



Ministry of Agriculture, Irrigation and Water Development
Department of Agricultural Extension Services (DAES)

Nutrition Handbook for Farmer Field Schools

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Foreword

Farmer Field Schools are one of the approaches that the Ministry of Agriculture, Irrigation and Water Development uses to reach farmers with various extension messages. It is a group training approach that focuses on adult non-formal education through hands-on field discovery learning on a subject matter that is related to their experiences. In the past, farmer field schools focused on agricultural production without considering issues of nutrition, yet food production cannot be complete if human nutrition is silent.

This manual helps readers recognise how crop management is similar to raising a child. Most farmers know that a healthy crop is dependent on fertile soils and timely operations. However, there is sometimes a disconnect to the similarity of needs for proper nutrition and care practices for healthy people and good care practices for healthy fields and environment. Optimal growth and development of human beings is achieved when each new life starts with healthy parents, appropriate feeding, and care for young children.

It must be appreciated that humans are what they are because of what they eat. Similarly, the quality and quantity of a crop depends foremost on the nutrients in the soil.

This manual has been developed to enable users to understand the fundamental similarity between production of crops and the care needed for human growth and development. Secondly, knowledge in food production cannot be complete if it is not linked to food requirements for human growth and development. The manual helps readers understand what is needed and how to put the information into practice to create balanced, nutritious meals and snacks.

Therefore, it is my sincere hope that this handbook will contribute to improved adoption of sustainable diversified food production practices and diets.

Mrs Erica Maganga

Secretary for Agriculture, Irrigation and Water Development

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Preface

Agriculture is the most important sector of Malawi's economy, engaging eight out of ten people, with the majority being smallholder farmers. Agriculture provides Malawi with almost all its foreign exchange with 8 out of every 10 US dollars coming from agriculture. Therefore, if you are reading this handbook, you are likely to be a farmer and VERY important to Malawi.

A Farmer Field School (FFS) is a group of 15-30 participants and a facilitator. They draw up a learning contract that binds both parties. The commitments include attendance, materials provision, management of resources, use of proceeds, and other key issues. Farmers contribute most of the inputs including labor while the facilitator contributes time.

Because what we eat comes from what we produce in agriculture, FFSs are an ideal learning forum to address issues of nutrition benefits farmers greatly, since farmer field school approaches help farmers become experts in managing their farms as well as their families – resulting in better yields, increased profit, improved nutritional status, and a healthy, productive population.

This handbook is written so that participating farmers and their families can equitably address food production and nutrition issues for good health. FFS participants are encouraged to share what they learn with farmers in their community, schools and other community groups so their whole community benefits. Persons working in extension support services such as Agricultural Extension Development Officers (AEDOs), Health Surveillance Assistants (HSAs), and other service areas (Community Development, Forestry, Environmental Health, Teacher Development Centres, schools, etc.) can use the handbook to support farming families to diversify food production and utilization for better nutrition.

It is our hope that this book is widely used and shared, that people are called to question their current ways of thinking, and that action is taken to help our families and our soils become as healthy and productive as possible.

Stella Kankwamba

Director of Agricultural Extension Services



Section 1:

**Integrating nutrition into
farmer field schools**

A farmer field school that will address production issues in relation to nutrition needs to start with formulation of a seasonal food availability calendar. This calendar is community specific and shows which foods are in short supply or not available in each season. This will determine which crops need to be grown and what production/management/processing/storage gaps need to be addressed in the farmer field school.

Steps in the establishment of farmer field school:

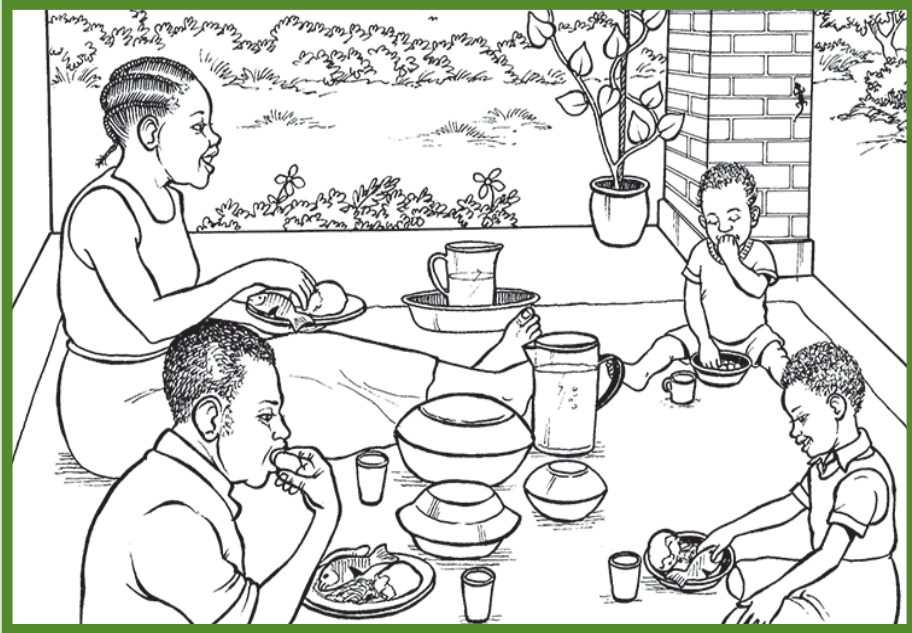
1. Conduct sensitization meetings with local leaders and farmers. Sensitize local leaders and farmers on the need to establish a farmer field school that addresses the linkage between agriculture and nutrition issues.
2. Form an interested group. The interest group should include the nutritionally vulnerable groups, for example youth and women.
3. Come up with a name for the school and norms for running the school.
4. Conduct a baseline survey to identify gaps on crop production and human development and nutrition. This should be done with the aim of developing a FFS that will be comparing crop production and human nutrition.
5. Analyze the data collected during the survey by segregating what crop production practices farmers follow against Good Agricultural Practices. Similarly analyze the nutrition data by segregating farmer practices against recommended nutrition practices.
6. Develop crop studies after prioritizing with the community. Link studies to nutrition conditions prevalent in the community.
7. Design plots/layout for studies. These should show farmers' practice versus recommended practices. Studies should be developed based around issues identified in the baseline survey; for example, nutrient management, variety studies, mixed cropping, pest management (IPM), time of planting, foods available or diet diversity. In the course of monitoring these studies, comparisons with human nutrition and development should be made through nutrition education and demonstrations. See the table on the next page for an example.

Study/Trial	Farmers' Practice	Recommended practice (Good Agricultural Practice)	Reasons for difference	Reasons for better practice
Foods available	Considering what staples (particularly maize) are available in their home	Considering ALL food groups available in the home using the Seasonal Food Calendar (see pages 20-21)	Lack of understanding of the need to produce and eat from all six food groups	Nutritional need for all food groups Better utilisation of available resources
Diet diversity	Eating too much staple and not enough from other food groups	Eating a balance of all six food groups daily	Lack of understanding nutrition needs or not having diverse foods available	Understanding nutrition, using and having the food groups available
Improving crop diversity	Planting maize only on a piece of land	Include and intercrop legumes between staple plants.	Have not seen the benefits of diversified crop production.	Increased number of food groups per unit area

8. Agree with the community on meeting sites, dates and duration for a day's meeting. Be mindful of routine village engagements such as market days and development activities.
9. Agree on the sources of funding of inputs, nutrition demonstration materials, as well as refreshments (where possible) during the meetings.
10. Design and implement visibility mechanism e.g radio, TV.
11. Conduct regular review meetings.
12. Conduct field days, food displays, and open days.
13. Conduct a graduation ceremony for school participants after a season-long school. Consider issuing certificates.

Integrating nutrition in the FFS agro-ecosystem analysis (AESA)

1. Conduct pre ballot box test to ascertain farmers' knowledge
 - Simple and objective questions-relevant to the training
 - Ten questions for a single crop are enough – include nutrition related questions
 - Allow 30-60 seconds per question depending on literacy level
2. Divide farmers into smaller groups of four to five to manage specific studies
3. Develop a schedule of activities for the next meeting day
4. Conduct agro-ecosystem analysis (AESA) in comparison with human development on weekly basis (see Appendix 1)
5. Conduct trainings and demonstrations on regular basis based on the outcome of pre-ballot box test
6. Conduct post ballot box test to establish knowledge gain as a result of Farmer Field School
7. Relate outcome of the studies with general human growth, development and nutrition



Section 2:

Food and nutrition issues and solutions

Maize production has increased significantly over the years to the point where it dominates agriculture and diets. Unfortunately, production of other foods such as legumes, nuts, fats, oilseeds, fruits, vegetables, and animals has received less attention.

These foods are often not available or accessible year round in the quantities needed by the body. Even in areas where these foods are available and accessible, people lack knowledge on the importance of including them in their diets.

The result is that meals are dominated by maize (*nsima*) with little relish (*ndiwo/dende*) as shown below:

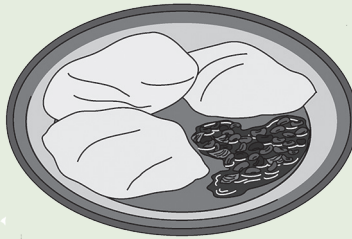
The current meal

One example. Similar problems worldwide.

- ❑ Few nutrients

- ❑ High risk of crop failure

- ❑ Environmental degradation



- ❑ Mono-culture

- ❑ High risk of food insecurity

- ❑ High input

- ❑ The current meal does not provide a variety of nutrients that the body needs. This can cause different forms of malnutrition such as: underweight; overweight /obesity); too short for age/stunting; slow to develop; or a variety of micronutrient deficiencies that affects blood formation, sight, energy, bone development, prevention of disease, or healing.
- ❑ This diet encourages monoculture and risk of food insecurity in case of adverse conditions in addition to being detrimental on the environment, which then needs high external input to be productive.

The better meal

One example. Similar solutions worldwide.

- ❑ Many nutrients
- ❑ Better chance of harvest
- ❑ Healthy environment



- ❑ Diverse agriculture
- ❑ Increased food security
- ❑ Fewer inputs

- ❑ The better meal is diverse. The foods change from meal to meal because of diversified production.
- ❑ This handbook shows that there are many foods to choose from for a more diverse diet in terms of both staple and other food groups (*ndiwo* and fruits).
- ❑ A diverse diet is better for the environment as well. It reduces the risk and increases resilience, ensuring food security. A healthy environment uses fewer inputs hence the need to care for and manage the natural resource base.

Nutrients

Nutrients are vital for life in plants and animals (including people). Different species at different stages of life have different nutrient needs. This section will look at general nutrient requirements and the similarity between plants' needs and people's needs.

Nutrition needs of plants & people

Different species. Similar needs.

Plants

Plants each have their own nutrient needs. Each needs a variety of nutrients.

Macronutrients:

- ❑ N = Nitrogen – similar to the human need for 'protein'

Micronutrients:

Minerals:

- ❑ P = Phosphorus
- ❑ K = Potassium
- ❑ Other key minerals are: Zinc, Manganese, Selenium and Iodine

Water

People

Humans need almost 50 nutrients to be healthy and productive.

Macronutrients:

- ❑ Proteins (people's nitrogen source)
- ❑ Fats
- ❑ Carbohydrates

Micronutrients:

Minerals:

- ❑ Phosphorous
- ❑ Potassium
- ❑ Other key minerals: Zinc, Iron, Manganese, Selenium and Iodine

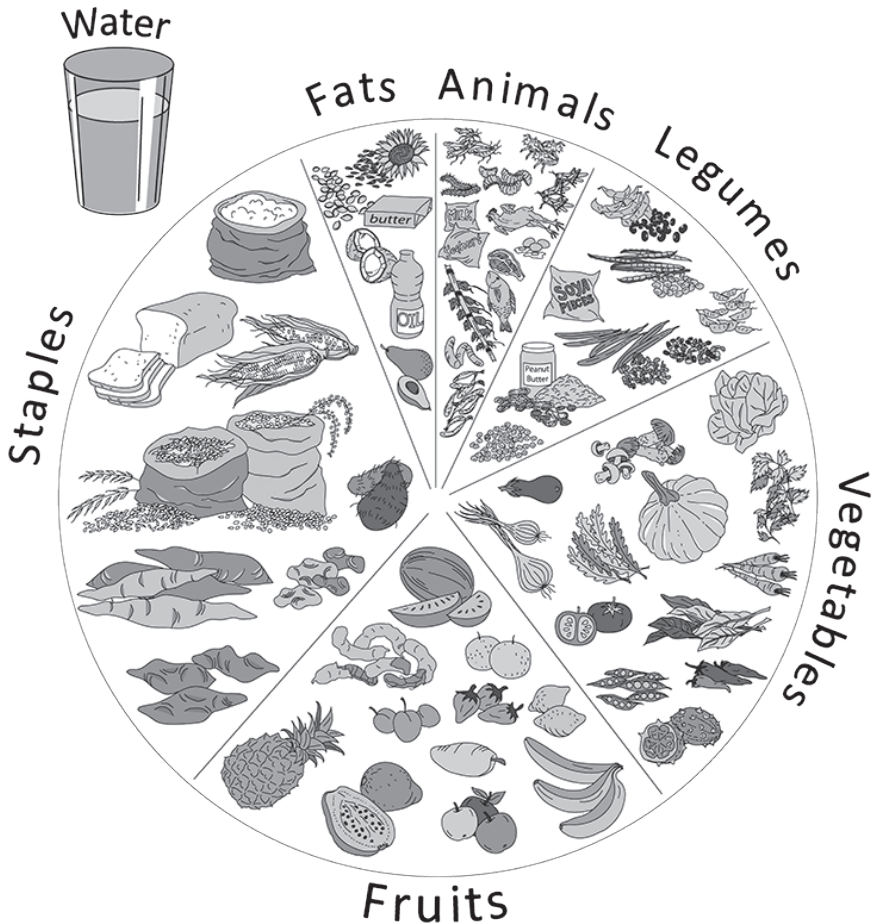
Vitamins:

- ❑ Vitamins A, B, C, D, E, K

Water

Food groups

Eating a wide variety of food allows humans to have all the nutrients they need to live healthy and active lives. As a guide to eating a variety of foods, nutritionists created the Food Groups.



Each country creates their own food groups based on their own situation. Malawi has six food groups. Each food group provides similar nutrients, but every food is unique, so eating a variety of foods from each food group helps provide a balanced diet. Adequate intake of water is also essential.

The proportion of the “pie” allocated to each food group in the food group illustration shows the proportion of each food group in an individual’s diet.

Not all food groups have to be eaten at one meal, but by the end of each day, all food groups should be consumed for a balanced diet.

A note on iodised salt:

- ❑ Iodine is very important for everyone, especially young children.
- ❑ In Malawi, much of the soil is poor in iodine so the crops that we grow also do not contain enough iodine.
- ❑ Iodine is volatile, meaning it can be lost easily if kept open. Store iodized salt in a tightly closed container away from light.
- ❑ Adding salt at the end of cooking retains iodine as well as other nutrients in the food. Add salt when the food is almost cooked.
- ❑ Look for the below fortification symbol on packages of salt.



Staples



Staples and agriculture

- ❑ Staples include cereals (maize, rice, millet, sorghum), root and tuber crops (cassava, sweet potatoes, Irish potatoes, yams), and starchy fruits (green bananas, plantains)
- ❑ Root crops often survive droughts better than cereal crops, which often die.

Staples and nutrition

- ❑ Staples are high in carbohydrates. They are an inexpensive source of energy for growing, working, learning and playing.
- ❑ There are many other nutrients that can come from the staples, depending on how they are processed. For example, whole grain maize flour (*mgaiwa*) has many more nutrients than white maize flour (*ufa woyera*). Similarly, brown breads have more nutrients than white breads.
- ❑ Germinated cereals (and legumes) are easier to digest and a better source of B-complex vitamins than ungerminated cereals. Encourage germination for making drinks (*thobwa*) and other foods

Fruits



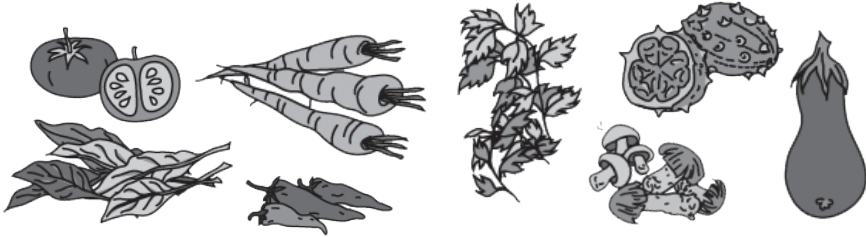
Fruits and agriculture

- ❑ Grow a variety of fruits, combining short-term exotic fruits such as bananas, papayas, guavas, oranges, and mulberries with long-term indigenous fruits such as *masau* and *masuku* which take many years to bear fruit, but produce for many years.
- ❑ Some fruits are ready in 3-5 months (melons, cape gooseberries, strawberries) while others take a year or more (papaya, bananas, mangoes, mulberries, *masuku*, *masau*, etc.)
- ❑ Plant fruit trees in as many places as you can because, in addition to providing nutrients, they help soak up standing water and protect soil. Target agricultural training centres, schools, offices, churches and other institutions for demonstrations.

Fruits and nutrition

- ❑ Fruits are good sources of vitamins and carbohydrate, they protect the body from illnesses and they also provide some energy
- ❑ Orange colour fruits are good sources of vitamin A
- ❑ Sour tasting 'tangy' fruits are high in Vitamin C
- ❑ Note: Encourage families to eat seasonal fruits every day, preferable more than one type of fruit every day. Home-grown seasonal fruits are cheaper than purchased ones.

Vegetables



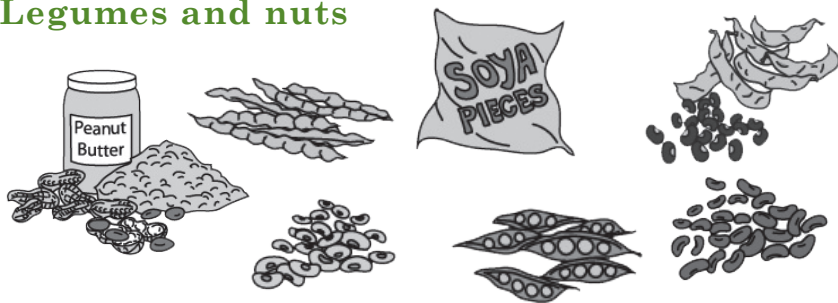
Vegetables and agriculture

- ❑ These include a variety of leafy vegetables (amaranthus, *luni*, rape), fungi (mushrooms), roots (turnips, carrots), bulbs (onions, garlic) and fruits (tomatoes, pumpkin).
- ❑ Vegetables can be grown in homestead gardens or as intercrops in fields and orchards.
- ❑ Indigenous vegetables are easy to grow, nutritious, and tolerant to local pests, diseases, and weather patterns. Farmers can produce their seeds themselves. Easy-to-grow indigenous vegetables include:
 - ❑ *Bonongwe* (Amaranthus)
 - ❑ *Luni* (Corchorus)
 - ❑ *Limanda* (Hibiscus)
 - ❑ *Chisoso* (Black jack)
 - ❑ *Kholowa* (Sweet potato leaves)
 - ❑ etc.

Vegetables and nutrition

- ❑ The foods in the Vegetable group mainly provide vitamins, minerals, fibre, and water.
- ❑ Green leafy and orange coloured vegetables are high in Vitamin A.
- ❑ Vegetables provide very little energy.
- ❑ Overcooking vegetables causes vitamins to be destroyed.
- ❑ Vitamin C improves the absorption of iron from vegetables and legumes. Encourage eating vitamin C rich foods such as baobab, tamarind, and lemons after a meal.
- ❑ Having a small amount of fat with meals of green leafy vegetables and yellow vegetables is necessary for the absorption of vitamin A.

Legumes and nuts



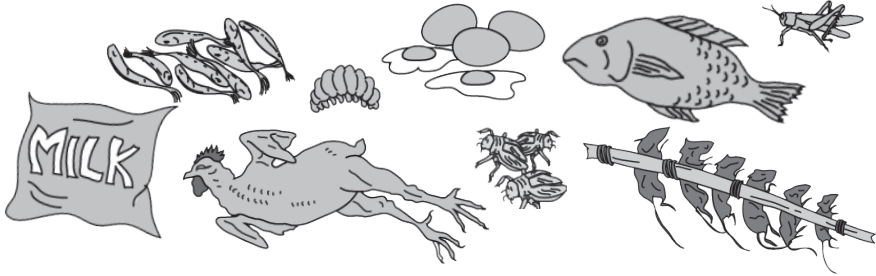
Legumes/Nuts and agriculture

- ❑ Grain legumes commonly grown in Malawi are common beans, soybeans, pigeon peas, groundnuts, chick peas, guar beans, grams, velvet beans, and field peas.
- ❑ Legumes can be planted as pure stands or interplanted with maize, cassava, sorghum or other suitable crops. This allows farmers to harvest two crops per season and improve the nutrient status of the soil.

Legumes/Nuts and nutrition

- ❑ Legumes are an important and inexpensive source of plant protein.
- ❑ Avoid eating mouldy grains and legumes to prevent aflatoxin poisoning.
- ❑ Soaking beans shortens cooking time and helps the beans retain their nutritional value. Encourage the families to soak beans overnight and cook them the next day.
- ❑ Soybeans need to be treated through boiling or roasting before using in order to destroy antinutritional factors and prevent odours.

Foods from animals



Foods from animals and agriculture

- ❑ Livestock species kept in Malawi include cattle (beef and dairy), goats, sheep, poultry (eggs and meat), rabbits, Guinea pigs, and pigs.
- ❑ Observe good animal husbandry practices; that is, good housing, good breeds, pest and disease control, and good feeding practices (avoid feeding grains or legumes with moulds as aflatoxin is passed to the meat).
- ❑ Encourage farmers to practice aquaculture to ensure availability and accessibility of fish. Fish in ponds need to be well cared for (for example, adequate feeding, protection from predators).

Foods from animals and nutrition

- ❑ Foods from animals contains high quality proteins and most provide vitamins, minerals, and fat.
- ❑ Apart from domesticated animals and their products, food from animals also includes insects, wild birds, rodents, and aquatic products, e.g. *ngumbi*, locusts, caterpillars, crabs and mice. These foods are a cheap source of protein and nutritious.
- ❑ Eggs and milk are complete foods and should be given to children or added to complementary foods to create high protein meals.

Fats



Fats and agriculture

- ❑ The major edible oil seed crops grown in Malawi are sunflower and sesame in addition to groundnuts from the legumes and nuts food group and cotton from the cash crops. It is important to use high quality seeds in order to increase production.
- ❑ Several fruits can be grown that are high in fat such as avocados and coconuts. Several types of nuts are also high in fat (see Legumes and Nuts food group)

Fats and nutrition

- ❑ Fats and oils are an important source of energy in the diet and can provide significant vitamins and minerals. Fats are important for the absorption of fat-soluble vitamins.
- ❑ Very little fat is needed in the diet. It is important to use fats and oils in small amounts to avoid overnutrition (overweight and obesity) and non-communicable diseases such as high blood pressure and diabetes.
- ❑ Oil seeds such as sesame or pumpkin seeds can be pounded into flour and used to season or prepare different dishes.

Water



Water and agriculture

- ❑ Water is very important in crop production for nutrient transportation.
- ❑ Malawi depends on rainfed agricultural production. With frequent dry spells, farmers are encouraged to conserve water through rainwater harvesting, grey water recycling, box ridging, swales, mulching, pit planting, agroforestry, etc.
- ❑ Irrigation should be encouraged wherever possible.

Water and nutrition

- ❑ Water carries nutrients in the body. It helps cool the body. It is a medium for blood cells to travel through. Water cleanses the body and helps eliminate dust and waste products.
- ❑ Drink clean water from protected wells, piped sources, or bore holes. Adults need to drink at least 2 Litres of water per day.
- ❑ To clean water:
 - ❑ Boil water for 15 minutes if the source is not safe.
 - ❑ Add water guard (water guard can be purchased in local shops)
 - ❑ Keep water sources clean and ensure the water source is 30 meters away from the toilet.
 - ❑ Always clean and cover water containers to prevent contamination.

How much of each food group do I need?

Food group	Daily grams	Daily calories	Number of cups (250mL) per day	Monthly (kg)	Yearly (kg)
Staples (Dry weight)	300	1,060	1.5	9	108
Fruits	300	155	1.5	9	108
Vegetables	300	98	1.5	9	108
Legumes and nuts	150	491	0.5	4.5	54
Foods from animals	100	192	0.5	3	36
Fats	50	305	6 Tbsp	1.5	18
Water	2 L	0	8	60 L	720 L
TOTAL FOOD (approximate)	1200 grams	2,300 calories			

Tbsp = tablespoons; L = Litre



Seasonal food calendar

Every household must ensure availability and access to all six food groups for good nutrition. Some of the foods can be grown by the household while others can be bought. Most of the foods are seasonal. Because of this, it is important to analyse each season/month to identify the when foods from each food group are available. Developing a seasonal food availability calendar can help identify the nutrition gaps in each season/month.

Closing the seasonal food gaps

The seasonal food gaps can be closed through a number of ways including:

- ❑ Diversifying production and consumption of foods to include all food groups, for example, through integrated homestead farming
- ❑ Using irrigation facilities to grow food crops during the dry season
- ❑ Using improved storage facilities to reduce crop damage and food losses
- ❑ Growing crops that mature at different times of the year

Example of a seasonal food calendar

Food Group	Foods	Month											
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Staples	Green banana/ plantain	x	x	x	x	x	x						x
	Maize (chimanga)			x	x	x	x	x					
	Millet (mawere)						x	x	x	x	x	x	x
	Cassava (chinungwa)				x	x	x	x	x	x			
Fruits	Papaya					x	x	x	x				
	Mango	x	x										x
	Wild fruits	x	x								x	x	x
Vegetables	Amaranth (bongongwe)	x	x	x	x							x	x
	Hibiscus (limanda)		x	x	x	x	x						
	Cassava leaves (chikwada)	x	x	x	x	x	x	x	x	x			x
Legumes and nuts	Cow peas (kholwe)			x	x	x	x	x					
	Beans (nyemba)				x	x	x	x	x				
	Groundnuts (ntedza)				x	x	x	x					
Animal foods	Chicken eggs	x	x	x	x	x	x	x	x	x	x	x	x
	Fish	x	x	x	x	x	x	x	x	x	x	x	x
	Termites	x	x	x									x
Fats	Sunflower seeds						x	x	x	x	x	x	x
	Pumpkin seeds		x	x	x	x	x						
	Avocado	x	x	x	x								



Section 3:

Crop growth and human growth

Caring for crops is a lot like caring for people. In this section we'll compare the steps of raising crops to the steps of raising a family. Most farmers know that a healthy crop is dependent on fertile soils and timely operations.

Crop growth and development

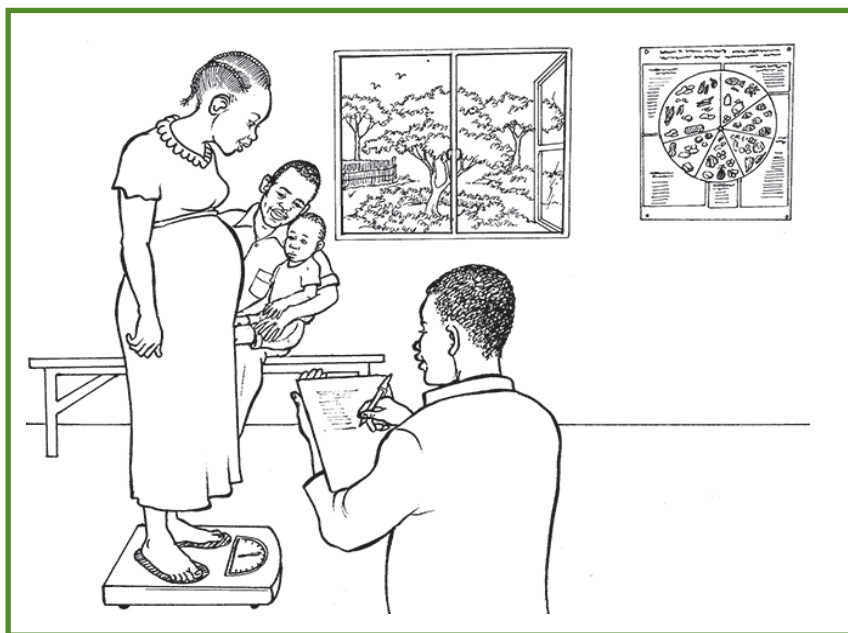


The productivity and quality of your crop depends on a number of factors:

- ❑ Health of your soil
- ❑ Quality of seed
- ❑ Planting the seed at the right time in the right spacing
- ❑ Caring for the crop as it grows to protect it from weeds, pests and diseases
- ❑ Time of harvesting and how it is processed and stored until time to eat it.
- ❑ Planning and monitoring the farm continually

Care practices for healthy people and care practices for healthy fields and environment are very similar. Optimal growth of humans is achieved when each new life starts with healthy parents, appropriate feeding, and care for young children.

Human growth and development



The productivity and health of your family depends on a number of factors:

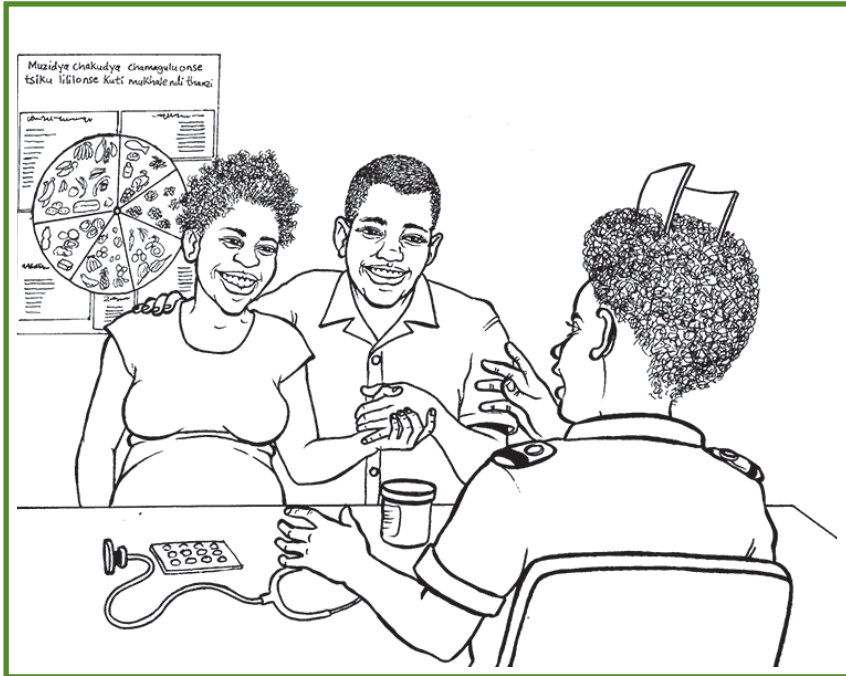
- Health of the parents, especially the mother as the baby will grow inside of her.
- Family planning allows families to have the right number of children for their family. It also allows for adequate spacing between children, giving parents the ability to care for each child.
- Exclusively breastfeeding a newborn, then adding complementary feeding at six months and continuing to 24 months.
- Protecting a child from illness and disease by following health recommendations for immunizations, growth monitoring and other necessary health treatments.

Starting with healthy seeds



- ❑ Crop diversity helps assure dietary diversity and the resilience of agricultural systems, so it is important to access and select diverse seeds for a variety of crops.
- ❑ Choose crops that are suitable for the area and appropriate for the nutritional needs of the family.
- ❑ Early land preparation allows decomposition of incorporated crop residues, which is vital for seed germination.
- ❑ Timely manure application helps add nutrients to the soil, which are important for crop growth and development.

Starting with healthy parents



- ❑ Both men and women's health are important in creating a new life.
- ❑ Men have very important roles in reproduction and support to the woman during pregnancy, birth and care of the newborn.
- ❑ Both men and women need health check-ups including HIV tests and any recommended treatments before deciding to have a child.
- ❑ The woman needs to eat a balanced diet from the six food groups so that she has all the nutrients necessary for a successful pregnancy.

Healthy crop spacing



- ❑ Agricultural land needs to rest (fallow) in order to replenish soil fertility. Where not possible, practices such as crop rotations, interplanting, and agroforestry help keep soil healthy. Pushing the land to produce the same thing every year over and over again will exhaust the land until it becomes unproductive.
- ❑ Crops need to be planted in a timely manner and at the right spacing for their species to avoid competition for nutrients and sunlight.
- ❑ Interplanting different types of crops in one field helps to maximize land use, improve control pests, and diversify crops.
- ❑ Some crops such as legumes help build soil fertility.

Healthy child spacing

Healthy child spacing

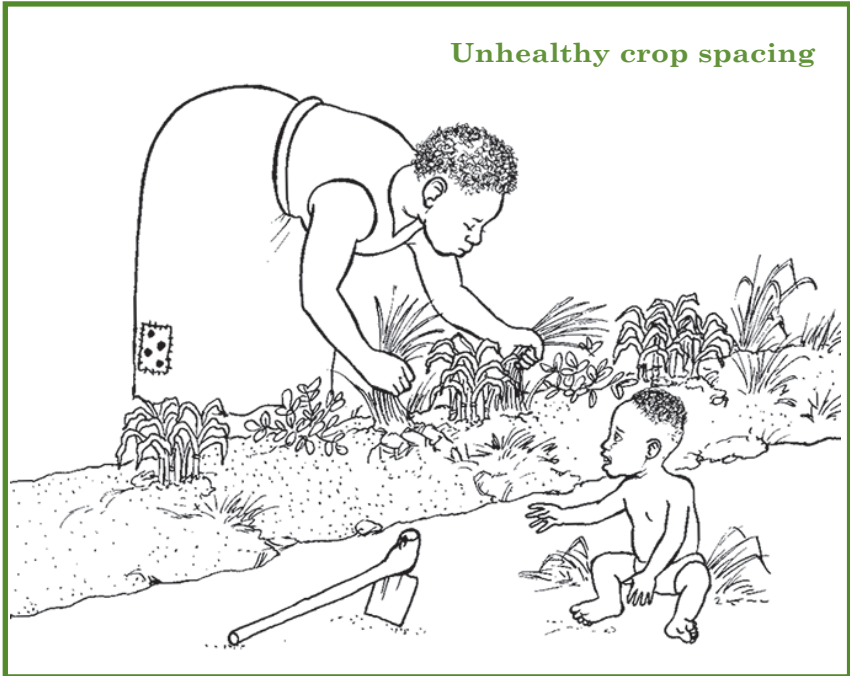


- ❑ A pregnant woman needs adequate macro- and micronutrients for the development of the unborn child and to enable her to carry the baby to full term. Consumption of a wide variety of foods from the six food groups ensures proper nutrition and supply of important nutrients for the woman and the foetus.
- ❑ Iron and folate are often lacking in many women's diets. Pregnant women may be advised to take iron and folate tablets.
- ❑ A pregnant mother should eat extra meals every day to cater for her extra energy (100Kcal) requirements.

Encourage families to:

- ❑ Visit the ante-natal clinic as soon as they know the woman is pregnant and at least four times during pregnancy in order to monitor the pregnancy.
- ❑ Space children two or more years apart for good health of the child and mother. Families should have the number of children that they have the capability to care for.
- ❑ Prevent malaria by, for example, sleeping under a mosquito net and removing standing water near the home. Pregnant women may be advised to take anti-malarial tablets.
- ❑ Ensure pregnant women rest during the day and are engaged only in light work. Heavy physical work during pregnancy may lead to complications.

Unhealthy crop spacing



- ❑ Crops need to be planted in a timely manner and at the right spacing and place for their species to avoid competition for nutrients and sunlight.

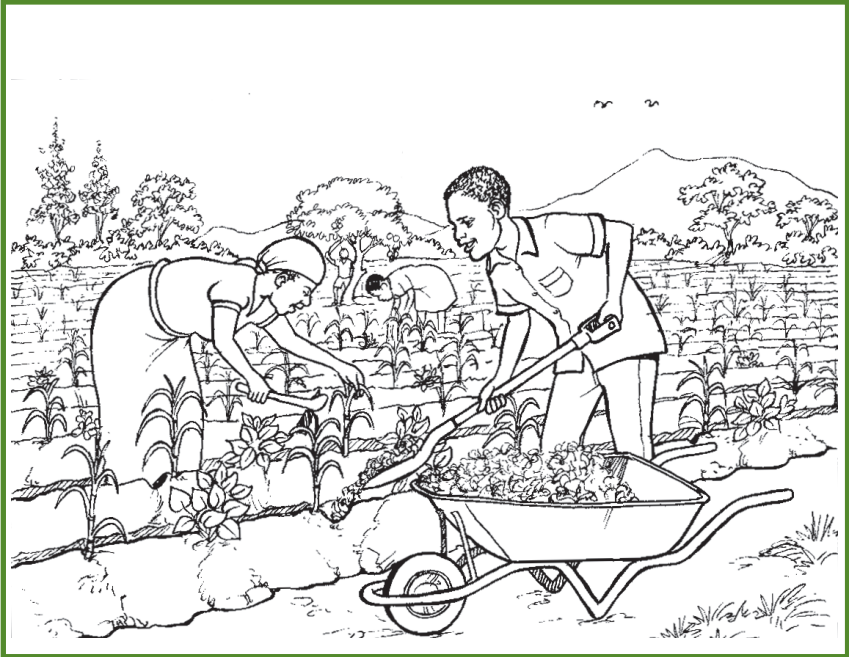
Unhealthy child spacing



Unhealthy child spacing

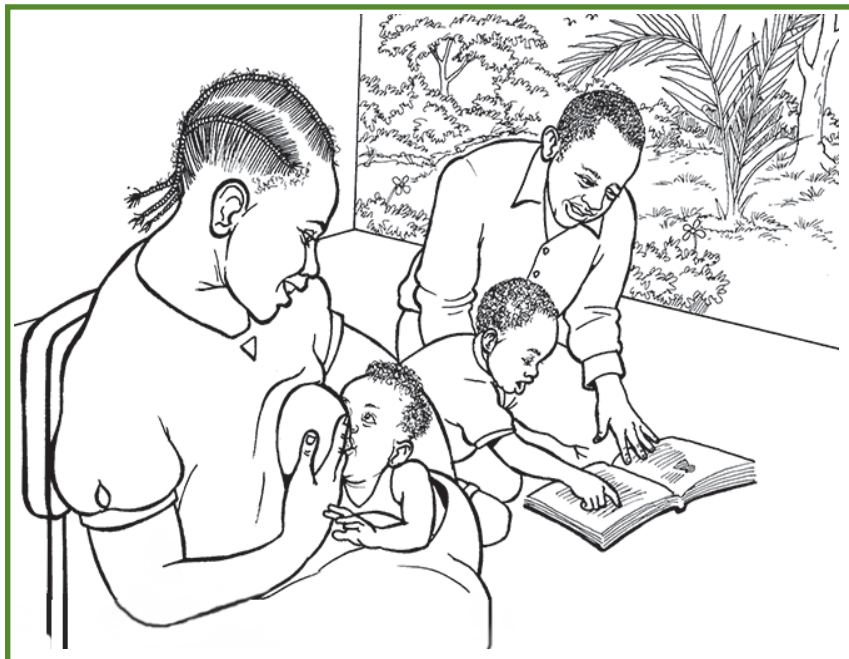
- For healthy growth and development of each child, good parental care and adequate birth spacing is important.
- If children are closely spaced they lack adequate parental care and nutrition as a result they may become malnourished.

Feeding our crops



- ❑ It is important to practice soil and water conservation all year long.
- ❑ Apply manure to the crops to improve soil structure while supplying nutrients to the plants.

Feeding our children



- ❑ Mothers should breastfeed within 30 minutes of birth and continue to breastfeed exclusively to the age of six months. Breast milk provides all the nutrients a baby needs at this age.
- ❑ Encourage lactating mothers to eat a variety of foods from the six food groups plus an extra meal every day to meet the extra demand for energy (500kcal), protein, iron and vitamins.
- ❑ As children grow older, their nutrient requirements increase. Encourage parents to start feeding infants with soft and nutritious complementary food at the age of six months while continuing breastfeeding to the age of two years.

Tips for feeding our crops

- ❑ Farmers are encouraged to apply manure to their crop not less than a month before planting. The recommended rate is 12.5 tonnes per hectare (a 20 Litre bucket of manure applied at every 8m along the furrow). Where manure is not adequate, the farmer should apply two handfuls per planting station and mix it with the soil before planting.
- ❑ Farmers should make compost manure from household decomposable refuse and crop residues.
- ❑ Crops grown on poor soils do not grow well and display symptoms of nutrient deficiencies:
 - ❑ Discoloured (reddish or yellow are common symptoms)
 - ❑ Stunted (too short)
 - ❑ Thin stems, leaves or roots
 - ❑ Low yield
- ❑ Some soils need fertilizer application in order to obtain high yields. The type of fertilizer that needs to be applied may be area and crop specific. Fertilizers have different nutrients to meet the nutrient needs of crops. For example, maize may need an application of 100 kg of 23:21:0+4S per hectare.
- ❑ If fertilizer is used in a maize crop, it should be applied away from planting stations and 10cm deep. Use cup number 5, 3/4 full on each side of the planting station. This should be applied at planting or soon after seedling emergency (5-7 days after planting). Follow it up with 150kg of Urea per hectare at the same depth and distance from the plant, using cup number 8 almost full or level on each side of the planting station. This should be applied 3-4 weeks after seedling emergency.

Tips for feeding our children

- ❑ Make sure lactating mothers receive and take vitamin A capsule within 8 weeks of delivery.
- ❑ As children grow older, their nutrient requirements increase. Encourage parents to start feeding infants with soft and nutritious complementary food at the age of six months while continuing breastfeeding to the age of two years.
- ❑ Complementary foods should be prepared from all six food groups to ensure the child receives nutrients for rapid growth and increased activity. *Mgaiwa* porridge for children can be enriched with margarine, milk, soya flour, groundnut flour, dried fish flour, mashed vegetables, etc.
- ❑ Children need to be fed not less than four times a day.
- ❑ Under-nutrition in a child may be seen as:
 - ❑ Low weight for age
 - ❑ Stunted (too short for age)
- ❑ Micronutrient deficiencies may not be easily noticed
- ❑ Adolescents (both boys and girls) need nutritious meals to support their rapid growth and activities. Encourage them to eat healthy meals and snacks.
- ❑ Adolescent girls need more iron to make up for blood lost during menstruation. Encourage them to eat iron-rich foods such as meat, fish, eggs, beans, and dark green leafy vegetables.
- ❑ Girls need good nutrition during adolescence in order to prepare their bodies for future motherhood. Encourage them to eat three meals a day plus nutritious snacks.

Keeping our crops healthy



- ❑ Pests, diseases and weeds can severely reduce yields and lower the quality of produce. Weeds deprive crops of plant nutrients, moisture and sunlight. They may also harbour pests and diseases. It is therefore important that farmers weed their crops timely and frequently. Mulching also reduce weed growth.

Keeping our children healthy



- ❑ Practicing good hygiene, taking steps to prevent common diseases, and taking care of our food and water sources help us to avoid disease-causing pathogens. Specific tips to prevent disease are given on page 47.
- ❑ When a child becomes sick, quick assessment and action is very important:
 - ❑ When a child gets sick, good nutrition alone is not enough; consult a health professional within 24 hours.
 - ❑ Give a sick child small, nutritious meals frequently. If a breastfeeding child is sick, breastfeed frequently and provide nutritious foods and clean water.
 - ❑ When a child has fever or diarrhoea, take them to a health facility as soon as possible. Use a cooling sponge to reduce the temperature and provide plenty of fluids or ORS. If a child is vomiting, continue giving liquid food frequently in small quantities.

Tips for keeping our crops healthy

- ❑ The incidences of pests and diseases can greatly be reduced by observing recommended cultural practices; for example, uprooting tomato, tobacco and cotton plants after harvesting, burning or burying infested crop materials away from the field, and destroying volunteer crops. Crop rotation also assists in preventing pests and diseases.
- ❑ Some crops may need to be sprayed with chemicals to prevent and control pests and diseases. Pesticides should be used as the last resort when necessary and as recommended. The chemical and application rate is crop specific; for example, tomatoes may need an application of dimethoate and carbaryl in order to control aphids and caterpillars.
- ❑ Pests may also be controlled by interplanting crops with plants that are able to repel insects such as garlic and lemon grass.
- ❑ Young plants are tender and vulnerable so they need a lot of care to protect them from pests, diseases and other adverse conditions. There is need for timely weeding, mulching, and regular monitoring for pests and diseases.
- ❑ Monitoring crops and keeping records including the dates of all operations and incidences such as dry spells or disease outbreaks will assist in crop management and timely pests and disease control.

Tips for keeping our children healthy

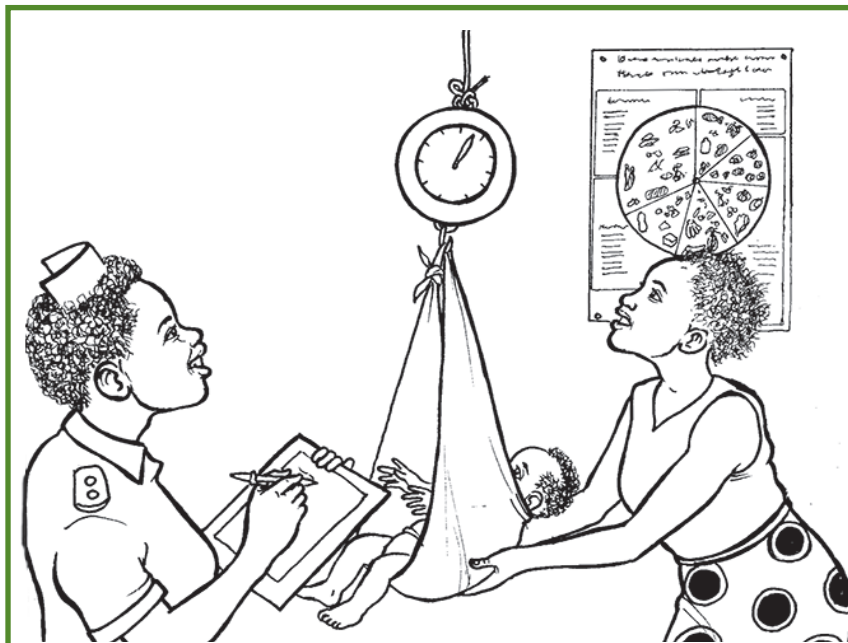
- ❑ Cleanliness of the house, kitchen, utensils and surroundings helps prevent diseases. Keep the kitchen area clean (sweep surroundings and mop/smear frequently). Keep chicken and livestock out of the house. Place your rubbish in a pit away from the kitchen and home.
- ❑ Ensure all family members maintain good personal hygiene (regularly bathing, washing clothes, clipping nails, etc.) to reduce the risk of disease.
- ❑ Always wash your hands with soap or ash after using the toilet, after cleaning your baby, before eating, and before feeding your child.
- ❑ Human faeces is a major source of diseases; always use toilets properly and teach your children to do the same. The toilet must be clean, covered, and away from home. Dispose of baby faeces in the toilet as soon as possible.
- ❑ Taking children to growth monitoring centres for weighing helps you assess how your children are growing and helps in early detection of malnutrition.
- ❑ Infants should complete the course of immunization by the age of one to avoid preventable illnesses such as measles, TB, whooping cough, and diphtheria.
- ❑ Ensure every member of the family sleeps under an insecticide-treated mosquito net to prevent exposure to malaria.
- ❑ Do not allow children to play in stagnant water to avoid worm infestations such as bilharzia.
- ❑ Rotten foods are poisonous; never eat rotten foods. Mouldy grains such as groundnuts and maize contain toxins (aflatoxin) which are harmful.
- ❑ Raw or half cooked foods (eggs, milk, meat) may contain disease-causing germs; always cook or boil foods thoroughly.
- ❑ Harmful germs may attack cold foods; always eat food when it is warm.
- ❑ Flies, cockroaches, and other insects spread diseases; keep food covered.
- ❑ Pesticides, fertilizers, and other chemicals are harmful; keep them and their containers away from food and out of reach of children.
- ❑ Always use clean water for drinking, washing foods, and other household use. Clean and cover water containers to prevent them from being contaminated. Boil water or treat it with Water Guard before drinking unless it is from a safe source such as bottled or piped water.

Monitoring and planning for our farm's health and productivity



- ❑ To make proper use of available resources, farms require planning so that there is efficient use of land, water, labour, time, money, and other resources.
- ❑ Farmers should aim at re-investing their financial resources to improve production.
- ❑ Planning farm activities in advance will help farmers ensure inputs are stored and purchased in a timely way.

Monitoring and planning for our families' health and productivity



- It is important to plan and manage food in a household annually before production and after harvesting to ensure food sufficiency and minimize losses.
- If growing cash crops, ensure some land is reserved for food crops for family consumption or use the income from the cash crop to buy a variety of foods.
- Reserve enough food for household consumption before selling, trading, or giving it away.
- Preserve vegetables and fruits by drying under a shade or in a solar dryer. Process and preserve perishable foods like cassava and sweet potato into flours and chips (*makaka*) when they are plentiful to reduce wastage.
- Reduce food wastage by cooking only enough food as the family needs.

Now that you've finished reading and discussing the handbook, you should be able to see and appreciate that the production and management of crops is closely related to human nutrition and development. You can start practicing and sharing some of the healthy ideas presented such as:

Step 1 – Planning

- ❑ Space births of children at least 2 years apart so that they get the attention, resources and care that they need for good growth and development.
- ❑ Space plants and trees according to their species so that they get the nutrients and care they need for good growth and development.

Step 2 – Healthy Beginnings

- ❑ Parents need to be healthy, especially the mother who is developing a child within her own body.
- ❑ The soil and environment need to be healthy so that seeds can grow well.

Step 3 - Diverse Diets

- ❑ The six food groups guide us on how to balance our diets; creating a food calendar helps us plan ahead so we can eat from every food group every day.
- ❑ Planting and raising the six food groups in our agriculture systems is better for our environment and food security.

Step 4 – Care

- ❑ Parents must work together to raise their children, starting with breastfeeding then adding complementary feeding with diverse foods at six months.
- ❑ People must work together to raise crops and provide the nutrients and care required for that species.

Step 5 – Monitoring, Learning & Improving

- ❑ Monitor your family's growth regularly; keep learning and sharing.
- ❑ Monitor your farm's growth regularly; keep learning and sharing.

If you have any other questions or ideas to share, contact Ministry of Agriculture's staff at Headquarters, Division, District, EPA, or Section level:

- ❑ Food and Nutrition Officers
- ❑ Agricultural Extension Development Coordinators
- ❑ Agricultural Development Extension Officers



Section 4:

Appendices

Name of farmer field school		Date:	
AESA no:		Week:	
Group no:		Problem addressed:	
Plot no			

General information		Measurement		Treatment
Variety		Length of leaves		Treatment schedule:
Date planted		Width of leaves		
Age of crop		No. of leaves		
Spacing		No. of leaves picked to eat		
Fertilizer		No. of dead leaves		Management practices:
Weather		Length of plant		
Time of observation		No of pods/ fruit		
Plant population				
Germination %				

Insect pests (draw pests seen)	Plant drawing	Natural enemies (draw those seen)

Issues	Observations	Recommendations (Indicate the management practice to be applied)
Soil moisture		
Diseases		
Insect pests		
Plant health		
Deficiency		
Weeds		
Predator		

Porridge

Porridge is an important dish in the Malawian diet for breakfast and also for complementary feeding. It is easily prepared and can be enriched to improve the nutritional value. It can be prepared from cereal or starchy tubers or roots. It can be enriched with legumes, fish, vegetables, fruits, eggs, milk, fats, etc. Germinated cereals and legumes are more digestible and nutritionally dense and should be used in porridge to improve its nutritional value.

Mgaiwa and soya porridge

Ingredients

6 Tbs Mgaiwa/millet or sorghum flour
1 1/2 Tsp Soya/nut flour
3 Cups water
1 Tbs mashed/powdered Vegetables
2 Tsp Sugar/ honey
pinch of iodized salt

Method

1. Bring two cups of water to the boil
2. Mix mgaiwa and soya flour in the rest of the water and add to the boiling water while stirring over time
3. Cook over low heat with cover on pot for 30-35 minutes stirring occasionally
4. Add sugar or honey and stir well. If nauseous reduce sugar.

NOTES / Variations

- Soya flour can be replaced with groundnut flour.
- Where possible use milk or mashed vegetables or beans to enrich the porridge.
- Porridge can also be made from rice, cassava, millet, sorghum and sweet potatoes.

One pot dish

One pot dish is a meal that is prepared from at least three food groups cooked in one pot. It saves fuel, wood, and time. A family can get many nutrients because it consists of a variety of foods. One pot dishes are not uncommon in Malawian culture; examples are mbalagha, futali, nkhowe, makaka with pigeon peas, etc.

A good one pot dish can be prepared from any available staple and should be combined with a legume, fish, or meat. Vegetables can also be added or served separately as a side dish. A one pot dish can be served as lunch or dinner.

Cassava and pigeon peas one pot dish

Ingredients

- 1 cup pigeon peas (half cooked)
- 3 medium sweet cassava tubers
- 2 large green pepper (optional)
- 1 medium onion
- 2 tablespoons cooking oil
- 5 cups water
- A pinch of salt

Method

1. Remove stones and twigs from pigeon peas
2. Wash and boil pigeon peas in 3 cups of water until half done
3. Peel and wash cassava and cut into cubes
4. Add cassava cubes to half cooked pigeon peas
5. Add 2 cups of water boil for 10 minutes
6. Add chopped onion, pepper, cooking oil and salt to taste. Using a wooden spoon, mix all the ingredients. Avoid mashing
7. Reduce heat and continue cooking until both are well cooked

NOTES / Variations

- Serve as main meal (Lunch or supper)
- Makes 2-3 servings

Pigeon pea and rice

Ingredients

- 1 cup dry pigeon peas
- 2 Cups coconut milk or fresh milk (optional)
- 2 Cups water
- 2 Medium chopped onions
- 3 T Cooking oil;
- 1-2 T Curry powder
- 1 ½ Cups rice
- 4 to 6 Large chopped carrots
- 1 tsp. salt
- ½ chopped jalapeno pepper (optional)

Method

1. Cook pigeon peas in boiling water and coconut milk until soft.
2. Fry but do not brown onion, and mix well.
3. Add all other ingredients to this mixture and stir for 1 minute, add ½ to 1 cup water if necessary.
4. Cover and cook slowly until rice and carrots are tender and all the liquid is absorbed.

NOTES / Variations

- Makes 5-6 servings

Cassava/Sweet potato or plantains

Ingredients

- 1 ½ cup dried fish
- 2 Cups sweet potatoes or cassava or plantains
- 1 medium onion
- 1 tomato
- 1 cup Pumpkin or green leafy vegetable
- 2 T Cooking oil
- ½ L Water or coconut milk*
- Water

Method

1. Wash the fish in warm water and cook until almost done.
2. Peel cassava or sweet potatoes or plantains. Cut into small pieces and add to the pot.
3. Add chopped onions, tomatoes, pumpkin or any green vegetables and water or coconut milk to the pot.
4. Add oil and a pinch of salt and cook until most of the liquid is absorbed.

NOTES / Variations

- *To make coconut milk: Grate one large dry coconut. Pour over one and half litres of water. Squeeze well and strain.
- Variation: Any meat can be used in place of fish.
- Makes 2 -3 servings

Chikondamoyo

Ingredients

- 1 cup soybean flour
- 3 cups mgaiwa (maize meal)
- 2 eggs (optional)
- 2-4 table spoon sugar
- Pinch of salt
- 1 ½ teaspoons soda or baking powder
- Water
- 2 T cooking oil (optional)

Methods

1. Mix soy flour, mgaiwa or corn soy blend with. Soda, salt, and sugar.
2. Beat eggs and add to the mgaiwa mixture
3. Add water to the mixture little by little until the mixture runs like thin porridge.
4. Grease a pot and pour in the mixture
5. Bake until it is brown on top and when pierced with a stick, the stick comes out clean.
6. Can be served as a breakfast food or snack.

NOTES / Variations

- ❑ Add ¼ cup pounded or dried mangoes, bananas and roasted groundnuts flour at method 3 if used.
- ❑ If a coconut milk or fresh milk is not available increase the 1tsp. Margarine/oil to 3T and add 2 cups of water.
- ❑ Use 4 cups Corn Soy Bean blend (CSB) instead of soybean flour and mgaiwa.
- ❑ Makes 12 servings

Guava juice

Ingredients

3 cups peeled sliced guava

1 cup sugar/ honey

1 cup lemon juice

Method

1. Boil the sliced guava until nearly done
2. Mix guavas, sugar and lemon juice
3. Add enough water
4. Simmer until done
5. Sieve and squeeze to remove seeds
6. Serve cool

NOTES / Variations

- A very good drink for everyone
- Any fruit can be used

Orange fleshed sweet potato juice

Ingredients

- 2 medium orange fleshed sweet potato (about 2 cups)
- 2 teaspoons of lemon juice
- Sugar to taste (optional)
- 5 cups water

Method

1. Peel and boil the sweet potatoes
2. Mash
3. Add water to mash and mix.
4. Pass through a sieve to squeeze the juice
5. Add lemon
6. Add sugar
7. Serve

NOTES / Variations

- juices can be made from all sorts of fruit such as lemons, chidede, malambe, and mango

We acknowledge use of materials from the following publications and encourage our readers to seek more information on the topic from them:

- Ministry of Agriculture, Irrigation and Water Development (2012). Guide to Agricultural Production and Natural Resources Management.
- Conrad, Abigail. 2014. “We are Farmers: Agriculture, Food Security, and Adaptive Capacity among Permaculture and Conventional Farmers in Central Malawi”. PhD Dissertation, American University. Available electronically on www.abigailconrad.com
- Nordin, S. (2014) “Sustainable Nutrition” (Second ed.)(S. Beare, ed.). Lilongwe, Malawi: World Food Programme (WFP) Malawi. Available electronically on www.NeverEndingFood.org

Your notes and recipes

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