughly cleaned before hand
- Spread sliced fruit on drying trays as slicing goes on to avoid fruit sticking together (do not wait until all fruit is dried)
- Load slices close together but not overlapping
- Keep flies and other insects away

Step 7: Drying

- Set the tray in the sun
- Drying may take 2-4 days, depending on the type of fruit and outdoor conditions.
- Keep flies and other insects away

4.3.5 Other methods

Smoking

This is a method used in many cultures to preserve meat and fish. It involves smoke-drying the cooked meat or fish over a low fire for 1-5 days, or longer for fresh meat and fish. Once smoked properly, the smoked product can keep for upto one year.

Salting

Meat and fish can be preserved Salt is an effective preservative, which prevents microbial growth. Salted foods can be smoked to increase their shelf life. Meat can be submerged in brine (a concentrated salt solution) or the salt is simply rubbed onto the surface of the meat.

Heating food

Heating food kills some microbes which may be present in food. It also stops biological activities that may lead to food spoilage. In case of boiling as a form of heat treatment, the foods but must be consumed within a day. It is important that foods are heated to sufficiently high temperatures, and not just warmed.

Fermenting

Is a naturally occurring chemical reaction by which a natural food is converted into another form by pathogens present in the food or introduced externally. Examples of foods that can be fermented are fresh milk and some vegetables

Drying meat

Traditionally, some communities sundried fresh meat or fish for storage for use in future. Figure 8 shows.

Source: Business Daily, 10th Nov 2015

Figure 8: Sundried fish in Turkana County

5 Hygiene and Sanitation

Components of good hygiene and sanitation practices:

- Observing hygienic hand washing practices
- Observing personal hygiene
- Observing food hygiene
- Observing environmental hygiene practices

5.1 When to wash hands:

Hand washing is an ordinary act that is very important for a child's health, growth and development. Hands should be washed:

- Before handling or eating any food
- After using the toilet
- After handling raw and cooked foods
- Before eating or drinking
- After blowing their nose
- Touching your hair
- After playing with pets or handling animals
- After handling refuse or waste materials
- After handling cleaning chemicals
- After changing a baby's soiled clothes/diapers
- After touching the garbage bin
- After handling pesticides, insecticides and other chemicals

Source: FAO, 2009

5.2 Food safety and hygiene

Contamination of food stuffs can occur through:

- inappropriate food handling at different stages throughout the food chain
- poor hygienic conditions of the places where food is placed, prepared and/or stored
- intentional or non-intentional mixing of food with other foods or non-food substances that are unhygienic (also known as food adulteration)
- general poor environmental hygiene
- when food is put together with other foods that have already undergone spoilage

5.3 How to ensure food is safe

Aim:

- Food is protected from contamination by harmful bacteria, poison and other foreign bodies
- Food is prevented from having any bacteria present multiplying to an extent which would result in the illness of consumers or the early spoilage of the food
- For some foods: thoroughly cooked to destroy any harmful bacteria present
- Food is discarded when spoilt and/or contaminated

Tips for safe food handling: personal hygiene

- Wash hands with soap and water before starting to prepare food
- Avoid wiping your hands on your clothing as this can easily transfer microbes and bacteria
- Dry hands with a clean towel
- Keep hair covered or pulled back
- Keep finger nails short and clean
- Avoid coughing or sneezing over food
- Cover all cuts or wounds with waterproof dressing

5.4 Tips for safe food handling: food hygiene

- Use paper towels to clean up during food preparation and serving
- Sun or air dry the dishes on a rack
- Wash fruits and vegetables thoroughly before eating them
- Keep raw and cooked food separated
- Do not keep food for long after cooking before serving
- Cool and cover all left over food
- Prepare and cook only as much food as you intend to use.
- Do not taste foods with any utensil used either to mix or stir food
- Serve food in clean utensils only

- When consuming leftover food, heat it thoroughly to ensure all bacteria are destroyed
- use clean water from a safe source

5.5 Environmental hygiene

This means keeping the environment where we live clean and free of contaminants or carriers of contaminants. To maintain environmental hygiene, households and communities should


Source: FAO, 2009

- Have and utilize a clean latrine or toilet
- Dispose of waste in a safe manner
- Keep the home surroundings clear of bush thickets
- Drain all stagnant water points to avoid breeding of animals
- Avoid sharing water sources with livestock
- Avoid drinking untreated water or water from unprotected sources
- Keep animal faeces away from the house, paths, wells, streams and children's play areas.
- Dispose household refuse safely, e.g. burning, burying, recycling, composting, etc.

5.6 How to prevent nutrient losses during food preparation

- When purchasing vegetables and fruits, choose the freshest, unbruised locally ones and use them raw whenever possible
- Avoid physical damage during picking and transporting, washing
- Do not cut into very small pieces, as this leads to more nutrient loss
- Do not soak vegetables in water: most water soluble vitamins will be lost
- Boil roots and tubers with skin and peel after cooking. If possible consume with the skin
- Use of baking soda destroys some vitamins (thiamine and vitamin C)
- Prepare fresh vegetables and fruits just before serving
- When peeling fruits and vegetables, remove as minimum skin as possible

- Cut vegetables after washing and not vice versa
- Use as little water as possible when cooking and having it boiling before adding vegetables; more preferably, steam vegetables instead of boiling
- Cover the pan during cooking
- Avoid overcooking vegetables
- Cook over low heat as opposed to high heat, which destroys nutrients
- Save cooking liquid for later use (for example in soups, stews, and gravies)
- Store fresh vegetables and most fruits in a cool, dark place, away from direct sun.

6 Food Poisoning

Food poisoning: Is an acute intestinal disease acquired by the consumption of contaminated food or drinks.

Toxic agents include:

- microorganisms that occur naturally in humans, animals and/or the environment
- parasites (eg intestinal worms)
- contaminants, adulterants and poisoning agents
- naturally occurring toxins in food
- agro-chemical and veterinary drug residues
- persistent organic pollutants that accumulate in soil, plants, animals and the human body
- heavy metals and various allergens

6.1 Who is at risk of food poisoning?

While everyone can get food poisoning, the following groups are at a higher risk

- Children: their immunity is generally weaker
- Women: they handle food more than men
- The sick: their immunity is lower
- Those living in urban slums: hygiene and sanitation levels are generally low

How to identify symptoms of food-borne illnesses

The following symptoms may occur and may last from 1 to 7 days

- abdominal cramps
- watery or bloody diarrhea
- vomiting
- loss of appetite
- mild fever
- weakness
- nausea
- headache
- dizziness

6.2 How to prevent food poisoning at home

- Wash hands with soap and water before handling food
- Ensure children wash their hands before eating
- Ensure caregivers wash their hands before feeding children
- Ensure caregivers wash hands after changing a baby's soiled clothes
- Ensure food is well stored
- Wash worktops with water and soap before and after preparing food.
- Take care not to handle uncooked meat, including poultry, fish together with or on the same surfaces/chopping boards with cooked meat
- Keep kitchen dish clothes clean; dry them thoroughly, preferably in the sun, before using again
- Keep raw meat away from ready to eat foods such as salads, bread, fruit
- Cook food thoroughly

6.3 What to do in case of food poisoning

In case of food poisoning, medical attention should be sought. In addition, the following is recommended:

- In case of nausea or vomiting, avoid solid food and instead drink plenty of fluids and cereal gruels/porridges
- Take small, frequent sips of clear liquids, including water to avoid dehydration
- Avoid alcoholic and caffeinated drinks
- Take Oral Rehydration Solution if available[2].
- When the person is able to take fluids well and the nausea and vomiting stop, one is allowed to eat, starting with cereals foods

2 If not available, you can make some at home: Mix 1 litre of clean boiled/treated water with 6 level table spoonful of sugar, half level tablespoon of salt, and stir until sugar and salt dissolve.

7 Nutrition Through the Life Cycle

Good nutrition is important at every stage of life – from pregnancy, to pregnancy, infancy, childhood (young and older), adolescence, adulthood, old age, and for the sick. Good nutrition helps to ensure the best possible start in life for children's bodies and brains, and is a prerequisite for thriving communities and countries. Ensuring a diet which contains the right calories, protein, carbohydrates, vitamins or minerals, is consumed to meet the needs at every life is important.

7.1 Feeding pregnant and lactating women

A pregnant or lactating woman has additional nutrient requirements, both for herself and for the foetus. A pregnant or lactating woman should therefore:

- Eat three nutritious meals daily
- Eat an extra healthy snack at the beginning of pregnancy building up to an extra small meal in the last three months. It is particularly important to eat well during the last trimester when babies bodies and brains are developing fast
- Have diets rich in protein as well as fruit and vegetables
- Eat foods from 4 main food groups at each meal
- Drink plenty of clean safe water
- Limit foods that are high in fats and sugar
- Increase intake of iron rich foods. Like green leafy vegetables, liver, meats and foods rich in vitamin C to increase availability of iron.
- Use salt sparingly; but must be iodised salt. Iodine is necessary for the children's brain development.
- Choose and eat fortified food – such as flour included blended flour, oil and sugar
- Take the recommended micronutrient supplements such as folate and iron;
- Avoid drinking alcohol while pregnant because it is damaging to the foetus, and may leads to fetal alcohol syndrome which cause irreversible brain damage and growth problems.
- Some pregnant women eat less than normal in an effort to have smaller babies and easier delivery. This puts mothers at risk of undernutrition and labor complications, and puts babies at risk of low birth weight.
- Encourage mother to always deliver in hospital. Mothers should

also know and plan for their expected date of delivery.

- Reduce workload; heavy workload means many women have too little time and energy to adequately care for children. Heavy workload can cause undernutrition if energy used is more than energy provided through food.
- Frequent pregnancies drain women's nutrient stores and many children means heavy work-loads and sometimes less food for everyone. Advice couples to have at least 2-3 years between pregnancies.
- Attend Ante Natal and Post Natal Clinics
- Sleep under an insecticide treated mosquito net

Importance of micronutrient supplements for pregnant women: prevent anaemia, birth defects and pre-term deliveries; improve breastmilk quality and nutrient stores of infants.

7.2 Recommendations for feeding infants 0-6 months

Children 0-6 months should be exclusively breastfed. No other food or drink should be given except for medicines as recommended by a trained health care professional. Figure 9 shows a breastfeeding mother. While Table 4 shows the benefits of breast milk and breastfeeding both for the infant and the mother.

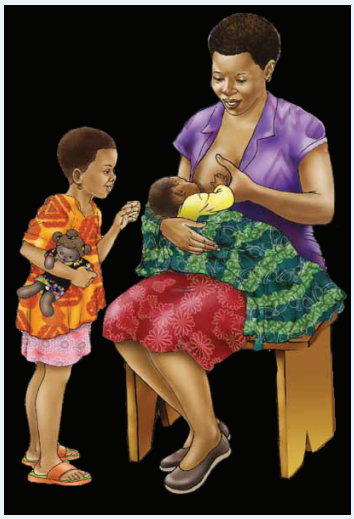


Figure 9: Breast feeding mother

- Infants should be initiated to breastfeeding within an hour after delivery.
- Breastmilk is the perfect food for babies. It has everything that a baby needs to grow and develop for the first 6 months.
- Ensure the child gets all the vaccinations for this age

Table 4: Health benefits of breastfeeding and breastmilk

For infant	**For mother**
• Contains white blood cells, and a number of anti-infective factors • Contains antibodies • Is readily available • Has the right composition and amount of nutrients for the human baby. • Prevents a variety of infections. • Protects against some chronic disease such as Type 1 and 2 diabetes and obesity. • Reduced risk of contamination • Reduced risk of allergic reactions • Promotes bonding between mother and child. • Lowers risk of sudden death syndrome • Encourages growth of healthy bacteria in the GIT • May improve intelligence • Decreased frequency of infections • Is easier to digest than formula milk (which is made from cow's milk) • Is sterile and of right temperature.	• Contracts the uterus • Delays ovulation as long as suckling is vigorous and consistent and therefore lengthens birth intervals (help delay next pregnancy) • Conserves iron stores (amenorrhea) • Protects bone density • Saves money and It costs less than artificial feeding • Convenience: no preparation required • Helps a mother and baby to bond – that is, to develop a close, loving relationship • Helps a baby's development • Protects a mother's health (it helps the uterus to return to its previous size, thus reducing bleeding; may help to prevent anaemia; reduces risk of breast and ovarian cancer.
Disadvantages of artificial feeding	

- Increased risk and incidence of diarrhoea and persistent diarrhea
- Interferes with bonding
- More frequent respiratory infections
- Higher risk of malnutrition, especially Vitamin A deficiency
- Increased risk of allergy and milk intolerance
- Increased risk of some chronic diseases later in life
- Increased risk of obesity
- Lower scores on intelligence tests
- Mother may become pregnant sooner

7.3 Choosing and preparing a nutritious meal for a young child below five years

At the age of six months, breast milk alone is no longer sufficient to meet the nutritional needs of the child. Other foods that are rich in nutrient and energy should therefore be introduced. Table 5 shows the recommendations for feeding children based on age. The following are the general recommendations:

- Continue breastfeeding upto 2 years
- Breastfeed the child more during illness, and give extra food after illness
- 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.
- At 6 months, introduce a staple food (porridge made from maize, sorghum, millet; pureed banana or potato)
- Do not mix more than two cereals when making porridge
- Feed children with a spoon, cup or clean fingers- never a bottle
- The food should be soft and not flow over the spoon
- Food should be served in clean disinfected utensils
- Introduce foods from other food groups at seven months; ensure the child gets the actual food and not just the soup
- Separate the child's bowl from the mother's and other children

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 hot, sugary, spicy or salty.
- The food should not contain bones or hard pieces that might choke the child.
- Give clean and safe water from a clean cup. Do not give tea or coffee or drinks made with sugar.

Table 5: Feeding recommendations based on age

Age (months)	No of meals and snacks	Amount per meal	Options for modifications
6	2 meals per day Continue breastfeeding on demand	During the first two weeks, 2 tablespoons per meal During the 3rd and 4th week, 3 tablespoons per meal	Mashing
7-8	3 meals Continue breastfeeding	1/2 cup per meal	Mashing, pounding, grating, shredding, grinding, mincing
9-11	3 meals 1 snack Continue breastfeeding	3/4 cup per meal	Mashing, mincing, grating, shredding, slicing, dicing; Finger foods such as fruits (banana, mango)
12-24 months	3 meals 2 snacks Continue breastfeeding	1 cup per meal	Finger foods, dicing, slicing, mincing, whole foods

Examples of modification for different foods for young children

- Pounding e.g. sardines (*omena*), edible insects
- Mashing e.g. Potatoes, orange fleshed sweet potatoes, pumpkin
- Blending
- Grating e.g. carrots
- Slicing, dicing and mincing
- Grinding e.g. nuts.

7.4 Recommendations for feeding older children (late childhood)

Physical growth at this stage is slow and steady but a high rate of cognitive, social and emotional development. The children are also very active. The child is now able to feed themselves. This is stage is critical for promoting healthy eating behaviors, prevent micronutrient deficiencies and reduce risk of Non Communicable Diseases (NCDs). Meals should have a variety of foods from at least 4 groups every day, while ensuring snacks are healthy and avoiding sweetened commercial drinks and juices.

How to encourage older children to consume healthy foods

- Involve them in food preparation e.g. harvesting and cutting vegetables
- Involve them in meal selection
- Provide a variety of foods (cereal based foods, fruits, vegetables)
- Do not keep sugary soft drinks and junk food at home
- Pack a healthy snack for the child to take to school (e.g. milk, sliced mango, banana, melon, peanuts)
- Provide and encourage child to drink water when thirsty and not soft drinks.

7.5 Recommendations for feeding adolescents

Adolescence is characterized by rapid physically, emotionally, cognitive and hormonal growth as well as psychosocial development. Protein and energy requirements are very high, as are those of vitamins that support tissue growth, cell and bone formation (Vitamins B12, B1, B2, B3, B6, D, A, C, E and Folic acid)

Vital minerals including calcium, magnesium and zinc are important for bone formation growth and development. 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.

To ensure adequate nutrient intake, the following is recommended:

- Consumption of at least three nutritious meals in a day and two healthy snacks
- Variety of foods from at least four food groups, with extra

servings of dairy products, green leafy vegetables and other calcium-rich foods and beverages
- Avoiding sticky, energy dense (sugar-rich and high fat) and salty snacks to reduce risk of excess weight gain, tooth decay, diabetes and cardiovascular diseases
- girls should eat iron rich foods due to menstruation, increased blood volume and muscle mass

Helping adolescents to make healthy food choices

- Avail healthy snacks
- Allow a variety of healthy foods and snacks to choose from
- Make breakfast a priority
- Encourage and practice eating together
- Ensure adults around them also choose and consume healthy food to serve as examples and role models

7.6 Recommendations for feeding adult family members

Adults should eat three nutritious meals daily chosen from at least 4 of the main food groups. The following should also be considered:

- Limiting foods that are high in fats, sugars and salt
- Drinking plenty of safe clean water (at least 8 glasses per day)
- Engaging in physical activity to stay healthy and prevent obesity
- Minimising consumption of alcohol and cigarettes

7.7 Recommendations for feeding the elderly

Older people usually are less physically active than younger adults and also tend to eat less food. Although energy requirement (and iron requirement for women) decreases with age, needs for other nutrients do not change. They may have better diets if they:

- Eat three nutritious meals daily chosen from at least 4 of the main food groups
- Eat small, frequent and healthy meals
- Eat plenty of fruits and vegetables.
- Eat soft foods if teeth are missing or gums are sore
- Drink plenty of fluids and safe drinking water
- Are physical activity active
- Increase intake of foods rich in Calcium and Vitamin D for bone

strength
- Avoid foods high in fat, sugar and salt
- Maintain a healthy weight
- Limit alcohol intake

Assisting elderly persons to eat healthy foods

- Allow a variety of foods to choose from
- Make the meals as nutrient dense as possible because they consume small amounts of food
- Modify the food to suits dental challenges: e.g. mash, pound, grate the food to improve palatability
- Provide soft foods
- Provide small frequent meals
- Provide healthy snacks
- Make fruits and vegetables easy to eat: e.g. boiled carrots
- Do not force them to eat
- Choose whole grains as opposed to refined grains
- Ensure they take any medication as prescribed

7.8 Recommendations for feeding the sick at home

Because of infection, most sick people eat less and absorb fewer nutrients yet have increased nutrient needs. The immune system is also weak as less energy and nutrients are available to produce antibodies. This can lead to undernutrition.

How to feed sick people

- Give frequent small meals. Most sick people are not hungry and can eat only a little at a time
- Give meals that are easy to eat and that the person likes
- Give frequent drinks, especially if there is diarrhea, vomiting or fever. Drinks may include water, fruit juice, milk, milky tea, soup or thin gruel
- Breastfeed child more often
- Offer a variety of foods, especially animal foods such as meats, fish, liver, milk and eggs
- Take extra care with food hygiene.
- Give extra vitamin A rich foods to build immunity

8 Strategies to Improve Nutrition Status In ASAL Areas

8.1 Characteristics of common diets of communities in ASAL

- The diet of most families in rural Kenya consists of predominantly maize and beans.
- Food availability is seasonal, with more food available during the wet months and less during the prolonged dry period
- Cereal crops grown include millet and sorghum.
- Dietary diversity is higher in households with a higher agricultural diversity, and is associated with a 50% increase in dietary diversity of school children (Ekesa *et al.,* 2008).
- These families are more likely to have access to vegetables, fruits, as well as root crops such as cassava and sweet potatoes.
- Diets are low in vegetables and fruits, especially during the dry season
- Milk availability is also seasonal, with increased milk availability and consumption during the wet season

8.2 Current health and nutrition interventions in arid areas

8.2.1 Health interventions

The ministry of health in in collaboration with partners is implementing high impact nutrition interventions (HINIs) which include

- Exclusive Breastfeeding
- Appropriate complementary feeding with continued breastfeeding
- Handwashing
- Iron Folate Supplementation
- Vitamin A Supplementation
- Deworming
- Multiple Micronutrient Supplementation
- Salt Iodization
- Zinc Supplements for diarrhea management
- Fortification of local Staples
- Prevention and Treatment of Malnutrition (Moderate and Severe Acute Forms)

8.2.2 Dietary Diversification and Modification using locally available foods in ASAL areas

Dietary diversification is an approach that aims to enhance the availability, access, and utilization of foods with a high content and bioavailability of micronutrients throughout the year. Diets of most households in rural areas lack adequate amounts of foods rich in nutrients to meet the requirements of family members for a healthy and productive life. Most rural diets are dominated by staple cereals, especially maize. Production of drought resistant cereals such as sorghum and millets is covered in Chapter 8. Options for diversifying diets in ASAL areas include:

Benefits of growing a variety of own food

- Improved soil health
- Reduced pest pressures
- Increased yield through beneficial intercropping or rotations
- Increased and varied income sources for the family
- Varied time of income from different harvests maturing at different times
- Reduced levels of risk: not all resources are invested in one crop that may fail
- A family that grows their own food is more likely to prepare and consume meals with a variety of foods from different food groups.
- Better control of production practices, especially pesticide, herbicide and fertilizer use, some of which affect food safety
- Food harvested directly from own farm has better flavor and taste

8.3 Opportunities for improving food and nutrition security at the household level

Communities can be trained on the various options for diversifying production and utilization of different foods using the Basic community level participatory approach (Annex C-2 FFA Manual). The following sections describe different options for improving availability and utilization of foods from different food groups at the household and community level. This section is supported by the technical manual as follows:

- Chapters 2-4: water harvesting technologies
- Chapters 5-8: Food (animal and crop) production technologies

- Chapter 9: Nutrition
- Chapters 10 and 11: Gender, youth and extension services

8.3.1 Cereals

1. Increased production of cereals

Households in ASAL areas should be encouraged to grow drought escaping cereals such as millets and sorghum. Crop production is described in Chapter 5 and 8.

2. Diversifying the preparation methods for cereals: example sorghum

Sorghum is a nutritious food with a high content of protein, vitamins, and minerals, such as iron, phosphorus and zinc (Proietti *et al.,* 2015). The consumption of sorghum at household level can be improved thorough diversification of sorghum based foods at the household (MOA, 2007). Examples of foods prepared from sorghum are shown in Figure 10. Other options for diversification include:

- Boiled sorghum: The cereal can be boiled and consumed just like rice
- Porridge and *ugali*
- Fermented porridge and *ugali*
- Sorghum chapatti
- Sorghum green grammes *pilau*
- Sorghum stew
- Sorghum cake
- Sorghum bread
- Fruits and vegetables.

Photos by WFP, Isiolo
Sorghum and beans

Sorghum porridge

Figure 10: Nutritious soghum based foods

Baking a sorghum cake using a charcoal jiko or gas cooker

Households in rural areas usually do not have access to electricity. It is however possible to diversity diets through baking using the innovative method described below and shown in Figure 11.

Ingredients

- 3 cups sorghum white flour
- 1 cup Wheat flour
- 4 tablespoons sugar
- 4 tablespoons margarine
- 3 Eggs
- 3 cups milk or water
- 1/2 teaspoon baking powder
- 1 pinch salt

Procedure

- In a clean *sufuria*, mix the margarine and sugar
- Add beaten eggs in the mix
- Fold in sifted flour and add remaining ingredients
- Add milk (or water) to make soft paste after stirring with the table spoon.
- Place mixture in a well greased *sufuria*, baking tin or tray
- Place a rack or stand or three clean stones in a bigger heavy, clean, dry and EMPTY, *sufuria*
- Cover the pot with a tight lid or another big *sufuria* and place on the fire for 5 minutes. (This is to pre-heat the pot and create an oven-like environment)
- Open the pot very carefully since it is very hot
- Place the cake pan gently on the rack/stand/stones
- Cover the pot once more and allow the cake start baking
- Keep the heat on high for 5 minutes, then lower it to medium
- Bake for another 20 minutes
- Open the top *sufuria* and lift the inner *sufuria* very carefully because it is very hot
- Place the cake on a plate and allow to cool

Photos by Lets cook Kenyan meals group

Figure 11: Baking a sorghum cake without an oven

3. Preservation of cereals through fermentation, germination or soaking. Fermentation of cereals (e.g. millet, sorghum) has been proposed as a mechanism to improve the nutrient quality of staple foods especially complementary foods (Gibson and Holtz, 2007). Some of the advantages of consuming fermented cereals foods are:
   - porridge is easier to digest
   - fermented foods have a unique flavor (taste better)
   - The minerals are easier to absorb
   - Fermented porridge is high in energy and nutrients
   - Fermented sorghum flour does not get spoiled fast (has a longer shelf life)
   - Foods made from cereals that have undergone processing such as fermentation, germination and soaking are highly nutritious. grains, making it healthier

8.3.2 Meat, fish, poultry, edible insects and animal protein products

The production and management of livestock is discussed in Chapter 7. Livestock products are rich in proteins and micronutrients. Inclusion of livestock products into family diets helps reduce malnutrition, especially among women and children. Options for diversifying diets using livestock and livestock products:

- Encourage households to keep small animals and birds to increase the availability of protein rich foods at the household
- Encourage consumption of poultry, meat, eggs and edible insects in households. Only surplus should be sold

- Encourage families to purchase healthy and nutritious foods after selling of livestock and livestock products
- Encourage consumption of eggs by children to meet their additional requirements for growth
- Preserve meat by using any of the methods described chapter 9. Examples of preserved meat products are *ng'atoosa*[3] and *Nyirnyir*[4].

Options for cooking eggs at home

Examples egg-based foods are egg curry and scrambled egg (Figure 12)

1. Egg curry

Ingredients

- 4 Eggs (hard boiled)
- 1 onion
- 1/2 tomato (pureed)
- 3-4 flakes of garlic
- 1/2-inch piece of ginger
- 2 tbsp chopped coriander leaves salt to taste
- 3/4th tsp turmeric powder
- 1/2 tsp coriander (*dhania*) powder or leaves
- 2-3 tbsp vegetable oil / ghee
- 1 cup green peas (or pigeon peas) if available

Procedure

- Remove the shell of boiled eggs & keep aside
- Using a mortar and pestle, pound onion, garlic, ginger into a paste
- Heat oil in a *sufuria* and add the onion-garlic-ginger paste and fry till golden brown
- Add all the spices and fry for a minute then add tomato puree. Fry till it starts leaving oil
- Add a cup of water and cook till it dries up.
- Add the green peas (which ever using) and boiled eggs.
- Add 1 cup of water and bring to boil and reduce the flame.
- Allow to simmer for 10 minutes.
- Garnish egg curry with coriander leaves and serve hot
- Can be served with *ugali*, rice, boiled or roasted potatoes

3 Traditionally dried fish among the Turkana
4 Traditionally dried meat among the Pokot

Photos by Lets cook Kenyan meals group
Egg curry

Scrambled egg

Figure 12: Egg curry and scrambled egg

Scrambled egg

Figure 8-3 shows a poached egg.

Ingredients

- 1 whole egg
- Salt (a pinch)
- 1tbsp whole milk
- ½ tsp oil

Procedure

- Place it on the fire over low heat
- Add the oil on the pan
- Whisk (mix together using a whisk or folk) the eggs, salt and milk until the mixture is light and foamy.
- Pour the mixture on the pan
- Scramble the eggs by stirring slowly with a small light cooking spoon.
- As soon as curds (big soft lumps) of eggs begin to form, reduce the heat to low and start folding the curds on top of each other while gently shaking the pan with the other hand.
- Allow to cook until no more liquidous egg is running around the pan and remove from the fire
- Can be eaten separately or accompanied by rice, bread, *ugali*, and any other soft meal, especially for children

Poached egg (Figure 8-4)

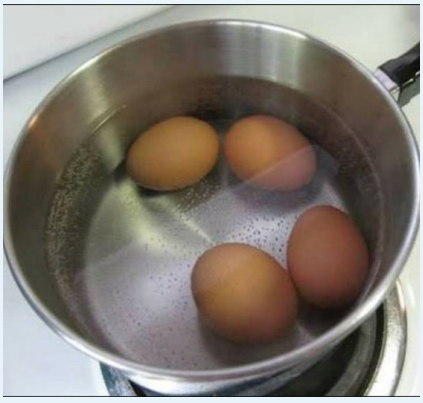
- Put water into a *sufuria* and bring to boil
- Break one fresh egg into a cup
- Carefully drop the egg into the center of the *sufuria*

- Let it poach then turn off the heat, cover the *sufuria* with a lid
- Allow to rest for about five minutes without opening the *sufuria*
- Remove the egg carefully and serve immediately.
- For children: can be consumed separately or as part of any meal

Boiled egg (Figure 13)

- Put water into a *sufuria* and
- Bring water to boil and then lower the heat
- Add the fresh eggs to the boiling water and cook for 7 minutes to allow thorough cooking

Photos by Lets cook Kenyan meals group
Poached egg



Eggs boiling in a pan

Figure 13: Poached egg and boiled eggs

8.3.3 Milk and milk products

Milk and milk products are high in proteins, vitamins (especially the B vitamins) and minerals. Families can diversify their diets through:

- Ensuring small children consume milk and milk products every day
- Give priority to children whenever milk is produced at household level: only surplus should be sold
- Preserve milk by processing. Examples of processed milk products are yoghurt fermented products such as yoghurt, *Mursik*[5], *soyo*[6], *Edodo*[7]

5 Traditionally fermented milk among the Kalenjin
6 Traditionally fermented milk among the Pokot
7 Traditionally fermented milk among the Turkana

Making yoghurt at home

Requirements

- A litre of fresh milk
- 300ml yoghurt (to act as culture)
- 1-2 tablespoons of sugar
- Thermos Flask (1 litre)
- Two clean *sufurias*
- Clean spoons

Procedure

- Sieve the milk using a kitchen sieve
- Boil milk while constantly swirling. (Use medium/low heat and make sure the milk doesn't boil to a froth).
- After boiling, place milk in a larger *sufuria*/bowl with cold water or water with ice.
- Keep swirling until it cools to room temperature (test this by scooping with a spoon and pouring it on the back of your hand; it should be warm enough not to cause pain).
- Remove the milk and set aside
- Take a little bit of the milk and add to the ready yoghurt and mix well.
- Pour the contents into the rest of the milk and mix thoroughly and gently
- Add 1-2 sugar and mix well
- Put this mixture in a flask and let it stand for at least 8-12 hrs (i.e. overnight).
- After your 8-12hrs,open the flask and shake well
- Empty its contents into a clean container
- Consume for upto 5-10 days depending on prevailing temperatures (store in a cool place).

8.3.4 Legumes

Legumes and pulses provide a good source of proteins, especially for rural households for whom animal protein foods maybe too expensive. They also contribute to household food security. Households should be encouraged to sell surplus pulses only after adequate amounts are kept aside for the household consumption. Examples: all varieties of beans, chickpeas, cowpeas, pigeon peas, green and dried peas, lentils and Bambara groundnuts.

Preparing legumes

Procedure

- Sort the grains to remove foreign matter and impurities (e.g. chaff, dirt, small stones)
- Place pulses in a large strainer or colander and you should run your fingers through them to remove any remaining foreign substances
- Repeat the process again under a running water
- Transfer into a large pot
- Add water until the grains are fully covered: leave room for expansion of the grain during soaking
- Allow grain to soaking for not more than 12 hours (after 24 hours, seeds start to germinate)
- Rinse until the water is clear
- Place rinsed pulses in a pot and add plenty of water
- Heat the water till boiling
- Reduce the fire and cook on low heat until soft

8.3.5 Fruits and vegetables

1. Increasing fruit and vegetable production

Fruits and vegetables can be grown using rain-fed agriculture or irrigated agriculture (Chapter 8) using the water harvesting technologies described in chapters 3, 4 and 5.Examples of vegetables than can be grown in a vegetable garden include kales, spinach, cowpeas, African night shade (*managu*) and pigweed (*mchicha*). Figure 14 shows mangoes and spices growing in Makueni county, a semi-arid county.

Households should be encouraged:

- Have a kitchen garden in every homestead
- To plant of fruit trees in the farm, kitchen garden or around the homestead for shade
- To plant vegetables in kitchen gardens and or in the family farm
- Include locally available vegetables in all family meals
- Only sell vegetables and fruits after having enough for household consumption

Photos by Bancy Mati
Mango production in Makueni

Coriander nursery

Figure 14: Mango and coriander growing in Makueni

2. Consume different types of vegetables

Nutrient content of different vegetables varies. Green leafy vegetables (e.g. kales, spinach and most traditional vegetables) and yellow/orange (e.g. carrots, beetroot) vegetables are rich in Vitamin A as well as other nutrients. Figure 15 shows an example of a sliced orange and a staple food (*githeri*) enriched with green vegetables. To increase fruit and vegetable consumption and preserve nutrients during vegetable preparation, households should be encouraged to:

- Consume upto four-five servings of fruits and vegetables every day
- Include vegetables in every meal
- Wash vegetables before cutting to preserve nutrients
- Cook vegetables for short periods to preserve nutrients
- Cook vegetables in minimum or no water
- Not to discard cooking water from vegetables because it is full of nutrients
- Use the cooking water (if any) to cook or add flavor to other dishes
- Cook fresh vegetables because they have more nutrients than those that are not fresh
- Choose clean, disease free and unbruised fruits and vegetables
- Ensure children consume fruits and vegetables in every meal
- Provide a variety of fruits as snacks to encourage household members to consume, especially children

Photos by Lets Cook Kenyan Meals Group

Slices of orange

Plate of *githeri* (Maize and beans) mixed with green vegetables

Figure 15: Fruits and vegetable ready for consumption

3. Processing and preservation of fruits and vegetables

Fruits and vegetables are highly perishable seasonal foods. Production and consumption are high during the harvest season but low during the off-season, which may contribute to undernutrition, especially micronutrient deficiencies. Processing and preservation fruits and vegetables helps to increase availability, access and consumption during the off season, and therefore maintain stability in consumption and contribute to dietary diversity. Drying of fruits and vegetables is described on section 5.5.

9 References

Ekesa, B. N., M. K. Walingo, and M. O. Onyango, 2008. Role of agricultural biodiversity on dietary intake and nutritional status of preschool children in Matungu division, Western Kenya. *Afr. J. Food Sci. 2:026–032.*

FAO, 2009. Nutrition Handbook for the family. FAO

Gibson and Holtz, 2007: Traditional food-processing and preparation practices to enhance the bioavailability of micronutrients in plant-based diets. *J Nutr. 2007 Apr;137(4):1097-100*.

Government of Kenya, 2009. National Guidelines for Integrated Management of Acute Malnutrition

Ministry of Agriculture (2007). Recipe Manual for Traditional and Underutilized Foods. Government of Kenya.

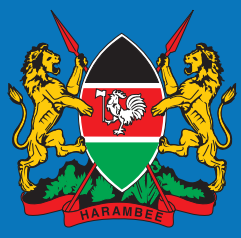
MOA (2009). Strategic Plan

Petersons and Bari (2015). Nutrition training manual developed for tea communities in Uganda. Uganda Action for Nutrition. The Nutrition Society of Uganda.

Proietti I, Frazzoli C, and Mantovani A, 2015. Exploiting Nutritional Value of Staple Foods in the World's Semi-Arid Areas: Risks, Benefits, Challenges and Opportunities of Sorghum. *Healthcare* 2015, *3*, 172-193

WFP, 2009. Annex C-2 FFA Manual. Basic Community Level Participatory approach.


WFP
World Food
Programme


HARAMBEE
REPUBLIC OF KENYA