REPUBLIC OF ZAMBIA
MINISTRY OF HEALTH

Nutrition Guidelines for Care and Support of People Living with HIV and AIDS

February 2011

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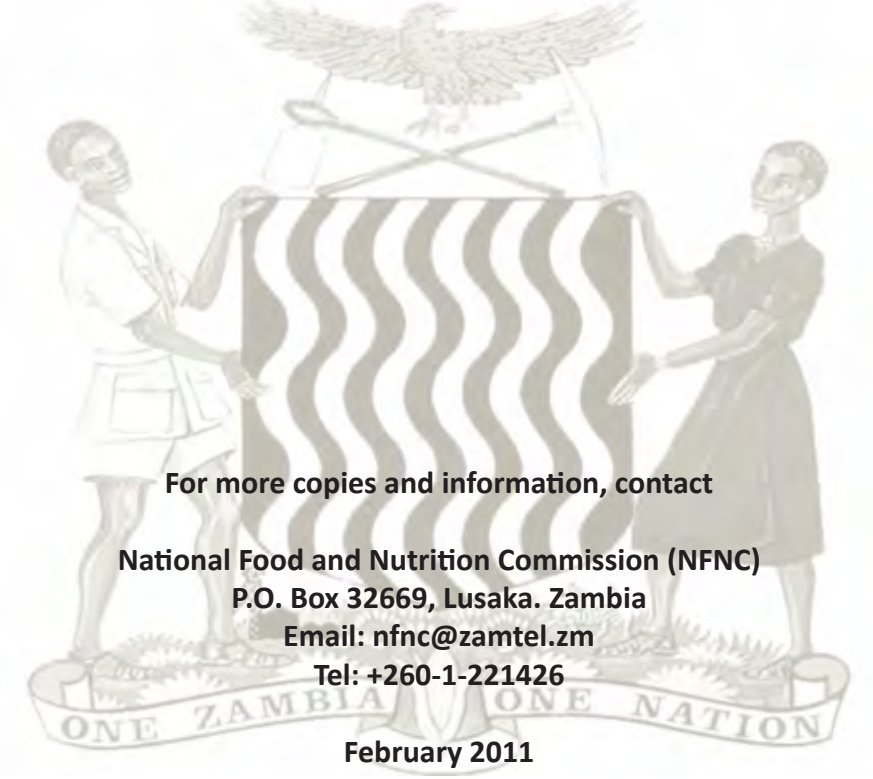

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February 2011

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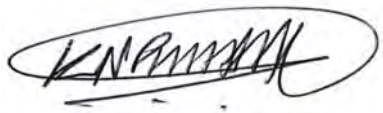
Foreword

The Republic of Zambia has been hit hard by HIV and AIDS. The government and its local and international partners have worked together the past 15 years to reduce the spread of the epidemic and relieve the burden it has placed on Zambian citizens, households, and the national economy.

Nutrition care is an important component of the treatment and care of people living with HIV. These guidelines provide the information needed to optimise such services. They were developed by a team led by the National Food and Nutrition Commission for service providers at all levels and for people living with HIV and their families.

The guidelines are subject to continual revision and updates. It is hoped that any useful information that may Nationimprove the document will be communicated to the National Food and Nutrition Commission or the Ministry of Health and the National AIDS Commission.



The Honourable Kapembwa Simbao
Minister of Health
February 2011

Acknowledgements

The Ministry of Health, through the National Food and Nutrition Commission (NFNC), appreciates the contributions made by various partners in the development of these guidelines. The National HIV/AIDS/STI/TB Council provided the policy and technical context. The United States Agency for International Development (USAID)/Zambia contributed financial and technical support. We also thank other stakeholders and development partners who participated in the review and finalisation of this document.

Our sincere gratitude goes to our colleagues from the Network of Zambian People Living with HIV/AIDS (NZP+) for their valuable input in ensuring that the guidelines were tailored to the practical needs of people living with HIV and AIDS in Zambia.

We are also grateful for the technical input from the Food and Nutrition Technical Assistance II Project (FANTA-2), Infant and Young Child Nutrition Project, the Catholic Relief Services (CRS) Scaling Up Community Care and Enhancing Social Safety Nets Return to Life (SUCCESS/RTL) Project, the Natural Resources Development College, the Ministry of Community Development and Social Services, the Nutrition Association of Zambia, UNICEF, the World Health Organisation (WHO), and the World Food Programme (WFP), which provided a thorough technical review of the updated guidelines.

Finally, we would like to acknowledge the tireless work of staff from NFNC in compiling material and coordinating the process that led to the production of this document.

Abbreviations and Acronyms

µg	Microgram(s)
ABC	Abacavir
AIDS	Acquired immune deficiency syndrome
ART	Antiretroviral therapy
ARV	Antiretroviral drug
AUC	Area under the plasma concentration-time curve
AZT	Zidovudine
BFHI	Baby-Friendly Hospital Initiative
BMI	Body mass index
CDC	U.S. Centers for Disease Control and Prevention
CIDRZ	Centres for Infectious Disease Research in Zambia
cm	Centimetre(s)
CMV	Cytomegalovirus
CSO	Central Statistical Office
dL	Decilitre(s)
FAO	Food and Agriculture Organization of the United Nations
FBF	Fortified blended food
g	Gram(s)
GMP	Growth monitoring and promotion
HAART	Highly active ART
Hb	Haemoglobin
HBC	Home-based care
HDL	High-density lipoprotein
HEPS	High-energy protein supplements
HIV	Human immunodeficiency virus
IMAM	Integrated Management of Acute Malnutrition
IU	International unit
kcal	Kilocalorie(s)
LDL	Low-density lipoprotein
M&E	Monitoring and evaluation
MAM	Moderate acute malnutrition
mg	Milligram(s)
MOH	Ministry of Health
MTP	Medium-Term Programme
MUAC	Mid-upper arm circumference
n.d.	No date
NAC	National HIV/AIDS/STI/TB Council
NACS	Nutrition assessment, counselling, and support for PLHIV
NASCOP	Kenya National AIDS and STI Control Programme
NFNC	National Food and Nutrition Commission
NGO	Non-governmental organisation
NZP+	Network of Zambian People Living with HIV/AIDS
OVC	Orphans and vulnerable children
PLHIV	Person or people living with HIV
PMTCT	Prevention of mother-to-child transmission of HIV

RDA	Recommended dietary allowance
RUTF	Ready-to-use therapeutic food
SAM	Severe acute malnutrition
SD	Standard deviation
STI	Sexually transmitted infection
TB	Tuberculosis
UL	Upper limit
UNAIDS	Joint United Nations Programme on HIV/AIDS
UNU	United Nations University
WHO	World Health Organisation
WFA	Weight for age
WFH	Weight for height
WFP	World Food Programme
ZDHS	Zambia Demographic and Health Survey

Definitions

Advocacy	Speaking or writing in support of someone or something
AIDS	A group of illnesses caused by HIV that weaken the immune system
Antioxidant	A substance (e.g., vitamin E, vitamin C, zinc, selenium) that prevents and repairs damage caused by free radicals (by-products of the body's use of oxygen)
Antiretroviral	A drug used for HIV prophylaxis or treatment but not cure
Balanced diet	A diet containing foods which provide all nutrients in the correct proportion for adequate nourishment
Body mass index	A statistical measure of the body based on weight and height, calculated by dividing weight in kilograms (kg) by height in metres (m) squared, or (kg/m^2)
CD4 cells	Specialised white blood cells which signal to other cells in the immune system to protect the body from bacteria or viruses. HIV attacks these types of cells and uses them to make more copies of HIV, weakening the immune system and making it unable to protect the body from illness and infection
CD4 count	The number of CD4 cells in a cubic millilitre of blood
Complementary feeding	Giving a child semi-solid or solid foods in addition to breast milk from the sixth month of life until the child is fully weaned
Enzyme	A biological catalyst which enhances or inhibits a chemical reaction

Exclusive breastfeeding	Providing an infant only with breast milk and no other liquids or solids, not even water, for the first 6 months of life
HIV	Human immunodeficiency virus
Indigenous food	Food native to a country or community
Legumes	Plants (e.g., beans and peas) that are high in protein and contain many of the essential amino acids (also known as pods or pulses)
Malabsorption	Failure of the digestive tract to absorb nutrients into the body
Malnutrition	A condition caused by inadequate or excess intake of nutrients
Meal	Food served or eaten at a given time during the day (e.g., breakfast, lunch, supper)
Metabolism	The continuous physical and chemical processes taking place in living cells, including the release of energy from food
Mixed feeding	Feeding an infant under 6 months breast milk and other foods or liquids
Mortality rate	The ratio of the total number of deaths to the total population in an area over a specified time, often expressed as the number of deaths per 1,000 people per year
Nutrient	A substance that can be metabolised to provide energy and build tissue. The nutrients in food include carbohydrates, proteins (amino acids), fats (lipids), vitamins, and minerals.
Nutrition	The process of assimilating food and using it for growth and replacement of tissues

Nutritional status	A measurement of the extent to which a person's physiological needs for nutrients are met
Opportunistic infection	An infection which takes advantage of weakness in the immune system; people living with HIV are vulnerable to such opportunistic infections as tuberculosis, bacterial pneumonia, candidiasis, herpes simplex, and Kaposi's sarcoma
Replacement feeding	Feeding an infant who is not breastfed either breast milk substitutes (including infant formula) or other milk products, foods and beverages marketed or otherwise represented to be suitable, with or without modification, for use as a partial or total replacement of breast milk
Snack	A small quantity of food which is readily available, can be eaten without much preparation, and is usually taken between meals
Viral load	The amount of HIV in the blood; the higher the viral load, the higher the risk of disease progression to AIDS

Chapter 1. Introduction

Zambia has a generalised HIV epidemic fuelled by structural factors, gender and social norms, unequal distribution of wealth, and unemployment. HIV prevalence in adults gradually decreased from 16.0% in 2002 (Central Statistical Office [CSO] et al. 2003) to 14.3% in 2007 (CSO et al. 2009). Over 900,000 Zambians are living with HIV, and over 280,000 are receiving antiretroviral therapy (ART) which allows them to live longer and healthier lives (Ministry of Health [MOH] and National HIV/AIDS/STI/TB Council [NAC] 2010). More females (16.1%) than males (12.3%) are HIV positive, likely because of biological, economic, and social factors (Ibid.). Urban areas have a higher prevalence (20%) than rural areas (10%) (CSO et al. 2009). Approximately 16.4% of pregnant women are HIV positive (MOH 2010 draft), and an estimated 10% of HIV transmission is from mothers to children during pregnancy, birth, or breastfeeding (MOH and NAC 2010). In 2009, the country had an estimated 690,000 orphans as a result of AIDS (Joint United Nations Programme on HIV/AIDS [UNAIDS] 2009). HIV and AIDS have had a negative impact on health indicators. The 2007 Zambia Demographic and Health Survey (ZDHS) reported that life expectancy at birth for males dropped from 50.4 years in 1980 to 48.0 years in 2000, although for females the drop was smaller, from 52.5 in 1980 to 52.0 in 2000 (CSO et al. 2009). HIV and AIDS have also increased the disease burden and increased pressure on the health care system.

The 2007 ZDHS reported that 45% of children 0–59 months old who were surveyed were stunted (low height for age) in 2006, compared with 47% in 2002; 5% were wasted (low weight for height), compared with the same percentage in 2002; and 15% were underweight (low weight for age), compared with 28% in 2002. The 2009 National Nutrition Surveillance Report conducted in 32 districts by the National Food and Nutrition Commission (NFNC) found global stunting in 54% of boys 6–59 months old and in 44.6% of girls 6–59 months old. The 2007 ZDHS also reported malnutrition (in these guidelines, “malnutrition” refers to inadequate intake or under-nutrition) in 9.6% of women of childbearing age surveyed (CSO et al. 2009). The 2009 National Nutrition Surveillance Report found 11% of women 15–19 years old in rural areas and 7% in urban areas were underweight and 20% of women in urban areas and 12% in rural areas were overweight.

Research conducted in 2007 by the Centres for Infectious Disease Research in Zambia (CIDRZ), the World Food Programme (WFP), and the U.S. Centers for Disease Control and Prevention (CDC) found that malnutrition among people living with HIV (PLHIV) was much higher than in the general population. Of adults starting antiretroviral drugs (ARVs), 33.5% were moderately malnourished, with a body mass index (BMI) between 16.0 kg/m^2 and 18.5 kg/m^2, and 13.5% were severely malnourished, with a BMI < 16 kg/m^2, as shown in figure 1 (Lusaka District Health Management Team [LUDHMT] and CIDRZ 2007). The same studies found that 44% of HIV-positive children were

underweight, with < –2 weight for age z-score (figure 2), compared with 15% in the general population (CSO et al. 2009).

Figure 1. BMI: Adults on ART in Lusaka

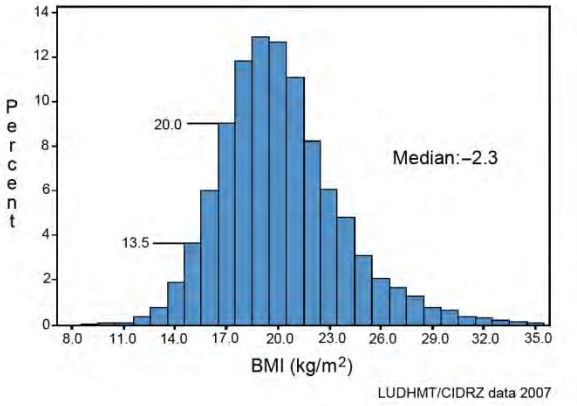
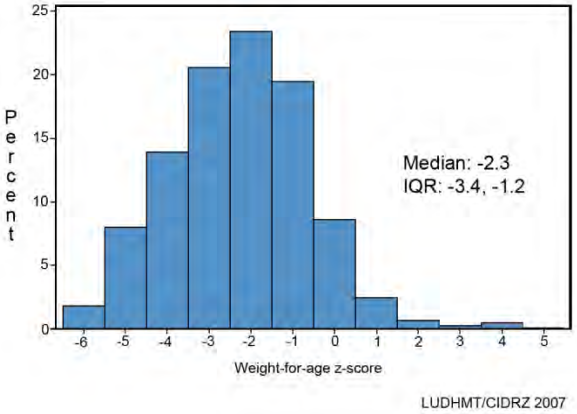


Figure 2. WFA z-scores: 2,965 children on ART in Lusaka



High mortality is reported among HIV-positive patients in treatment facilities in Zambia. A 2004–2005 study among clients starting ART found that patients with BMI < 16 kg/m^2 were 2.4 times more likely to die during the first few months of starting ART than those with higher BMI (Stringer et al. 2006). Patients with haemoglobin (Hb) levels of < 8 g/dL were 3.6 times more likely to die during the first 90 days than those with higher levels (Ibid.). The University Teaching Hospital reported in 2010 that average mortality rate among severely malnourished children admitted to the malnutrition ward was 40% (associated mainly with cryptosporidium- and salmonella-related diarrhoea), with a rate of 55% among HIV-positive children (Mwambazi and Irena 2010).

1.1. Government Response to the HIV/AIDS Epidemic

The commitment of the Government of the Republic of Zambia to the fight against HIV and AIDS is shown in the following milestones:

- 1984: First confirmed case of HIV and AIDS in Zambia (retrospective diagnosis)
- 1986: Establishment of the National AIDS Prevention and Control Programme
- 1987: Development of an emergency short- term plan to ensure safe blood and blood product supplies
- 1988–1992: First Medium-Term Programme (MTP) with eight operational priorities: tuberculosis and leprosy; information, education and communication; counselling; laboratory support; epidemiology and research; sexually transmitted diseases and clinical care (including nutritional care); programme management and home-based care (HBC)
- 1994–1998: Second MTP, with a multi-sectoral approach and a mechanism for coordination and collaboration
- 1999–2003: Creation of the semi-autonomous, multi-sectoral NAC
- 2001–2003: Launch and implementation of the first National AIDS Strategic Framework
- 2000–2002: Establishment of the PMTCT Secretariat
- 2000–2006: Ndola Demonstration Project to integrate infant feeding counselling into HIV services
- 2003–2004: Scale-up of ART
- 2007: Commencement of National Nutrition Surveillance

The National Policy on HIV/AIDS guides national efforts to mitigate the impact of the epidemic. Since 2001 all government mitigation interventions have been channelled through a national strategic framework that directs interventions for prevention, treatment, and care. Interventions and mitigation strategies and approaches encompass all government ministries, the private sector, religious groups, and civil society. The first National HIV/AIDS Council Strategic Framework 2006–2010 details a plan of action for care and treatment of PLHIV.

Scaling up ART has been a major part of the national strategy since 2005. The National HIV/AIDS Council Strategic Framework 2011–2015 identifies the promotion of appropriate nutrition and positive living actions as core interventions in the care and treatment of PLHIV.

In 2010 Zambia revised its CD4 threshold for initiating ART from 200 to 350, in accordance with World Health Organisation (WHO) guidelines. This change has implications for nutrition care and support of PLHIV because fewer clients who are eligible for ART will be likely to be severely malnourished.

1.2. Nutrition Guidelines for the Care and Support of People Living with HIV and AIDS

The *Nutrition Guidelines for the Care and Support of People Living with HIV and AIDS* provide the information needed to optimise such care services. The first edition of these guidelines was published in 2004. The current edition includes updated global and national guidance as well as references to more recent publications.

The guidelines are divided into 10 chapters, followed by references and annexes.

- Chapter 1 introduces the HIV/AIDS epidemic in Zambia.
- Chapter 2 gives an overview of the relationship between nutrition and HIV.
- Chapter 3 covers the components of nutrition care and support for non-pregnant, non-lactating adults with HIV.
- Chapters 4 and 5 describe recommended nutrition interventions for HIV-positive pregnant and lactating women and infants and young children of HIV-positive women, respectively.
- Chapter 6 explains how to manage the interaction between food and the drugs used to treat HIV.
- Chapter 7 covers the important issue of hygiene and sanitation for PLHIV with weakened immune systems.
- Chapter 8 describes the impact of HIV on food security and suggests approaches to help PLHIV and their households in this area.
- Chapter 9 discusses community outreach and mobilisation as essential components of the care and support of PLHIV and the management of malnutrition.
- The final chapter discusses monitoring and evaluation (M&E) of nutrition interventions in HIV services.

These guidelines are intended for health care managers, health service providers, and nutritionists who implement nutrition and HIV/AIDS interventions. The guidelines can also be used by policy makers and training institutions to standardise management of HIV-related malnutrition by new graduates joining the health workforce.

With some adaptation, the guidelines can be used by non-health staff, including social welfare development workers, interest groups, churches, politicians, nongovernmental organisations (NGOs), extension workers, and teachers. Any local adaptations should be done only with the collaboration and consent of the MOH and NFNC. Suggestions for adaptation are listed below.

- Efforts to manage malnutrition for PLHIV should go hand in hand with efforts to curb the underlying causes of malnutrition and prevent the spread of HIV in the target area.
- Details on specific topics can be found in other national guidelines that can be obtained from the MOH, NFNC, or NAC.
- Diets can be modified according to the food available in different settings, but macro- and micronutrient-specific requirements for treatment of moderate and severe malnutrition for PLHIV must be observed.
- Reference to job aids such as posters, counselling flip charts, and flowcharts are useful to explain counselling points.

Chapter 2. HIV/AIDS and Nutrition

Acquired immune deficiency syndrome (AIDS) is caused by a retrovirus known as the human immunodeficiency virus (HIV). The virus attacks the immune system and impairs the body's natural defence system's ability to fight against infection. Some people who contract HIV do not show symptoms or become ill for years. This phase of the disease is called the asymptomatic phase. During the asymptomatic phase, the immune system becomes progressively weaker and other viruses and bacteria can take advantage of the "opportunity" presented by the weakened immune system to cause other illnesses such as pneumonia or tuberculosis (TB). These opportunistic infections are a clear indication of a weakened immune system. Once these opportunistic infections are evident, the person is said to have AIDS, which is the end-stage of HIV infection.

The time it takes to progress from having HIV to having AIDS depends on general health and nutritional status before and during the time of HIV infection. Good health, including good nutrition, can help delay the progression from HIV to AIDS and improve quality of life. This is why nutrition care and support are a very important part of comprehensive care and treatment of PLHIV.

2.1. Basic Nutrition

Nutrition is the sum of all the processes involved in the body's taking in, assimilating, and utilising nutrients. Food contains the nutrients that the body needs for the following:

- Development, growth, maintenance, replacement, and repair of cells and tissues
- Resistance to and fighting of infection
- Production of energy, warmth, movement, and work

When the body does not get enough quality food, it becomes weak and cannot function properly. The nutrients the body needs to function are water, carbohydrates, proteins, fats, vitamins, and minerals. Some of these nutrients (carbohydrates, proteins, and fats) are needed in large amounts. These are referred to as *macronutrients*. Others (vitamins and minerals) are needed in smaller amounts and are referred to as *micronutrients*. The body needs both macronutrients and micronutrients in the right amounts and combinations for the body to function properly (annex 1).

Good nutrition requires eating a variety of safe and nutritious foods in the right quantities to meet the body's needs.

Diet is the amount and kind of food and drink a person eats day to day. A nutritious or *balanced diet* includes a variety of foods that help meet the body's functional needs. No single food except breast milk provides infants under 6 months old with all the nutrients their bodies need to function properly. For everyone else, including young children, adolescents, pregnant and lactating women, the elderly, and PLHIV, eating a variety of foods is key to good health.

2.2. The Link between Nutrition and HIV

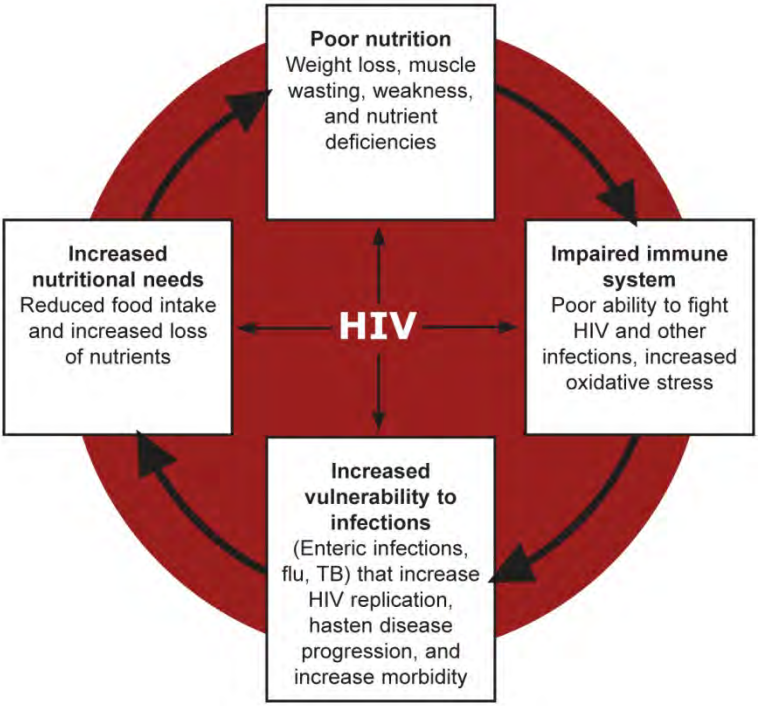
Malnutrition—a condition caused by inadequate or excess intake of nutrients—is a common problem in Zambia and a prominent feature of HIV and AIDS. The relation between malnutrition and HIV is a vicious cycle. Malnutrition weakens the immune system, which worsens the effects of HIV, which then increases the likelihood of malnutrition. People with HIV have an increased risk of malnutrition because of reduced food intake, reduced nutrient absorption, and reduced nutrient utilisation. Because poor nutrition increases susceptibility to opportunistic infections, it may speed up the progression from HIV to AIDS. Figure 3 illustrates the relationship between poor nutrition and HIV.

Unlike other infections, HIV attacks and destroys the cells of the immune system. Ultimately, other organs become more vulnerable to other infections. These infections affect nutritional status by reducing nutrient intake and absorption while increasing the utilisation and excretion of other nutrients, leading to protein-energy malnutrition and certain micronutrient deficiencies as the body tries to fight the attack on its immune system. This cycle usually contributes to weight loss and the wasting syndrome seen in adult AIDS patients. Decreased food intake is the most important cause of malnutrition and wasting. Other causes are malabsorption of nutrients and alterations in metabolism.

HIV affects nutritional status early in the course of the infection, even before other symptoms appear. It is important to identify and treat malnutrition promptly because it negatively affects immune function and is associated with HIV disease progression. Good nutrition plays an important role in the comprehensive care and management of HIV and AIDS because it:

- Helps prevent malnutrition and wasting
- Enhances the body's ability to fight opportunistic infections
- Helps achieve and maintain optimal body weight
- Improves the effectiveness of medications
- Helps prolong good health
- Improves the quality of life

Figure 3. Cycle of poor nutrition and infection in a person with HIV



Source: Food and Agriculture Organization of the United Nations (FAO). 2002. *Living Well with HIV/AIDS: A Manual on Nutritional Care and Support for People Living with HIV/AIDS*. Rome.

Figure 4 shows the relationship between good nutrition and HIV.

The following clinical signs and symptoms can indicate malnutrition in PLHIV:

- Weight loss
- Loss of muscle tissue and subcutaneous fat
- Vitamin and mineral deficiencies
- Reduced immune competence
- Increased susceptibility to infection
- Diarrhoea and poor absorption
- Poor response to medication
- Hair changes, hair loss, and other signs of nutritional deficiencies

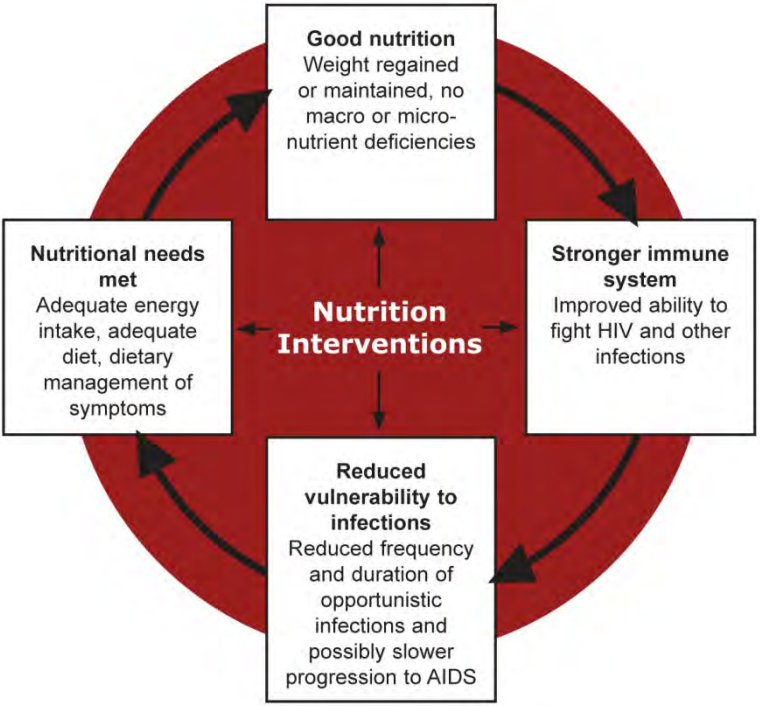
The following factors can cause poor nutrition:

1. **Reduced food intake** for the following reasons:
    - Difficulties eating or swallowing because of painful mouth or throat sores
    - Nausea and vomiting
    - Poor appetite as a result of fatigue, depression, and/or changed taste of food

- Lack of money to buy food
- Inability to grow food
- Difficulty shopping and cooking
- Lack of awareness of the importance of nutrition, especially when recovering from illness
- Side effects of medications (e.g., nausea, vomiting, metallic taste in the mouth, diarrhoea, and abdominal cramps)
- Weakness

2. **Excessive nutrient loss** from diarrhoea

Figure 4. The benefits of good nutrition for people with HIV



Source: FAO. 2002. *Living Well with HIV/AIDS: A Manual on Nutritional Care and Support for People Living with HIV/AIDS*. Rome.

2.3. Nutritional Requirements of Adults with HIV or AIDS

Most PLHIV lose weight at some point, and weight loss is associated with mortality in PLHIV. Adequate nutrition at all times is important to prevent weight loss or maintain weight, fight infection, and build and maintain muscle mass. PLHIV have increased energy needs because of the HIV infection itself, opportunistic infections, and changes in metabolism. They therefore need to eat a diet that provides all the essential nutrients (carbohydrates, protein, fat, minerals, and vitamins).

2.3.1. Energy Requirements

WHO recommends that PLHIV consume more energy to meet the increased nutritional needs resulting from infections and metabolic changes caused by HIV. Energy requirements vary based on the stage of the infection. An HIV-infected adult with no symptoms (asymptomatic) requires **10%** more energy over the level recommended for a healthy non-HIV-infected adult of the same age, sex, and physical activity. An HIV-infected adult with symptoms (symptomatic) requires **20%–30%** more energy over the level recommended for a healthy non-HIV-infected adult of the same age, sex, and physical activity (WHO 2003). Box 1 summarises the energy needs of PLHIV.

Box 1. Energy requirements of PLHIV

Healthy adults without HIV: Between 1,990 and 2,580 kilocalories (kcal) a day

HIV-infected adults in the early/asymptomatic stage: 10% more energy, or about 200–300 additional kcal a day, the food equivalent of one additional snack (for example, a mug of porridge with sugar, milk, and oil or a slice of bread with a handful of groundnuts)

HIV-infected adults in the advanced/symptomatic stage: 20%–30% additional energy (420–630 kcal) a day, depending on the severity of symptoms, the food equivalent of two or three additional snacks

HIV-infected children: 10% more energy to maintain growth if asymptomatic, 20%–30% more energy to maintain growth if symptomatic, and 50%–100% more energy if losing weight

2.3.2. Protein Requirements

Recommended protein intake for healthy non-HIV-infected people is 12%–15% of total energy intake. Combining sources of protein (meat, dairy, and legumes) helps ensure adequate intake of essential amino acids, which maintain body cell functions. The recommended dietary allowance (RDA) for protein for healthy adults is 0.8 g per kg of ideal body weight per day. The RDA increases by 30 g of protein per day during pregnancy and 20 g per day during lactation (WHO et al. 2007).

According to WHO (2003)**,** there is insufficient evidence to recommend that PLHIV consume more protein as a proportion of total energy intake than uninfected people. However, the amount of protein which PLHIV consume as part of their increased energy intake may also increase. If energy intake is insufficient, the body uses protein to provide energy. This means that less protein is available to maintain muscle tissue, strengthen the immune system, and (in children) nurture growth and development. **PLHIV need adequate energy intake at all times**, especially during infections and symptomatic periods of HIV, so that their bodies can use protein to build or maintain their lean muscle and strengthen their immune systems.

2.3.3. Fat Requirements

Dietary fat is a good source of essential fatty acids and concentrated energy. PLHIV without fat malabsorption or diarrhoea can consume fat to help meet their increased energy needs. The recommended fat intake for a healthy adult is 20%–35% of total calories, with less than 10% from saturated fats and 6%–10% from polyunsaturated fats. WHO does not recommend that PLHIV eat a higher percentage of fat in their total diet than healthy non-HIV-infected people. However, the amount of fat they need to maintain the proportion of energy derived from fat will increase proportionally with increased energy intake. People on ART or with persistent diarrhoea may need individual advice regarding fat intake.

2.3.4. Micronutrient Requirements

Many vitamins and minerals are important for PLHIV because of their role in the functioning of the immune system. HIV-infected people commonly have deficiencies of vitamins (A, C, E, B6, and B12 and folic acid) and minerals (zinc, iron, and selenium) because of excessive losses of these micronutrients in urine. Correcting vitamin and mineral deficiencies may help slow disease progression from HIV to AIDS. WHO does not recommend that PLHIV consume more micronutrients than the RDA, which is shown in table 1. *WHO's recommendation is not to exceed two times the RDA*. Annex 2 lists recommendations for micronutrient supplementation in Zambia.

Table 1. RDA and upper limits (ULs) for a healthy non-HIV-infected adult 19–50 years old

	Vit A µg/d	Vit C mg/d	Vit E mg/d	Vit B6 mg/d	Vit B12 µg/d	Folate µg/d	Zinc mg/d	Iron mg/d	Selenium µg/d
RDA									
Men	900	90	15	1.3	2.4	400	11	8	55
Women	700	75	15	1.3	2.4	400	11	18	55
UL									
Men	3,000	2,000	1,000	100	-	1,000	40	45	400
Women	3,000	2,000	1,000	100	-	1,000	40	45	400

Source: Institute of Medicine Food and Nutrition Board. 2001. "Dietary Reference Intakes". Washington, DC.
There is no established UL (maximum level of daily nutrient intake from food, water and supplements that is likely to pose no risk of adverse effects) for vitamin B12, although caution is warranted in consuming levels above the recommended intake because excessive amounts of some micronutrients (vitamin A, vitamin E, zinc, and iron) have been shown to impair or speed up disease progression rather than improve the immune system.

2.4. Foods to Meet the Energy and Nutrient Needs of PLHIV

PLHIV should do the following to meet their increased energy and nutrient needs:

- Eat more food and a wider variety of food than they normally do.
- Eat more frequently throughout the day in small meals to maximise energy intake, especially if appetite is a problem.
- Eat more nutrient-dense foods.
- Eat foods fortified with essential nutrients, such as iron and B vitamins.

Locally available and indigenous foods can provide a healthy diet for PLHIV. These foods are often easy to prepare and provide essential nutrients. They are generally wholesome, affordable, accessible, unrefined, and unprocessed and therefore more nutrient dense. These foods can be part of a nutritious and balanced, healthy diet**.** Annex 3 lists local and indigenous foods in Zambia and their roles in nutrition.

Below are some practical ways for PLHIV to ensure adequate nutrient intake.

2.4.1. Energy-Giving Foods

Carbohydrates provide the body with energy and some protein. Staple foods are the main source of carbohydrates and usually make up the largest part of meals. Some staples also contain some vitamins and minerals. Staples in Zambia include rice, maize, millet, sorghum, potatoes, sweet potatoes, cassava, and green bananas, depending on the region.

Staple foods alone cannot provide all the essential nutrients the body needs. Other food should be eaten in combination with the staples to make up a nutritious and balanced diet.

Fats and oils are an important source of energy, especially for people who need extra energy to gain weight. Fats and oils provide twice the energy of an equivalent amount of carbohydrates. They add flavour and taste, which help stimulate appetite, and are a good source of the essential fat-soluble vitamins A, D, E, and K. Excess fat consumption, however, can lead to obesity or heart disease. PLHIV who have fat malabsorption or diarrhoea should limit their intake of fats and oils.

A good diet should have a mixture of fats and oils in moderation.

Fibre, also known as roughage, is important for bowel movement. Dietary fibre is made of carbohydrates that the body cannot break down to produce energy. Fibre helps give bulk to food and move it through the digestive tract. It also causes a sense of fullness that may make people eat less and reduces the likelihood of obesity. There are two types of fibre: soluble and insoluble. Soluble fibre forms a gel when mixed with liquid, while insoluble fibre does not. Soluble fibre, which is found in whole grains, dried beans and peas, nuts, fruits, and vegetables, binds with fatty acids and prolongs stomach emptying so that sugar is released and absorbed more slowly. Insoluble fibre, which is found mainly in whole grains and cereals, seeds and nuts, and the skin of fruits and root vegetables, promotes regular bowel movement and prevents constipation. People with diarrhoea should avoid insoluble fibre, which makes diarrhoea worse, and eat soluble fibre, which binds water in the gut and helps reduce diarrhoea. The best sources of fibre in the diet are whole grains, fruits, and vegetables.

A good diet should include whole grains, cereals, fruits and vegetables.

2.4.2. Body-Building Foods

Proteins are also known as body-building foods because the body uses them to build and repair body tissues and muscles. Proteins are essential for cell growth. There are two main types of protein in the diet: animal protein and plant protein. Sources of animal protein are meat, poultry, fish, cheese, eggs, and milk. Sources of plant protein include legumes and other nuts. Animal protein contains the nine essential amino acids (amino acids which must come from the diet because the body cannot produce them). Plants can also be excellent sources of protein if eaten in combinations that supply all of the essential amino acids.

PLHIV should eat a diet containing some meat, fish, or other animal foods as often as they can afford them to benefit from their vitamins, minerals, and higher-quality protein to build muscle and strengthen the immune system.

A good meal should contain at least one body-building food.

2.4.3. Protective Foods

Vitamins and minerals keep the body functioning and strengthen the immune system. Fruits and vegetables contain vitamins and minerals and make up a category referred to as protective foods. Eating a variety of fruits and vegetables every day is part of a healthy and nutritious diet. Fortified and enriched foods, cereals, and grains, where available and affordable, are also a good source of some essential vitamins and minerals. Food-based sources of vitamins and minerals are the best choice for protective foods, although multivitamin supplements can also provide these micronutrients. Taking multivitamins is better than taking individual micronutrients because excesses of some single micronutrients can be harmful. Multivitamins, however, should not replace healthy foods and good eating habits.

A nutritious diet includes a variety of fruits and vegetables every day.

2.4.4. Water

Water is an important component of the body and its functions. The body loses water through sweat, urine, breath, faeces, fever, and diarrhoea. PLHIV need to drink plenty of water and other fluids, especially when they have been sweating from physical exertion or hot weather or they have diarrhoea, vomiting, or fever. The water should be safe, clean, and boiled to avoid infections. Water is also found in teas, soups, milk, juices, and fruits. PLHIV should drink tea and coffee in moderation because they cause dehydration and contain substances called tannins that bind essential nutrients such as iron, making them unavailable to the body.

No single food provides all the nutrients the body needs in the right amounts and combinations. A nutritious diet includes a variety of foods in adequate amounts and combinations to meet the body's daily needs.

2.5. Ensuring Adequate Nutrient and Energy Intake

As noted above, PLHIV need 10% more energy than healthy non-infected people, and symptomatic PLHIV need 20%–30% more energy. PLHIV can consume enough energy and nutrients for their stage of illness by following the recommendations below.

- Eat frequent meals and do not miss meals.
- Eat a variety of foods at every meal to get the necessary nutrients—carbohydrates, proteins, fats, and micronutrients. A meal should contain a staple food such as *nshima* (a thick porridge made from maize meal), potatoes, rice, cassava, or sweet potatoes; meat, fish, beans, or *kapenta* (dried fish); vegetables such as *ibondwe* (amaranthus), sweet potato leaves, or cassava leaves; and fruits in season such as mangoes, guavas, pawpaw, *masuku* (a wild fruit), apples, and oranges.
- Eat high-energy foods such as avocado, groundnuts, sugar cane, jam, honey, and margarine and add fats or oils to foods, but only in moderation.
- Eat snacks of fruit, cooked or roasted groundnuts, or porridge at least twice a day to increase energy and nutrient intake.
- Eat fermented foods such as *maheu*, *chibwantu*, *munkoyo*, sour milk, or yoghurt to improve taste and prevent the growth of diarrhoea-causing germs.
- Eat germinated foods to activate proteins and essential fatty acids.
- Eat fortified foods such as vitamin A-fortified household sugar and iodised salt to improve micronutrient intake.

Chapter 3. Nutrition Care and Support for Adult PLHIV

PLHIV need counselling and support to improve their nutrition at all stages of HIV infection. Good nutrition helps strengthen the immune system and can delay the progression of HIV to AIDS, making it possible for PLHIV to remain productive.

The goals of nutrition care and support for adult PLHIV are listed below.

1. Ensure adequate nutrient intake by improving eating habits and building stores of essential nutrients needed for the immune system to function.
2. Prevent nutritional deficiencies.
3. Prevent loss of weight and muscle mass.
4. Improve response and adherence to ART.
5. Prevent food-borne and water-borne illnesses.
6. Minimise the nutritional impact of secondary infections.
7. Manage HIV-related symptoms and medication side effects that affect food intake.
8. Promote a sense of well-being, self-esteem, and a positive attitude, which improve the quality of life.

To achieve the goals of nutrition care and support, the following **minimum package** of nutrition assessment, counselling, and support (NACS) should be included in any programme serving PLHIV:

1. Nutrition assessment
2. Nutrition education and counselling
3. Therapeutic and/or supplementary feeding
4. Referral to follow-up care and other needed services such as food security and social safety net programmes (e.g., food support and cash transfers)

NACS is an approach that provides food and nutrition interventions as part of a clinical package of HIV care and treatment, with strong links to community-based services whenever possible. The purposes of NACS are listed below.

1. Improve nutritional status and minimise loss of muscle mass.
2. Promote and improve adherence to ART or TB treatment.
3. Improve ART or TB treatment efficacy and help manage side effects.
4. Slow disease progression.
5. Improve birth outcomes of HIV-positive pregnant women and promote HIV-free survival of infants and children.
6. Provide continuity of care for PLHIV in PMTCT and ART health programmes.
7. Improve quality of life.

Each component of NACS is described in detail below.

3.1. Nutrition Assessment of PLHIV

Nutrition assessment is critical for PLHIV for the following reasons:

- Nutritional status is a sensitive indicator of well-being and helps identify problems early for quick response.
- Nutrition assessment helps determine what nutrition interventions clients need, such as diet changes, food supplements, medical treatment, and referral for further assessment.
- Nutrition assessment measures changes in nutritional status to monitor progress.

Nutrition assessment of adult PLHIV should include the following components:

1. **Anthropometric assessment.** Weight and height should be measured regularly to calculate BMI in non-pregnant/post-partum adults, and mid-upper arm circumference (MUAC) should be measured regularly for adults who are pregnant or post-partum or cannot stand up to be measured. Percentage of weight gain or loss is another measure of nutritional status in adults. Adult PLHIV who lose 10% of their body weight over 1 month should seek medical and nutritional care.

2. **Biochemical assessment.** Laboratory examinations for blood (Hb, haematocrit), protein (serum albumin) and micronutrient (vitamin B12, iron, zinc, and folate), and lipid (cholesterol and triglycerides) measurements help identify nutrient deficiencies. PLHIV on Zidovudine (AZT) should have their Hb checked every 3–6 months.

3. **Clinical assessment of signs and symptoms of illness.** PLHIV should be checked for symptoms that affect food intake (diarrhoea, nausea, vomiting, anorexia, mouth and throat sores, oral thrush), signs of clinical malnutrition (wasting and weight loss, skin changes, oedema, apathy, hair changes), and signs of anaemia (pale conjunctiva, gums, nails, and skin; breathlessness; rapid pulse; and oedema).

4. **Dietary assessment.** Information about the types and amounts of foods eaten, appetite, food habits and eating behaviours helps identify factors that affect food intake such as food availability, side effects of medications, traditional food taboos, and economic factors.

5. **Medical history.** Information about other illnesses (e.g., diabetes), psychological factors (e.g., depression and stress) and traditional therapies helps identify needed nutrition and dietary interventions, as well as harmful drug-food interactions.

6. **Assessment of the living environment and functional status.** A clean environment is vital to the well-being of PLHIV because of their compromised immune systems. At every contact, health service providers should assess the cleanliness and sanitation of a client's environment, the availability and use of safe and clean water, food hygiene, and support from family members, friends, and support groups.

7. **Assessment of lifestyle practices.** Smoking, alcohol, and drug abuse may affect food and nutrient intake and decrease the effectiveness of some medications.

Annex 4 summarises the types of nutrition assessment for PLHIV.

3.2. Nutrition Education and Counselling

Nutrition education and counselling are integral parts of the care and support of PLHIV. Nutrition education and counselling should emphasise the following points:

- **The need for regular weighing.** PLHIV enrolled in care and treatment should be weighed during every clinical visit. PLHIV not enrolled in such programmes can be weighed regularly in HBC or other community-based programmes and support groups.

- **The need for an adequate diet.** Annex 5 describes the steps to follow when counselling PLHIV on maintaining a healthy weight.

- **The need to increase energy intake** and maintain recommended protein and micronutrient intake

- **The importance of treating illness promptly.** PLHIV are vulnerable to infections that can affect food intake and nutritional status. Any illness should be taken seriously and treated quickly.

- **Ways to manage common HIV-related symptoms.** Symptoms that can affect food intake and accelerate disease progression include thrush, mouth and throat sores, fever, fatigue/lethargy, diarrhoea, nausea/vomiting, taste alterations, and loss of appetite (anorexia). Annex 6 lists ways to manage these common symptoms through diet.

- **The importance of personal and food hygiene and water safety.** Infections that cause diarrhoea commonly cause HIV disease progression and morbidity. Health service providers should counsel PLHIV on how to wash their hands, make drinking and cooking water safe, dispose of garbage and faeces safely, and prepare and store food safely.

- **The effects of smoking, alcohol intake, and drug abuse** on food intake, absorption, and utilisation.

3.2.1. Prevention for Positive Living

Health service providers should also promote the following actions as part of nutrition education and counselling:

- **Physical activity.** Physical activity can improve body composition and quality of life. Walking, aerobics, jogging, and light physical exercise in the home, including housework, helps stimulate appetite and increase energy. Weight-bearing exercises help enhance and maintain muscle mass. Massage therapy for bed-bound clients can help relieve aching muscles and prevent muscle loss.

- **Safer sexual and reproductive health practices.** PLHIV should be counselled and educated on all positive HIV prevention methods, including abstinence and faithfulness and the use of condoms, to avoid re-infection and transmission of HIV to their partners. Re-infection increases the viral load and hence damage to the immune system, leading to faster progression to AIDS.

- **Involvement in prevention, treatment, and care.** PLHIV should know how to protect their own health through active involvement in planning and monitoring their own care. This ensures that interventions address their needs and can decrease stigma and discrimination.

- **Adherence to prophylaxis and treatment regimens.** Good adherence to ARV prophylaxis and treatment facilitates maximum viral suppression and reduces the risk of HIV transmission from mother to child. Adherence counselling, use of pill boxes, and medication companions can be provided in clinical, community, or home settings.

- **Prevention of mother-to-child transmission of HIV (PMTCT).** Health service providers should discuss strategies to reduce the likelihood of HIV transmission to partners and infants with HIV-positive women and couples who want children. HIV-positive women who become pregnant should be referred to PMTCT services as early as possible.

- **Disclosure strategies.** Health service providers should discuss with all HIV-positive adults strategies for disclosing their HIV status to sex partners and offer confidential HIV testing to their partners and children. Health service providers and counsellors can offer to mediate disclosure for people who do not feel comfortable disclosing on their own.

- **Diagnosis and treatment of sexually transmitted infections (STIs).** Active STIs can increase the chance of HIV transmission. Health

service providers should advise PLHIV on diagnosis, treatment, and syndromic management of genital herpes and other STIs as part of routine care and treatment.

Prevention messages and strategies can be included in counselling, support groups, peer-led interventions, and HBC. Drawing on the leadership of PLHIV strengthens these interventions and provides further support for HIV-positive people. Referral to income-generation activities or programmes to empower women and girls increases the likelihood that PLHIV will have the means to change high-risk behaviours.

3.2.2. Psychosocial Support

Psychological support is an important component of nutritional care and support because depression, stress, and stigma can affect appetite and reduce nutrition intake and have a serious impact on self-esteem. PLHIV need emotional, spiritual, and social support in a supportive and non-stigmatising environment. Health service providers can refer clients to support groups and networks in the area; encourage a positive attitude toward their illness, and help them overcome feelings of guilt, fear, and denial.

3.3. Nutrition Support

Many food assistance programmes, such as those of WFP, aim to increase the food security of HIV-affected populations, targeting families with household food rations that often consist mainly of staple foods. In the health sector, food is sometimes prescribed to supplement the diets of individual PLHIV with clinical malnutrition identified through routine anthropometry or assessment of health status or vulnerability.

Nutrition support for PLHIV may include therapeutic foods to treat severe acute malnutrition (SAM) and/or supplementary foods to treat moderate acute malnutrition (MAM), based on strict eligibility criteria including nutritional status, micronutrient supplementation, and enteral or parenteral feeding of clients who cannot take food orally.

3.3.1. Specialised Food Products

Trained staff prescribe specialised food products for a limited time, based on clear anthropometric entry and exit criteria. Take-home rations of specialised food products are designed to supplement individual diets to improve nutrition and health outcomes.

Specialised food products prescribed to clinically malnourished PLHIV should be dense in energy, protein and micronutrients; safe; palatable; easy to use; easy to deliver within the health and other systems; and not easily shared with other household members. Specialised food products include therapeutic milks and ready-to-use therapeutic food (RUTF) to treat severely malnourished

PLHIV and fortified blended foods (FBF) to treat moderately malnourished PLHIV. FBF is nutrient dense and fortified with vitamin and mineral premix. The prescribed amount should provide at least 50% of the daily energy requirements of a malnourished client and contain enough protein to provide 12%–15% of total energy needs. Like RUTF, FBF should meet high safety standards.

Therapeutic milks used in Zambia

- F-100 and F-75 and modified formats for inpatient care

1. RUTF used in Zambia
    - Plumpy'nut® (imported), packaged in 92-gram sachets providing 500 kcal each (or 543 kcal/100 g) for inpatient and outpatient care
    - Valid Nutrition RUTF imported from Malawi and packaged in pots of 250 g that provide 1,325 kcal each (or 530 kcal/100 g) for inpatient and outpatient care

2. FBF used in Zambia
    - High-energy protein supplement (HEPS), which contains maize, soy and micronutrient premix, sometimes with milk powder and sugar added

The amount and combination of specialised food products to prescribe to individual PLHIV depend on individual nutritional status. The food should be provided in a way that minimises dependency, based on clearly defined entry and exit criteria that are communicated to clients and posted where clients can easily see them. Specialised food products for PLHIV should be prescribed by staff trained in the national guidelines for this approach.

The following adult clients may qualify for specialised food products in Zambia:

- Malnourished adult and adolescent pre-ART and ART clients (non-pregnant, non-post-partum)
- Malnourished HIV-positive pregnant women and malnourished HIV-positive women with infants under 6 months old

Annex 7 summarises recommended NACS entry, transition, and exit criteria.

Although PLHIV may need other food support, specialised food products are prescribed only for *nutritional therapy and rehabilitation*. Health service providers should promote consumption of local foods and an adequate and varied diet for a healthy and productive life and should refer PLHIV to other available services for family food support.

3.3.2. Micronutrient Supplementation

Whenever possible, PLHIV should meet their vitamin and mineral needs from their diet by eating a variety of fruits and vegetables. PLHIV who do not get enough micronutrients from their diet or live in areas where anaemia and

vitamin A deficiency are common should take daily multiple micronutrient supplements according to government-recommended protocols and the directions of health care providers.

Multiple micronutrient supplements work better than individual micronutrients taken separately (see annex 2). Excessive use of some micronutrients (e.g., vitamins A and D) can be toxic. Intestinal upsets and kidney stones have been reported in people taking high doses. Oral or intravenous micronutrient supplementation may be considered for PLHIV who are severely deficient and have severe diarrhoea, intolerance, or severe malnutrition. PLHIV who are consuming highly fortified specialised food products to treat acute malnutrition should consult their health care providers before taking additional micronutrient supplements.

Chapters 4 and 5 outline the protocols for vitamin A supplementation for pregnant women and children 6–59 months old.

3.3.3. Enteral and Parenteral Nutrition Support

Rapid and unintentional weight loss, malabsorption, recurring infections, and nutritional deficiencies are common problems for PLHIV. When they cannot take food orally, other options should be considered to help prevent malnutrition associated with these problems. Enteral and parenteral nutrition are usually undertaken only in a hospital setting. Parenteral nutrition in particular requires close monitoring and evaluation by trained staff.

Enteral Feeding

Enteral feeding may include both oral and tube feeding for people whose oral intake is inadequate. It can be used as the sole source of nutrition for people who have problems chewing and swallowing because of painful sores in the mouth. A qualified health service provider should ensure that the client's gut is working before using enteral feeding and should calculate the enteral formula on the basis of the client's dietary requirements.

Parenteral Feeding

Parenteral feeding is the provision of nutrients directly into the circulatory system through the veins. Parenteral nutrition should be administered only if a patient has a non-functional or extremely compromised gastrointestinal tract. Parenteral nutrition may be administered to PLHIV with AIDS, major intestinal disorders, intractable vomiting, acute pancreatitis, cytomegalovirus (CMV) infection of the bowel, Mycobacterium avium-intracellulari (MAI) infection of the gastrointestinal tract, persistent diarrhoea, severe protein-energy malnutrition, and/or intolerance for enteral feeding. As with enteral nutrition, nutrient requirements should be calculated on an individual basis.

A **thorough nutrition assessment** should be done before beginning enteral or parenteral feeding. Fluid, energy, protein, and micronutrient requirements should be assessed because the HIV-infected patient may be dehydrated and/or have protein-energy malnutrition.

Both forms of nutrition support require **ongoing management and monitoring** to reduce complications and undesirable side effects.

Hospital guidelines for enteral or parenteral nutrition support should be followed.

Annex 8 is a simple algorithm for NACS in adults.

3.4. Client Follow-Up and Referral

A **continuum of care** is an integrated system of care that tracks a client over time through a comprehensive set of health services spanning all levels of care, from the hospital to the home. Medical and social services should be pooled in the community and linkages made among home, community, and clinical care.

Nutrition care is important for people in both the early and late stages of HIV disease to restore immunity and strength and maximise the effectiveness of ART. Many families care for PLHIV at home. This is not an easy task. It requires meeting the needs of the sick person and balancing those needs with the needs of other family members. Caregivers need support to make sure PLHIV consume an adequate diet, take medications as directed, and follow care regimens.

At all levels of care, health service providers should:

- Spend time with PLHIV.
- Focus nutrition interventions on both family members (primary caregivers) and clients.
- Provide comprehensive client-family education on all aspects of good nutrition.
- Involve clients and caregivers in planning meals.
- Adopt a supportive and encouraging attitude toward clients that reinforces positive living principles.

Client follow-up and referral involve providing required services to clients after the first service delivery contact, including ensuring that they are able to follow recommended treatment and advice.

3.4.1. Follow-Up

Client follow-up starts from the time the client and health service provider agree on a return date and ends when the client is lost to follow-up, moves, or dies. The frequency of follow-up depends on the client's health and needs. The purposes of PLHIV client follow-up are listed below.

- Review health and nutrition records.
- Assess current nutritional status and weight gain or loss.
- Assess progress managing symptoms and drug side effects.
- Review the client's experience implementing nutrition recommendations.
- Recommend modified practices if needed.
- Support adherence to drug regimens.
- Renew prescriptions for specialised foods.

3.4.2. Referral

Referral is sending or directing a client elsewhere to seek care or services that are not offered at the current contact point. Health care providers should refer PLHIV to the following services:

- Supplementary food support
- Community care, spiritual care, or legal support
- Livelihoods support and income-generation activities

Community care and support can help PLHIV and their families address their psychosocial, emotional, social, spiritual, health, and material needs and serve as a link between health facility care and the social welfare sector. A strong continuum of care between clinical services and PLHIV households ensures comprehensive care and support for malnourished PLHIV and allows faster recovery from malnutrition. Community referral and follow-up can ensure that PLHIV receive early treatment for opportunistic infections, timely treatment of malnutrition, and interventions to reduce transmission of HIV from mother to child. Community health volunteers should refer PLHIV to health care facilities for medical assessment or treatment.

Strong referral links require an inventory of community support services available in the vicinity of ART clinics. Referrals may also involve the following challenges:

- Client's refusal to seek follow-up care
- Transport problems
- Poor coordination with other services
- Fear of stigma that leads PLHIV to seek ART services away from their places of residence

3.5. Nutrition Care and Support for PLHIV at Increased Risk of Malnutrition

This section summarises nutrition considerations for elderly PLHIV and for PLHIV with HIV and TB co-infection.

3.5.1. Nutrition Care and Support for Elderly PLHIV

A therapeutic high-energy protein diet may be appropriate for elderly PLHIV, whether or not they are on ART. Nutritionists and dieticians can advise on individual requirements. Because weight is a significant factor in the care and treatment of PLHIV, overweight or obese elderly clients may need to be advised to reduce their weight until they are within the normal BMI range of 18.5–24.9 kg/m^2.

Hypoglycaemia is common in elderly people with or without HIV. It is important to establish whether this condition is present in PLHIV because of the following nutritional considerations:

- Quantity and timing of food and drinks containing carbohydrates
- Timing of meals in relation to medication
- Effects of alcohol on hypoglycaemia

Older people are at greater risk of dehydration. PLHIV with diabetes and uncontrolled diabetes may be at high risk of dehydration as a result of polyuria. These clients should be monitored and provided with fluids and treatment modified to limit symptoms of hypoglycaemia.

3.5.2. Nutrition Care and Support for PLHIV with TB Co-infection

Malnutrition is a well-established risk factor for development of active TB, and it is known that TB affects nutritional status through a variety of mechanisms (Papathakis and Piwoz 2008). For example, the incidence of active TB is inversely related to BMI (Lönnroth et al. 2010), and malnutrition and HIV infection are two important proximate risk factors that contribute to progression from latent to active TB.

Nutritional status may influence progression from TB infection to disease by altering the availability of essential nutrients. Like HIV, TB reduces appetite and increases energy expenditure, causing significant wasting. Protein loss in TB patients can cause nutrient malabsorption. Malnutrition reduces expression of mycobactericidal substances, which may compromise cell-mediated immunity and lead to active TB. Increased energy expenditure and tissue breakdown in TB are thought to increase micronutrient requirements.

In many countries with high HIV prevalence, there is a close relationship between TB and HIV. TB is the most common opportunistic infection diagnosed

among PLHIV in developing countries. PLHIV are more vulnerable to TB and more difficult to treat for TB than people without HIV. HIV increases the risk of getting TB, the risk of latent TB becoming active (PLHIV are up to 50 times more likely to develop active TB than people without HIV [WHO n.d.]), and the risk of relapse after treatment. In return, TB speeds HIV disease progression. For these reasons, WHO recommends HIV testing of all TB patients and referral of positive cases for care and treatment (WHO 2009). Malnutrition may be more severe in people with TB/HIV co-infection than in people with either disease alone, and malnutrition can hasten the progression of either or both diseases and increases the risk of mortality for co-infected people.

Currently there are no internationally agreed guidelines on nutrition/food support to TB patients or contributions of national TB programmes to improved nutritional status in the general population.

Chapter 4. Nutrition Care for HIV-Positive Pregnant and Post-partum Women

Good maternal nutrition is vital for the survival and well-being of both mothers and their developing infants. Pregnant and post-partum women with HIV have an increased risk of malnutrition and mortality because of the extra demands not only of pregnancy and lactation but also of HIV and related infections. Poor nutritional status can also increase an HIV-positive pregnant woman's risk of transmitting HIV to her infant.

4.1. Nutritional Requirements of Pregnant and Post-partum Women with and without HIV

During pregnancy and lactation, energy, protein, vitamin, and mineral needs increase to meet the demands of gestational weight gain, foetal development, and milk production. For HIV-positive pregnant and lactating women, HIV causes excess nutrient loss and malabsorption at the same time that it increases nutritional needs.

4.1.1. Energy

The recommended increase in energy intake for HIV-positive pregnant and lactating women is the same as for non-pregnant and non-lactating adult PLHIV—10% more than the basic energy needs of non-pregnant, non-lactating women of the same age and physical activity level if asymptomatic and 20%–30% more if symptomatic. Table 2 lists the energy requirements for healthy, non-HIV-positive women during pregnancy and lactation and the additional requirements resulting from HIV infection.

Table 2. Increased energy requirements during pregnancy and lactation

	Average energy intake (kcal)	Increased energy requirements for pregnancy and lactation (kcal)	Increased energy requirements for HIV (kcal)	Total energy intake (kcal)
Pregnant				
HIV-negative	2,140	280	0	2,420
HIV-positive, asymptomatic	2,140	280	210	2,630
HIV-positive, symptomatic	2,140	280	640	3,060
Lactating				
HIV-negative	2,140	500	0	2,640
HIV-positive, asymptomatic	2,140	500	210	2,850
HIV-positive, symptomatic	2,140	500	640	3,280

Source: Food and Nutrition Technical Assistance (FANTA) Project. 2004. *HIV/AIDS: A Guide for Nutritional Care and Support*. Washington, DC: FHI 360.

Table 3 shows the approximate energy needs of a moderately active, *asymptomatic* 25-year-old HIV-positive pregnant woman who weighs 55 kg.

Table 3. Energy requirements of an asymptomatic 25-year-old HIV-positive pregnant woman weighing 55 kg

Energy requirement	Kcal
Normal	2,140
Extra 10% because of HIV	210
Extra because of pregnancy in the 2nd and 3rd trimester	280
Total recommended daily energy intake	**2,630**

Table 4 shows the approximate energy needs of a moderately active, *symptomatic* 25-year-old HIV-positive pregnant woman who weighs 55 kg.

Table 4. Energy requirements of a symptomatic 25-year-oldHIV-positive pregnant woman

Energy requirement	Kcal
Normal	2,140
Extra 20%–30% because of HIV	640
Extra because of pregnancy in 2nd and 3rd trimester	280
Total recommended daily energy intake	**3,060**

4.1.2. Protein

Table 5 lists the extra energy and protein requirements for healthy, non-HIV-positive women during pregnancy and lactation. Because pregnant and lactating women with HIV need to consume additional energy, their total protein intake will increase proportionally.

Table 5. Increased protein requirements during pregnancy and lactation

		Increased protein requirements
Pregnant	1st trimester	+12.0 g/day[1]
	2nd trimester	+6.1 g/day[1]
	3rd trimester	+10.7 g/day[1]
Lactating		+16.0 g/day for the first 6 months of lactation[1]
		+12.0 g/day for the second 6 months of lactation and 11.0 g/day thereafter[1]

Sources: [1] WHO. 1985. *Energy and Protein Requirements: Report of a Joint FAO/WHO/UNU Expert Consultation.* WHO Technical Report Series No. 724. Geneva.

4.1.3. Micronutrients

Pregnant women are particularly vulnerable to iron deficiency. Anaemia during pregnancy is a risk factor for infant and maternal morbidity and mortality. Because of the high prevalence of anaemia in Zambia, all women should take iron and folic acid supplementation during pregnancy and lactation regardless of their HIV status. In some cases, however, excessive amounts of iron can contribute to disease progression.

A daily multivitamin supplement may be beneficial for HIV-infected women.

4.2. Nutrition Care for HIV-Positive Pregnant and Post-partum Women

MUAC should be measured regularly for adult PLHIV who are pregnant or post-partum.

For all pregnant women, nutrition care should start as early as possible to maximise the well-being of mothers and infants. Health service providers should encourage pregnant women to do the following:

- Attend antenatal care (ANC) for weight monitoring and nutrition assessment as soon as they are aware of their pregnancy.
- Eat a diversified diet rich in nutrients and avoid foods with little nutritional value.
- Get more rest than usual, particularly in the third trimester.
- Share information on traditional foods and therapies or practices that could be beneficial or harmful during pregnancy and lactation.
- Use only clean, boiled water to drink and prepare food.
- Take iron and folic acid if pregnant and vitamin A within 6 weeks of delivery.
- Use iodised salt in foods to prevent iodine deficiency.
- Sleep under insecticide-treated mosquito nets.
- Seek recommended intermittent presumptive treatment and prompt treatment for malaria.
- Prevent and treat parasitic infestations such as malaria and worms to enhance adequate gestational weight gain.
- Seek help for breastfeeding problems.

For HIV-positive women, nutrition care before or during pregnancy is important to minimise the impact of HIV on nutritional status. Besides the recommended actions above, HIV-positive pregnant women should be counselled to do the following:

- Enrol in a PMTCT programme as early as possible in pregnancy for ARVs and counselling on nutrition and infant feeding in the context of HIV.
- Manage HIV-related symptoms (diarrhoea, nausea, vomiting, loss of appetite, and oral thrush) and food-drug interactions that can have a negative impact on nutritional status.
- Practice food safety and hygiene to avoid food-borne illnesses.

Chapter 5. Nutrition Care for Infants and Young Children of HIV-Positive Mothers

About two-thirds of infants born to HIV-positive mothers are not infected with HIV, even without any intervention. Approximately 5%–20% of infants born to HIV-positive mothers are infected through breastfeeding. The risk continues as long as the mother breastfeeds (De Cock et al. 2000; Nduati et al. 2000). Exclusive breastfeeding (breastfeeding only) for the first 6 months of life carries a lower risk of HIV transmission than mixed feeding (feeding breast milk and other liquids, foods, or milks during the first 6 months of life). All pregnant women should be encouraged to be tested for HIV so that they know their status and can receive the appropriate infant feeding counselling.

5.1. Feeding Infants of HIV-Positive Mothers for the First 6 Months of Life

In Zambia HIV-positive pregnant women are counselled and supported to breastfeed and receive ARVs.

WHO (2010) made the following recommendation on HIV and infant feeding: Mothers who are HIV positive and whose infants are HIV negative or of unknown status should breastfeed their infants exclusively for the first 6 months, introducing appropriate complementary foods thereafter, and continue to breastfeed for the first 12 months of life. Where available, both mothers and infants should receive ART to reduce the risk of HIV transmission during the breastfeeding period. Breastfeeding should stop only when mothers can provide a nutritionally adequate and safe diet without breast milk.

Policies that support exclusive breastfeeding in Zambia—the Baby-Friendly Hospital Initiative (BFHI), Maternity Protection, and the International Code of Marketing of Breast-Milk Substitutes—should be promoted, implemented, and enforced.

5.1.1. Exclusive Breastfeeding

To help HIV-positive mothers breastfeed exclusively for the first 6 months of life, health service providers should:

- Support them to position and attach their infants properly.
- Counsel them on the importance of continuing exclusive breastfeeding without giving any other foods or liquids, even water, for 6 months.
- Counsel them to seek immediate medical attention for sore or cracked nipples or mouth lesions or thrush in their infants; good breastfeeding techniques help reduce the risk of cracked nipples associated with HIV transmission during breastfeeding.

- Help them solve common breastfeeding difficulties such as “insufficient milk”.
- Help them make breastfeeding safer.
- Encourage them to attend well-baby under-5 clinics for infant growth monitoring and promotion (GMP).
- Show them how to express and discard milk from cracked nipples and from breasts affected by sores, nipple trauma, engorgement, and mastitis.
- At each contact, encourage them to continue to breastfeed exclusively.
- Encourage them to seek medical advice immediately for any illness.
- Counsel them to stop breastfeeding immediately if they develop symptoms of full-blown AIDS during the breastfeeding period.
- Counsel them to stop breastfeeding gradually over 1 month and continue taking ARV prophylaxis along with their infants until 1 week after breastfeeding is fully stopped.
- Counsel them on the importance of continuing Cotrimoxazole prophylaxis for severe pneumonia.

5.1.2. Exclusive Replacement Feeding

HIV-infected mothers should feed commercial infant formula milk as a replacement feed only when the following conditions can be met (WHO 2010):

- Safe water and sanitation are ensured in the household and in the community.
- The mothers or caregivers can reliably provide sufficient formula milk to support normal growth and development of the infants.
- The mothers or caregivers can prepare formula cleanly and frequently enough so that it is safe and carries a low risk of causing diarrhoea and malnutrition.
- The mothers or caregivers can feed infant formula milk exclusively in the first 6 months.
- Families are supportive of this practice.
- The mothers or caregivers can access health care that offers comprehensive child health services.

If HIV-positive mothers choose to replacement feed exclusively, health service provider should do the following:

- Show them or other caregivers how to prepare the formula.
- Assess and address any difficulties the mothers or caregivers may have.
- Give the mothers or caregivers information about the risks of mixed feeding.

Counsel the mothers or caregivers to introduce appropriate complementary feeding after the infants reach 6 months of age.

5.2. Nutrition Interventions for HIV-Infected Children over 6 Months Old

Regardless of their HIV status, all children need complementary foods from the age of 6 months. HIV affects the nutritional status of children just as it does that of adults. Stunted growth and failure to thrive are common in HIV-infected children. Children with HIV also have more frequent common childhood infections such as diarrhoea, ear infections, pneumonia, fever, chronic gastroenteritis, and TB. All these infections can affect nutrient intake, leading to malnutrition and higher risk of death. In addition, poor appetite, inability to suckle, swallowing difficulties, and nausea increase the risk of malnutrition for HIV-positive children. Children need to consume adequate amounts of macronutrients and micronutrients to meet the increased metabolic demands for illness, growth, and development.

With appropriate nutrition care, HIV-infected children can improve their nutritional status. Nutrition care should be part of comprehensive care and support and include the following interventions:

- Regularly assess all children of mothers with HIV or AIDS for feeding problems and signs of malnutrition. Weight and height should be measured regularly to calculate weight for height (WFH) for children under 5 years old and weight for age (WFA) for children 5–10 years old. BMI for age should also be considered for children and adolescents 5–19 years old and MUAC for children 6 months to 14 years old. Severe growth failure in HIV-infected children is associated with reduced survival. Early monitoring is critical because symptomatic HIV disease can impair growth. As soon as growth faltering is observed, appropriate nutrition interventions should start as part of a comprehensive assessment of children's health and nutrition. Children with HIV or children enrolled in the Integrated Management of Acute Malnutrition (IMAM) programme should be weighed regularly according to the national monitoring schedule.
- Support all HIV-infected children to consume adequate energy and nutrients.

Energy needs vary in HIV-infected children depending on the type and duration of HIV-related infections. Asymptomatic HIV-infected children need 10% more energy than uninfected children of the same age, sex, and activity level to help maintain growth. HIV-infected children who are losing weight need 50%–100% more energy than uninfected children of the same age, sex, and activity level.

Protein intake should be similar to that of uninfected children of the same age and sex (WHO 2003), although some increase is warranted when the children are symptomatic (e.g., have fever or diarrhoea). The increase in energy intake may call for increases in protein intake in terms of absolute amounts. The increase should be based on individual needs, severity of symptoms, and ability to meet the needs.

Specialised food products are not appropriate for infants under 6 months old because such food can interfere with exclusive breastfeeding, the recommended method of feeding for this age group unless otherwise indicated, and is usually not nutritionally adequate for infants on exclusive replacement feeding.

The following child clients may qualify for specialised food products in Zambia:

1. Orphans and vulnerable children (OVC) 6–23 months old
2. Malnourished OVC 24 months to 17 years old

Micronutrient intake is recommended at the same level as that for uninfected children. Children should receive biannual vitamin A supplementation (see annex 2).

Health service providers should do the following:

1. Review the appetite, diet, and food intake of HIV-infected children at every under-5 clinic visit to ensure appropriate feeding and adequate nutrient intake, to identify early growth faltering and other nutritional problems, and to initiate timely interventions.
2. Treat conditions that affect appetite and food intake appropriately.
3. Advise mothers and caregivers to improve the children's diet, taking into consideration age, resources, and family circumstances.
    - Feed foods rich in energy and other nutrients.
    - Enrich porridge with milk, sugar, pounded groundnuts, bean powder, or soya beans and oil.
    - Add a small amount of margarine or oil to the food of symptomatic children (with diarrhoea, nausea, or fat malabsorption) to increase energy intake.
    - Feed infants mashed fruits and vegetables such as ripe bananas, avocadoes, and pumpkin, as often as possible to increase energy and nutrient intake.
    - Feed children small frequent meals with nutritious snacks such as banana, avocado, mashed pumpkin, or boiled sweet potato between main meals.
    - Feed children actively and responsively, responding to their cues for hunger and encouraging them to eat.
    - Serve and feed children on their own separate plates to ensure adequate intake.
    - Give HIV-infected children a daily multivitamin supplement, if available, to prevent micronutrient deficiencies.
4. Counsel mothers and caregivers on good hygiene and food and water safety.
5. De-worm children every 4–6 months.
6. Counsel mothers and caregivers to seek medical care as soon as possible if the children have any secondary infections (such as skin infections, which occur during or immediately after treatment for

another infection or disease) and maintain their food and fluid intake to reduce the nutritional effect of these infections.

7. Make sure HIV-infected children receive all other child health and survival interventions, such as immunisations, on the same schedule as uninfected children.
8. Refer symptomatic HIV-infected children for medical treatment.

Annex 9 is a simple algorithm for NACS in children 6 months to 14 years old.

Children with HIV should be followed up using the national children's clinic card and approved immunisation schedule as part of GMP. Severely malnourished HIV-infected children without complications should be managed at the community level. Severely malnourished HIV-infected children with complications should be referred to a hospital for management of complications and nutrition rehabilitation. Malnourished children with HIV should be treated according to the national IMAM guidelines and followed up within the GMP framework.

Chapter 6. Nutrition and Antiretroviral Therapy

PLHIV may take various medications to treat HIV, opportunistic infections, and other common ailments such as colds, malaria, and intestinal parasites. Some PLHIV also take herbal remedies and micronutrient supplements. There is no cure for HIV, but ARVs can mitigate the effects of HIV by lowering the viral load, thus reducing morbidity and mortality. ARVs are divided into the following types:

- Non-nucleoside reverse transcriptase inhibitors
- Nucleoside reverse transcriptase inhibitors
- Protease inhibitors
- Fusion inhibitors (entry inhibitors)

ARVs are usually given in combination (combination therapy) to produce a synergistic effect. This is currently the recommended method of treating HIV-infected clients.

6.1. Drug-Food Interactions

Interactions between drugs and food can affect the effectiveness of medicines, nutritional status, and adherence to drug regimens. Drug-food interactions fall into the following categories:

- Drugs may alter nutrient absorption, metabolism, distribution, and excretion, thus affecting nutritional status.
- Food may affect the absorption, metabolism, distribution, and excretion of drugs.
- Some drugs may lower food intake or absorption.
- Many drugs have diet restrictions (e.g., avoiding milk and milk products when taking tetracycline).
- Drug side effects may include loss of appetite/anorexia, changes in taste, diarrhoea, fatigue, depression, loss of sleep, and pain, which are likely to lower food intake.

Health service providers should give PLHIV updated information on drug-food interactions to mitigate the side effects of medications. Annex 10 summarises the interactions between food and ARVs commonly given in Zambia, and annex 11 describes how to counsel PLHIV on nutrition and ARVs. This information can also be obtained from health facilities that provide ART services; peer groups; nutrition counsellors; and the websites of WHO, UNAIDS, NAC, and the Food and Nutrition Technical Assistance Project II (FANTA-2).[1]

[1] WHO, http://www.who.int/nutrition/publications/infantfeeding/en/index.html; UNAIDS, http://www.unaids.org; NAC, http://www.nac.org.zm; FANTA-2, http://www.fanta-2.org.

6.1.1. Sequencing Drugs and Food to Increase Drug Effectiveness

Different foods can enhance or inhibit the absorption, metabolism, distribution, and excretion of drugs. All PLHIV should be educated, advised, and counselled on sequencing drug and food intake to increase the effectiveness of their medicines.

Because food can reduce the absorption of Isoniazid, which is used to treat TB, Isoniazid should be taken 1 or 2 hours after a meal. Fatty foods can reduce the absorption of most ARVs, including AZT and Efavirenz (EFV/Stocrin). Certain ARVs affect the body's use of nutrients. Stavudine (d4T) may change the way the body uses fat and carbohydrates. Increased intake of fatty foods can increase the risk of heart problems. Increased intake of sugary foods raises blood sugar levels, increasing the risk of diabetes. A high-fat meal increases the bioavailability of the ARV Tenofovoir, whereas a high-fat or high-protein meal decreases the absorption of Indinavir.

Health service providers should help PLHIV and their caregivers make timetables to take drugs in relation to meals and adhere to these plans to reduce the negative effects of drug-food interactions.

6.1.2. Modifying the Diet to Enhance Nutrient Absorption and Metabolism

Health service providers should counsel and advise PLHIV on ART on diet modifications that may be needed to enhance nutrient absorption and metabolism. Some medications interact with certain nutrients in foods, affecting their absorption, metabolism, distribution, and excretion and thus reducing their effectiveness. Because the TB drug Isoniazid inhibits the metabolism of vitamin B6, supplementation of vitamin B6 is recommended to avoid its depletion and symptoms associated with its deficiency. Some ARVs produce metabolic disorders that elevate levels of triglycerides and cholesterol, fat maldistribution, and insulin resistance (which may lead to diabetes). PLHIV taking these drugs may have to modify their diets, avoid alcohol and smoking, and take medications to lower the lipid levels.

6.1.3. Modifying the Diet to Improve Drug Effectiveness

Health service providers should counsel PLHIV on foods to eat or avoid to improve the effectiveness of their medications. For example, PLHIV who are taking the drug Idinavir should avoid grapefruit juice because it lowers the drug's effectiveness. Drinking alcohol may cause liver and pancreas problems for PLHIV who are taking Didanosine. PLHIV who are taking Zidovudine, Lamivudine, and the anti-TB drugs Rifampicin and Isoniazid should avoid alcohol. See annex 10 for ARVs prescribed in Zambia and their potential side effects and interactions with food.

6.1.4. Managing ARV Side Effects through Diet

Health service providers should advise PLHIV of side effects of ARVs that might result in poor nutrient intake and absorption, weight loss, and malnutrition and counsel them on how to mitigate those effects. Such side effects include nausea, vomiting, loss or change in taste, loss of appetite, bloating and heartburn, constipation, and diarrhoea. Annex 10 lists dietary actions to manage side effects of common ARVs in Zambia.

Various complications have been recognised in PLHIV who are on ART for a long period. These include disorders of lipoprotein, glucose, and bone metabolism.

Highly active ART (HAART) is associated with **dyslipidaemia**, a disorder of lipoprotein metabolism that raises levels of total cholesterol or "bad" low-density lipoprotein (LDL) cholesterol and triglyceride concentrations in the blood and decreases levels of "good" high-density lipoprotein (HDL) cholesterol. Dyslipidaemia is a consideration in many situations including diabetes, a common cause of lipidaemia. The ARV Ritonavir predominantly affects triglycerides. Protease inhibitors have the most affect on lipids, followed by non-nucleoside and nucleoside reverse transcriptase inhibitors. Dyslipidaemia is associated with an increased risk of atherogenesis and artherosclerosis, raising concern that PLHIV living longer on HAART may have an increased risk of coronary or cerebral vascular morbidity and mortality. About half of patients with dyslipidaemia have abdominal obesity. Clients should be counselled to increase exercise, fruit and vegetable intake, intake of omega-3 fatty acids from fish and plant sources, and the proportion of mono- and polyunsaturated fats in the diet, as well as to reduce intake of refined carbohydrates and sugar and decrease intake of saturated fats and trans-fatty acids to less than 7% of total calories. Measuring LDL, HDL, and total cholesterol and triglyceride levels every year is recommended for adults on HAART. Optimal LDL cholesterol levels for adults with diabetes are less than 100 mg/dL (2.60 mmol/L), and optimal HDL cholesterol levels are equal to or greater than 40 mg/dL (1.02 mmol/L).

Disorders of glucose metabolism, or **dysglycaemia**, were one of the first metabolic complications identified with ART. Dysglycaemia is usually diagnosed through periodic fasting glucose determinations or a 2-hour oral glucose tolerance test. Glycosylated Hb levels are usually normal, even in the setting of insulin resistance. Mild cases respond to dietary intervention (reducing intake of refined carbohydrates, sugars, and poor-quality fats) and exercise. Moderate cases respond to insulin-sensitising agents such as the glitazones, and severe cases respond to insulin therapy. Replacing protease inhibitors with non-protease inhibitors may also be successful.

Osteopaenia and osteoporosis have both been described in patients on HAART. The cause has not been established, although the HIV-1 protease inhibitors may affect osteoclast or osteoblast differentiation. Diagnosis is done by standard DEXA scanning. Routine DEXA scanning is not indicated for all PLHIV but should be considered for PLHIV who have other risk factors for

osteoporosis such as family history, hypogonadism, smoking, and corticosteroid use. Preliminary studies have shown that alendronate is effective in treating osteoporosis in these patients. Dietary management should include reducing intake of meat, fish, grains, legumes, nuts, sweet carbonated drinks, and caffeine; reducing smoking; and increasing intake of calcium-rich foods (green vegetables, fruit, and dairy products).

Lipodystrophy is a disturbance in the way the body produces, uses, and distributes fat. PLHIV, especially PLHIV on ART, may show changes in body shape from changes in fat distribution. Cohort studies have estimated that up to 50% of ART clients suffer from lipodystrophy. Lipoatrophy, or subcutaneous fat loss, is most commonly seen in the face, extremities, and buttocks. Lipohypertrophy, or increased deposit of fat, is most often seen in the abdominal region ("paunch"), dorsocervical region ("buffalo hump"), and breasts. PLHIV often have a combination of the two types. A recent prospective study of PLHIV initiating ART showed an association between a Stavudine (d4T)-containing regimen and lipoatrophy and between a protease inhibitor-containing regimen and lipohypertrophy. There is no definitive treatment for fat maldistribution. For lipoatrophy, studies have shown a possible association with substitution of either AZT or Abacavir (ABC) for Stavudine with small increases in subcutaneous fat, compared to continued declines in those remaining on Stavudine. For lipohypertrophy, replacement of the protease inhibitor with a reverse transcriptase inhibitor may be useful.

6.1.5. Modifying the Diet to Increase Consumption of Nutritious Foods

Lack of adequate food may make it difficult for PLHIV to manage drug-food interactions and might result in their discontinuing ART. Health service providers should counsel PLHIV to eat locally available and affordable foods as dictated by specific drug-food interactions. They should also refer PLHIV to food support where available. Families and caregivers who are informed about drug-food interactions can help PLHIV manage them and support intra-house food distribution that favours PLHIV. Health service providers should do the following to help PLHIV manage drug-food interactions and support ART:

- On every contact, stress the importance of following instructions on the use of drugs, including completing the full course. Taking intermittent doses of ARVs and sub-optimal levels of drugs can lead to ARV-resistant strains of HIV.
- Counsel the client to avoid alcohol and recreational drugs, which may interfere with ART.
- Counsel the client to avoid self-prescribed medications.
- Caution the client about herbs that may be sold under the pretext of curing HIV or opportunistic infections.
- Record drug side effects and actions taken to manage those side effects and refer all abnormal reactions to a health facility.

- Inform the client that there are no established methods to treat lipodystrophy or redistribution of fat in the body as a side effect of ARVs.
- Encourage exercise to reduce fat accumulation and improve blood triglyceride levels.

Seek regular updates on side effects of drugs and drug-food or drug-nutrient interactions and best management practices.

6.2. Herbal Treatments and Diet Supplements

Many Zambians use herbal and traditional medicines to treat ailments. Annex 12 describes the benefits of common herbs and spices and ways to use them. Herbs and spices can enhance the taste and smell of food and improve appetite, but they may also interfere with the effects of drugs, have negative effects on the body, and/or restrict food intake. Many of these foods have not been subjected to formal clinical research, and their toxicity and effect on the course of HIV infection are unknown.

PLHIV can use herbal and traditional medicines as long as these preparations:

- Do not interfere with drug treatment (e.g., high doses of garlic may reduce the effectiveness of Saquinavir and St. John's wort reduces the effectiveness of Nevirapine, Indinavir, and Ritonavir)
- Are used as supplements and not as replacement for standard therapy
- Have the potential to prevent, alleviate, or cure symptoms (e.g., lower blood pressure, increase energy, improve digestion, reduce severity of diarrhoea, or reduce depression)
- Are not toxic and do not overburden the body's ability to metabolise and eliminate them

Health service providers should ask PLHIV if they are taking herbs and traditional therapies and advise them about any harmful effects these may have (for example, fasting can cause weight loss). Health service providers should also inform clients about the benefits and negative side effects of herbal preparations.

Dietary supplements are available as single or multiple micronutrients alone or with herbal formulations. Supplements containing micronutrients and selected amino acids alone or with herbs are also available. Some health-promoting bacterial cultures (probiotics) and materials that promote growth of bacteria associated with good gut flora (prebiotics) or their combination (symbiotic) may play a significant role in nutritional care of PLHIV. However, taking several of these formulations at the same time may increase the risk of overload and side effects. This risk is greater for fat-soluble vitamins (vitamins A, D, E, and K) than for water-soluble vitamins.

Chapter 7. Food and Water Safety and Hygiene

“Safe” food and water contains no dangerous germs or toxic chemicals at levels that could cause health risks. Diarrhoea is the most common symptom of illness from contaminated food and water. Anyone can get a food- or water-borne illness, and even healthy people sometimes have stomach pains, diarrhoea, nausea, or vomiting from eating contaminated or spoiled food or drinking unclean water.

A healthy person’s immune system is well equipped to fight harmful germs, but a PLHIV’s immune system is not. Food and water safety are important for PLHIV because their low immunity puts them at higher risk of infection. They also experience more severe symptoms of food- and water-borne illness, which are more likely to cause serious conditions such as meningitis and can affect nutrient intake and absorption and increase the need for nutrients to fight infection. PLHIV may also have a hard time recovering from illness. Food- and water-borne illness can cause weight loss and further lower the body’s resistance to other infections.

7.1. Causes of Food- and Water-Borne Illness

Germs are very small living things, so small that they cannot be seen with the naked eye. It takes a million germs to cover the head of a pin. Bacteria, viruses, yeasts, moulds, and parasites are all germs. Some germs can be useful for making food and drinks such as yoghurt and beer and medicines such as penicillin, as well as helping digest food in the gut. But dangerous germs can make people sick and even kill them.

Germs are everywhere. All living things carry them. Humans carry them in their mouths and intestines and on their skin, hands, and fingernails, but germs are mainly found in human and animal faeces, soil (1 teaspoon of soil contains more than 1 billion germs), and contaminated food and water. Most of these germs do not change the appearance, taste, or smell of food or water.

To move around, germs rely on someone or something. Hands are one of the most common ways to move germs. Raw and under-cooked chicken, meat, fish, and eggs; milk; contaminated raw vegetables; raw and smoked fish, and unsafe water are ideal conditions for germs to multiply.

Toxins are another cause of food and water contamination. These toxins and chemicals include natural toxins, metals, and environmental pollutants; chemicals used for treating animals; improperly used pesticides; chemicals used for cleaning; and some food additives.

Aflatoxin, a natural toxin which may be caused by mould growing on maize and groundnuts stored in damp places, may have harmful effects on the liver that can lead to cancer. If not processed well, some cassava varieties may cause cyanide poisoning, which in severe cases may lead to kidney failure and death. Washing and peeling fruits and vegetables may reduce risk from chemicals found on the surface of foods, and appropriate storage can help avoid or reduce the formation of some natural toxins.

People who live or eat food grown near highways or roads in areas where most vehicles use leaded fuel may have increased levels of lead in their bodies. Lead is toxic to many organs and tissues and interferes with the development of the nervous system, causing learning and behavioural problems in children. People can also be exposed to lead from contaminated water, soil, food, and consumer products. Cookware and utensils glazed with materials containing heavy metals such as lead or cadmium can cause chemical poisoning.

Chemicals used for cleaning can be toxic. It is important to read and understand the instructions on the labels of these products.

7.2. Food Safety

No food is 100% safe at all times for all people, but PLHIV can reduce the risk of disease from contaminated food by following the simple rules below.

1. Wash hands properly—this is one of the most effective way to prevent disease.
    - Wash hands with running water and soap or ashes,
    - Rub hands together to make a lather and scrub all surfaces for 15–20 seconds.
    - Rinse hands well under clean running water.
    - Wash hands before handling food and during food preparation and after going to the toilet, sneezing, or blowing your nose, changing or cleaning an infant, or touching animals.
2. Keep food preparation areas and utensils clean.
    - Wash all surfaces and equipment used for food preparation or serving.
    - Protect kitchen areas and food from insects, pests, and other animals.
    - Store kitchen utensils out of reach of pests and other animals.

    IMPORTANT: Sharing eating utensils with PLHIV cannot spread HIV.
3. Separate raw and cooked food.
    - Separate raw meat, poultry, fish, and seafood from other foods.
    - Use separate equipment and utensils such as knives and cutting boards for handling raw foods.
    - Store foods in covered containers to avoid contact between raw and cooked foods.

4. Eat clean, safe food.
    - Wash fruits and vegetables well in clean, safe water.
    - Throw away bruised, mouldy, or rotten fruit or vegetables.
    - Do not buy cracked eggs.
    - Do not eat raw eggs, meat, or fish.
    - When cooking meat or poultry, make sure juices are clear, not pink.
    - Bring soups and stews to a boil.
    - Keep food well covered to keep flies and other insects away from it.
    - Reheat cooked food thoroughly, bringing it to a boil, or heating it until too hot to touch.
    - Drink pasteurised milk or boil unpasteurised milk before using.
    - Cover all wounds to prevent contamination of food during preparation and handling.
    - Avoid eating street food (*nshima*, stew, fried vegetables, smoked sausages, *buka buka* fish, offal, *ifisashi*) because vendors may not use safe and hygienic practices.
5. Store food properly.
    - Keep food storage areas dry and clean.
    - Do not eat packaged food that has passed its expiry date.
    - Do not eat food from dented or bulging tins.
    - Store food where insects and rodents that carry germs that can contaminate food can't reach it.
    - Do not leave cooked food out at room temperature for more than 2 hours.
    - Do not eat food that has been frozen, thawed, and then refrozen.
    - Serve freshly prepared food to PLHIV and infants and young children—do not store it after cooking.
6. Bury or burn garbage or dispose of it as far away from the home as possible.

7.3. Water Safety

Contamination of water during collection, transport, and home storage is a serious health risk for everyone in the family, but especially for PLHIV, who are most vulnerable to infection. Several studies have shown an increased risk of diarrhoea because of inadequate water storage. Storage vessels with wide openings such as pots or buckets are easily contaminated with faeces when people use cups, dippers, or hands to take out water. Water can also be contaminated by flies, cockroaches, and rodents. PLHIV can reduce the risk of disease from contaminated water by following the simple rules below.

1. Boil or treat water used for drinking, preparing food, and taking medicines.
    - If water looks dirty, let it settle until it is clear and pour it into a new container, leaving the dirt behind, OR filter it through a clean cloth.

- Then boil the water until large bubbles appear OR treat the water with chlorine or another disinfectant recommended by the health service provider to destroy germs.

2. Store water safely.
   - Store cooled boiled water or treated water in a safe container with a small opening, a tight-fitting lid and if possible a tap (spigot).
   - Clean water containers regularly with soap and clean water.
   - Do not scoop the water out with a cup or bowl—use a ladle.
   - Do not drink boiled water that has been stored for more than 24 hours, as it can easily become contaminated again.

Chapter 8. Food Security in Households with PLHIV

The 1996 World Food Summit defined food security as “all people at all times having access to sufficient, safe, and nutritious food to maintain a healthy and active life”. Household food security depends on income and assets, including land and other productive resources. HIV reduces families’ ability to produce and purchase food because of the disease’s impact on productive labour, income, and food stores. Households with PLHIV tend to reduce portion size or skip meals and to divert earnings and savings to meet health care and funeral costs. Economic pressures may lead to poverty and increase vulnerability to risky behaviour, such as providing sex for food and money, child labour, crime, and drug abuse.

HIV and AIDS affect all four components of food security: availability, access, utilisation, and stability (U.S. Government 2010). These components are defined below.

- **Availability:** Reliable and consistent source of quality food through production, imports, or aid
- **Access:** Sufficient resources to purchase appropriate foods to maintain an adequate diet
- **Utilisation:** Knowledge and basic sanitary conditions to choose, prepare, and distribute food in a way that results in good nutrition for all family members
- **Stability:** Stable and sustained ability to access and utilise food over time

The following nutrition actions can help PLHIV and families affected by HIV improve their food security:

- Assess the nutritional and economic vulnerability of HIV-affected households to identify needed support.
- Refer economically vulnerable PLHIV and their households to programmes that provide food support, cash transfers, training for income generation, micro-credit, or improved access to financing, such as the food security pack programme supported by the Ministry of Community Development and Social Services.
- Refer vulnerable PLHIV who depend on agriculture for their livelihood to programmes that provide inputs for sustainable food production and lobby for the prioritisation of PLHIV in such programmes. These include the farmer input support programme of the Ministry of Agriculture and Cooperatives and others that provide linkages to markets and marketing agents and access to labour-saving technologies such as safe and efficient cooking facilities, efficient and hygienic food preservation methods, lighter agricultural tools, and crops that require less tillage. Link PLHIV to village support systems

that provide labour for land clearing, ploughing, weeding, harvesting, and food storage.

- Provide food packages to PLHIV, child-headed households, and HBC clients according to strict eligibility criteria.
- Help PLHIV and HIV-affected households plan for the “hungry season” when supplies of some foods are low or nonexistent.
- Promote consumption of nutritious root vegetables, local vegetables and fruits, nuts, insects, and oilseeds.
- Include nutrition education for PLHIV in community-based gardening and poultry and small livestock-rearing initiatives.

Chapter 9. Community Participation in Nutrition Care and Support for PLHIV

In the course of opportunistic infections and recurrent episodes of illness, PLHIV face loss of income, medical expenses, isolation, increased nutritional needs, and lack of household necessities. Family members, community and religious leaders, volunteers, government officials, NGOs, and other community groups can provide essential support to help PLHIV maintain their dignity and quality of life.

Various constraints can prevent PLHIV from seeking access to nutrition care and support. They may be reluctant to seek care because of the stigma associated with HIV. They may not realise the importance of nutrition in maintaining health and maximising the effectiveness of treatment. They also may not know about existing services or live far from outpatient care sites.

Community outreach and mobilisation are essential components of both care and support of PLHIV and management of malnutrition. Community outreach fosters coordination, collaboration, and communication between ART and PMTCT services and community-based services for referral and follow-up. Community mobilisation involves the community in case-finding, awareness raising, and follow-up and encourages community involvement in nutrition and HIV interventions. Providing outpatient care without community outreach rarely results in high service coverage or uptake. In fact, community case referrals may represent the bulk of admissions in health facility nutrition care and support programmes.

The aims of community outreach in the context of nutrition and HIV are listed below.

- Increase understanding of the importance of nutrition for PLHIV.
- Empower community members to make others aware of NACS services.
- Strengthen case-finding and referral for care.
- Increase client coverage and follow-up.
- Allow early detection and follow-up of malnourished PLHIV and children to improve clinical outcomes and relieve the strain on inpatient services.
- Provide an alternative source of nutrition information and counselling where PLHIV hesitate to visit health facilities because of HIV-related stigma.
- Link prevention and treatment of malnutrition.

Channels of community outreach for management of malnutrition in PLHIV include the following:

1. **Community health workers** can be trained and equipped to identify, support, and monitor malnourished PLHIV and provide emotional, material, and counselling support to caregivers. They can measure MUAC, identify bilateral pitting oedema, and assess dietary habits and the nutrient content of household foods. They can also provide nutrition education, demonstrate safe preparation of nutritious meals, and refer malnourished PLHIV to health facilities for further nutrition assessment and counselling and to food assistance and livelihood support.
2. **Health posts and health centres** can participate in nutrition and HIV training, provide material support (e.g., soap, disinfectants, gloves, and drugs for common ailments) to PLHIV caregivers, and display posters or disseminate brochures in local languages about the signs and risks of malnutrition.
3. **District authorities and community leaders** can mobilise communities to take advantage of available nutrition support and disseminate information on good nutrition and hygiene practices through community outreach, radio, and community meetings.
4. **PLHIV networks and support groups** can provide psychosocial support and encourage their members to be weighed regularly, enrol in PMTCT programmes, and practice recommended nutrition actions for PLHIV. They can also refer malnourished members to services.
5. **Local media** can broadcast or print messages about where to access NACS services and eligibility criteria for specialised food products.

Chapter 10. Data Collection and Management

Collecting and reporting nutrition information is an important component of HIV care and support. This information is needed to monitor the outcomes and impacts of food and nutrition interventions, inform and improve food and nutrition programming, and increase awareness of the importance of diet and nutritional status among PLHIV and health service providers.

10.1. Purpose of Nutrition Data Collection

Health service providers should collect and report data on the nutritional status of PLHIV clients regularly to:

- Inform and improve programme design, implementation, supervision, and management.
- Share information with other programmes and stakeholders to improve programming and support advocacy for nutrition services.
- Report progress and results to national governments and donors.
- Inform and educate clients about progress in improving their nutritional and functional status.
- Inform health service providers of client status and progress to guide care, treatment, and counselling.
- Determine eligibility of clients for services such as prescription of specialised food products.
- Evaluate the impact of policy implementation and service delivery.
- Inform resource allocation.

10.2. Challenges in Nutrition and HIV Data Collection and Management

All data management is challenging, but these challenges are compounded in nutrition programmes for PLHIV. The health and nutritional status of many PLHIV inevitably declines over the long run, especially if they are not on ART. Many ART clients are lost to follow-up, which may affect the interpretation of results. Changes in nutritional status or other outcomes cannot be attributed to nutrition assessment, education, counselling, and food supplementation alone because many other factors, including economic difficulties, play a role. Nevertheless, regular data on the nutritional status of PLHIV are critical to guide and improve interventions.

Below are some common obstacles faced in collecting and analysing nutrition data on PLHIV and suggested ways to address them.

- **Clients may feel that the questions health service providers ask are intrusive or exploitative.** Collecting data from PLHIV can raise the fear of stigma and discrimination. Health service providers should let clients know that the information will be kept confidential and under lock and key, especially if clients' names are recorded. Unless the information is for health care purposes, it should not be shared with other people without the permission of the client.

- **Collecting data takes a lot of time and increases staff workload.** It is important that health service providers understand why they are asked to collect nutrition data on PLHIV and that they receive clear guidelines and support from supervisors and regular feedback on the data they collect and submit to higher levels.

- **It may not be clear who is responsible for collecting and reporting nutrition data.** If there is no nutritionist in the health facility that provides HIV services, the health manager should clearly delegate staff responsible for nutrition data collection on PLHIV clients and establish a structure and system for this purpose.

- **Health care facilities may lack standard data collection tools.** Weak data collection systems generate incomplete and inaccurate data that may be useless for decision making or for the central level. To the extent possible, there should be agreement at national level on a standard format and tool for collecting and reporting nutrition and HIV data. Districts should be supported in distributing the tool to all relevant facilities. Health facility managers should ensure that responsible staff are trained to use the forms, recording data on every client visit in the same way every time (including noting when a service was not provided), and compiling and submitting data according to schedule.

10.3. Nutrition and HIV Indicators

Table 6 suggests indicators for monthly retrospective nutrition data collection in ART and PMTCT sites in Zambia.

Table 6. Proposed indicators for nutrition data collection

Indicator	Children 0–17 years old		Adults 18 years old and older	
	Female	Male	Female	Male
1. Total number of clients seen in the past month				
2. Total number (or percentage) of clients who received individual nutrition counselling in the past month				
3. Number of clients weighed in the past month				
4a. Number of non-pregnant, non-lactating adults with BMI < 16 kg/m^2 OR MUAC < 18.5 cm OR bilateral pitting oedema				
4b. Number of pregnant and lactating women with MUAC < 21.0 cm				
4c. Number of children under 14 with WFH < –3 standard deviation (SD) OR bilateral pitting oedema				
4d. Number of children 6–59 months old with MUAC < 11.5 cm				
4e. Number of children 5–9 years old with MUAC < 13.5 cm OR bilateral pitting oedema				
4f. Number of children 10–14 years old with MUAC < 16.0 cm OR bilateral pitting oedema				
4g. Total number of severely malnourished clients (add lines 4a through 4f)				
5a. Number of non-pregnant, non-lactating adults with BMI < 18.5 kg/m^2				
5b. Number of pregnant and lactating women with MUAC < 23.0 cm				
5c. Number of children < 14 with WFH < -2 SD				
5d. Number of children 6–59 months old with MUAC < 12.5 cm				
5e. Number of children 5–9 years old with MUAC < 14.5 cm				
5f. Number of children 10–14 years old with MUAC < 18.5 cm				
5g. Total number of moderately malnourished clients (add lines 5a through 5f)				
6. Number of clients who received specialised food products				
7. Number of clients discharged from provision of specialised foods on meeting discharge criteria				
8. Number of clients who died during the reporting period				
9. Number of clients lost to follow-up				

The following indicators are suggested to capture information on training and service provision:

- Number of health service providers trained in nutrition and HIV using the MOH/NFNC course
- Number of sites providing nutrition assessment and counselling for PLHIV
- Number of sites with functioning nutrition assessment equipment
- Number of sites with updated *Nutrition Guidelines for Care and Support of People Living with HIV or AIDS*
- Number of sites with nutrition and HIV counselling materials and job aids

The MOH uses the SmartCare electronic health record system, developed with CDC and other implementing partners, to capture data from ART sites. This clinical information management system used at facility and district levels records but does not usually analyse most of the data referred to in table 6 above. Health service providers who work with PLHIV should become familiar with this information system. The National Health Management Information System contains data on a limited number of nutrition-related indicators.

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Annex 1. Macronutrients and Micronutrients Needed for Good Nutrition

Nutrient	Source	Function	Signs and symptoms of deficiency
Macronutrients (nutrients the body needs in large amounts)			
Protein	Beef, game meat, fish, poultry, beans, dried peas, groundnuts, edible insects, (e.g., *ifinkubala*, *inswa*), milk and milk products, eggs, soya beans, dried mushrooms	• Building, repairing and maintaining body tissues • Resistance to infection	• Protein energy malnutrition • Marasmus (wasting) • Kwashiorkor • Anaemia • Failure to thrive
Carbohydrate	Maize meal, millet meal, sorghum meal, cassava meal, rice, potatoes, sweet potatoes, cassava, bread, yams	• Energy production • Prevention of constipation, coronary heart disease, and diabetes and treatment of diarrhoea (fibre in carbohydrates)	• Protein energy malnutrition • Marasmus (wasting) • Kwashiorkor • Fatigue • General body pain
Fat	Edible insects (e.g., *tunkubyu*, *inswa*, *matingatila*), cooking oil, margarine, cream, groundnuts, avocados	• Stores excess energy for body to retrieve when it needs it • Insulates organs against shock • Maintains body temperature • Promotes healthy cell function	• Marasmus (wasting) • Skin problems • Anaemia • Hypothermia (sub-normal body temperature)

Nutrient	Source	Function	Signs and symptoms of deficiency
Micronutrients (nutrients the body needs in smaller amounts)			
Vitamin A (fat soluble, so poorly absorbed by people who eat low-fat diets)	Carrots, eggs, liver, mangos, papaya, pumpkins, green leafy vegetables, yellow sweet potatoes, red palm oil, full-cream milk (when fortified), cheese, butter, amaranthus (*ibondwe*), cassava leaves (*katapa*), cowpea leaves, sweet potato leaves (*kalembula*), turnips, wild fruits, fortified sugar, fortified maize meal	• Vision • Gene transcription • Reproduction • Growth of epithelial and other cells • Resistance to infection • Skin health • Maintenance of skin, mucous membranes, bones, teeth, and hair	• Dry eyes • Night blindness • Dry skin • Dry hair • Blindness • Skin infections • Growth retardation in children
Vitamin B1 (thiamine)	Whole-grain cereals, beef, pork, kidneys, liver, poultry, fish, milk, eggs, oil, seeds and legumes, bambara groundnuts, soya beans, cashew nuts, cowpeas	• Energy production • Appetite promotion • Support for central nervous system	• Beriberi (nervous system ailment marked by severe lethargy and fatigue and cardiovascular and gastrointestinal problems) • Appetite loss • Nausea • Numb hands and feet
Vitamin B2 (riboflavin)	Milk, eggs, liver, meat, fish, yoghurt, green leaves, whole-grain cereals, legumes, *ibondwe*, okra leaves	• Energy production • Vision • Skin health	• Cracked mouth corners • Cracked lips • Rough skin

Nutrient	Source	Function	Signs and symptoms of deficiency
Micronutrients (nutrients the body needs in smaller amounts)			
Vitamin B3 (niacin)	Milk, eggs, meat, poultry, fish, peanuts, whole-grain cereals, unpolished rice, cassava, potatoes, sweet potatoes, yams, beans, soya beans, cowpeas, groundnuts, bambara groundnuts, cashew nuts, pumpkin seeds, carrots, cauliflower, cowpea leaves, eggplant, mushrooms, okra, peppers, caterpillars, sweet potato leaves, avocados, guavas, mangos, pawpaw	• Energy production • Healthy skin	• Pellagra (lesion on skin exposed to sun, dermatitis, irritability, diarrhoea, confusion, mucous membrane inflammation, depression) • Fatigue • Forgetfulness • Nausea or vomiting • Appetite loss • Mouth sores • Headache • Anaemia • Trouble sleeping or relaxing
Vitamin B6	Legumes (white beans), potatoes, meat, fish, poultry, shellfish, watermelon, oil seeds, maize, avocado, broccoli, green leafy vegetables, peppers, bananas, groundnuts, soya beans, liver	• Breakdown of protein and fats • Production of antibodies, red blood cells, protein, and neurotransmitters	• Anaemia • Fatigue • Irritability • Depression • Dizziness • Muscle twitching • Nerve problems
Vitamin B12	Meat, fish, poultry, cheese, eggs, milk, liver, grubs	• Formation of red and white blood cells • Maintenance of nerves and digestive tissue	• Anaemia • Fatigue • Confusion • Numbness • Nerve problems • Memory problems • Ringing in the ears
Vitamin C	Guavas, oranges, lemons, cabbage, green leaves, tomatoes, peppers, potatoes, yams, cooked plantains, wild fruits	• Use of calcium and other nutrients to build bones and blood vessels • Non-haeme iron absorption • Immune function • Prevention or delay in oxidative damage • Protein metabolism	• Scurvy (bleeding of the gums) • Gingivitis (bleeding, sore, and inflamed gums) • Stomatitis (sores on corners of the mouth) • Anaemia

Nutrient	Source	Function	Signs and symptoms of deficiency
Micronutrients (nutrients the body needs in smaller amounts)			
Folic acid	Liver, green leafy vegetables (*kalebwe*/ *kalembula*, *chibwabwa*, *katapa*, *ibondwe*), fish, pork, kidneys, legumes, groundnuts, oil seeds	• Healthy teeth, gums, and bones • Resistance to infection • Iron absorption	• Bleeding gums • Poor hearing • Frequent infections • Anaemia • Muscle and joint pain • Depression
Vitamin E	Green leafy vegetables, (*kalebwe*/ *kalembula*, *chibwabwa*, *katapa*, *ibondwe*), vegetable oils and wheat germ, whole-grain products, butter, liver, egg yolk, groundnuts, milk fat, nuts, seeds	• Increases resistance to infections • Helps reproduction • Slows aging • Treats scar tissue • Prevents or slows oxidative damage	• Fatigue • Dry hair • Leg cramps • Muscle weakness • Nerve problems • Hearing problems • Infertility • Impotence
Calcium	Milk, yoghurt, cheese, green leafy vegetables, broccoli, dried fish with bones that are eaten, legumes	• Builds strong bones and teeth • Helps heart function (including normal blood pressure) • Helps prevent blood clots	• Delayed blood clotting • Weak and breakable bones • Problem teeth • Low resistance to infection • Rickets (weak bones, common in children) • Stunting
Iodine	Seafood, iodised salt	• Brain and nervous system development and functioning • Growth and development • Reproduction	• Goitre (swelling on the neck) • Cretinism (imbecility) • Impaired brain function • Dwarfism (gross stunting) • Abortion
Zinc	Meat, fish, poultry, shellfish, whole-grain cereals, legumes, groundnuts, milk, cheese, yoghurt, vegetables	• Protection of digestive and immune systems • Enzyme formation • Wound healing • Vitamin A metabolism • Development of male organs • Prevention or delay of oxidative damage	• Slow growth • Loss of smell and taste • Loss of appetite • Diarrhoea • Poor wound healing • Skin problems • Ringing in the ears • Prostate cancer

Nutrient	Source	Function	Signs and symptoms of deficiency
Micronutrients (nutrients the body needs in smaller amounts)			
Selenium	Brown rice and other whole grains, nuts, onions, garlic, egg yolk, milk, meat, seafood	• Prevents breakdown of fat and other body cells • Prevents or slows oxidative damage	• Weakness • Pancreatitis (blockage of pancreatic ducts) • Impaired growth • Impaired hearing • Faster HIV progression and reduced survival • Impaired immune system
Magnesium	Legumes, nuts, seeds, whole grains, avocados, green leafy vegetables, okra, broccoli, cucumber skin, seafood	• Muscle and nerve function • Release of energy from fats, proteins, and carbohydrates • Strong bones and teeth	• Spasms (muscle twitching) • Cramps • Tremors • Constipation
Iron (vitamin C is important for iron absorption)	Meat, liver, fish, poultry, shellfish, eggs, legumes, nuts including groundnuts	• Oxygen exchange in blood • Energy production	• Anaemia • Headache • Irritability • Fatigue • Pallor • Dizziness • Decreased alertness

Source: Adapted from Network of Zambia People Living with HIV/AIDS (NZP+). 2005. "*Food for People Living with HIV/AIDS*", Third Edition. Lusaka.

Annex 2. Micronutrient Supplementation Recommendations for Zambia

The National Micronutrient Operational Strategy 2005–2009 recommends preventive micronutrient supplementation following WHO recommendations.

1. Vitamin A supplementation for all children 0–59 months old

Age group	Dosage		
	International Units (IU)	100,000 IU (blue) capsule	200,000 IU (red) capsule
0–6 months old	50,000	½ capsule (one drop)	Do not give to this age group
6–11 months old	100,000	1 capsule	½ capsule
12–59 months old	200,000	2 capsules	1 capsule

Source: MOH and NFNC. 2009. *Essential Nutrition Package of Care in the Health Sector*. Lusaka, p. 29.

2. Vitamin A supplementation for post-partum women within 6 hours to 8 weeks after delivery

Group	Dosage
Post-partum	200,000 IU

Source: MOH and NFNC. 2009. *Essential Nutrition Package of Care in the Health Sector*. Lusaka, p. 69.

3. Iron and folate supplementation for pregnant women

Non-anaemic women* (prevention)	Women with anaemia** (treatment)
1 iron tablet of 200 mg daily throughout pregnancy and until 3 months post-partum or post-abortion 1 tablet of 5 µg of folic acid daily throughout pregnancy and until 3 months post-partum or post-abortion	1 iron tablet 3 times a day 1 folic acid tablet daily for 3 months

* Defined as Hb > 11 g/dL or no pallor.
** Moderate anaemia is defined as Hb 7–11 g/dL or pallor of the conjunctiva or palm. Severe anaemia is defined as Hb < 7 g/dL and/or severe pallor of the conjunctiva and palm with > 30 breaths per minute, breathlessness at rest, or uneasy feeling or tiredness. Pregnant women with severe anaemia should be treated for anaemia, referred to the hospital, and monitored after 2 weeks.

Annex 3. Nutritional Benefits of Zambian Foods

Food	Role in the body
Grains, cereals, and tubers	
• *Mugaiwa/umgayiwa* (straight-run mealie meal from maize or green maize) • *Musozya* (maize samp or hulled dried maize) • *Maila, amasaka* (sorghum) • *Nzembwe, amale* (millet) • *Umupunga* (rice) • *Tute* (cassava tubers) • *Ifyumbu, chimbwali* (sweet potatoes)	• Provide energy. • Provide minerals and vitamins, particularly B vitamins (riboflavin, thiamine, niacin, B6 and B12, folate) if the skin and kernel of the grains /cereals are eaten whole. • Some refined cereals are fortified with vitamins and minerals.
Indigenous vegetables and legumes	
• *Kalembula* (sweet potato leaves) • *Katapa* (cassava leaves) • *Ibondwe* (amaranthus) • *Nshaba, nyemu, imbalala* (groundnuts) • *Cilemba, nchunga* (beans) • *Ifipushi* (pumpkin) • Mushrooms • Okra • Baobab twigs	• Provide proteins, vitamins (especially vitamin A) and minerals; the dark green leafy vegetables and yellow, orange, and red vegetables and fruits are rich in vitamins. • Provide phytochemicals that may strengthen the immune system. • Provide fibre.
Wild fruits	
• *Mabuyu* • *Imfungo* • *Masuku* • *Masawu* • *Inji* • *Mmabungo* • *Impundu*	• Provide vitamin C and some minerals. • Provide phytochemicals that may strengthen the immune system.
Edible insects	
• *Dried finkubala* (caterpillars) • *Inswa* (termites) • *Inshonkonono* • *Makanta* (grasshoppers)	• Provide protein and some vitamins and minerals.
Small animals	
• *Imbeba* (bush mice) • *Imfuko* (moles) • *Sikaale* (squirrels) • *Impanya, kalulu* (rabbits)	• Provide protein, some vitamins, and minerals including iron and zinc.

Food	Role in the body
Local beverages	
• *Mabuyu*, orange, pawpaw or lemon juice • *Mantamba, maheu, chibwantu munkoyo* (non-alcoholic drinks made from grains)	• Provide vitamin C. • Provide B vitamins.

Annex 4. Types of Nutrition Assessment for PLHIV

1. Anthropometric measurement
    - Weight for height (WFH) to measure stunting in children
    - Weight for age (WFA) to measure wasting in children
    - Body mass index (BMI) to measure body fat composition compared with that of an average healthy person
    - Mid-upper arm circumference (MUAC) to measure nutritional status for pregnant and lactating women whose weight is not an indication of nutritional status and for bedridden PLHIV who cannot stand to be measured and weighed

2. Clinical assessment
    - Protein-energy malnutrition
    - Anaemia
    - Skin changes
    - Hair changes

3. Biochemical assessment
    - CD4 count
    - Lipid profile for ART clients
    - Cholesterol
    - Triglycerides
    - Haemoglobin (Hb)

4. Dietary assessment
    - Food intake
    - Food security, access, and utilisation
    - Food preparation and handling
    - Use of medications
    - Factors that affect food intake

Annex 5. Counselling PLHIV to Maintain Desirable Weight

1. Weigh the client.
   - Compare current weight to previous weight.
   - Refer to points 2–9 for clients who are underweight, experiencing unintended weight loss, or want to increase their weight.
   - Refer to point 13 for clients who are overweight and experiencing unintended and undesired weight gain.
2. Urgently refer clients who are severely malnourished (BMI < 16 kg/m^2) for appropriate nutrition rehabilitation. For children under 5 years old, follow the national IMAM guidelines.
3. Inform the client of the nine Critical Nutrition Practices for PLHIV listed below.

Nine Critical Nutrition Practices for PLHIV

1. Get weighed on every clinical visit to a health care facility.
2. An asymptomatic adult should consume 10% more energy (one snack) a day over the recommended daily allowance (RDA) for HIV-negative healthy people of the same age, sex, physical activity level, and health status. A symptomatic adult should consume 20%–30% more energy (two to three snacks) a day over the RDA for HIV-negative healthy people. A symptomatic child with weight loss should consume 50%–100% more energy than the RDA for HIV-negative children of the same age and sex. A severely malnourished adult (BMI < 16 kg/m^2) should be treated with therapeutic food. A moderately malnourished adult (BMI < 18.5 kg/m^2) should be treated with supplementary food where available.
3. Maintain good sanitation, food hygiene, and food and water safety at all times. If living in an area where hookworm is endemic, get de-wormed every 6 months with an appropriate broad-spectrum anti-helminthic such as Albendazole or Mebendazole.
4. Practice positive living behaviours, including safer sex (condom use to avoid re-infection), avoidance of alcohol and tobacco, and management of depression and stress.
5. Get regular physical exercise (housework, walking, gardening) to strengthen or build muscles and increase appetite and health.
6. Drink plenty of clean (filtered and boiled or chlorinated) water and use clean boiled or treated water to take medicines and prepare juices.
7. Get infections treated promptly and manage HIV-related symptoms through diet.
8. Manage drug-food interactions and drug side effects through diet and inform health service providers if you are taking traditional remedies (herbs, medicines) or other nutrition supplements.
9. Give exclusively replacement-fed infants under 6 months old born to HIV-positive mothers 50,000 IU of vitamin A and give daily multivitamin supplements to infants who are not fed commercial infant formula.

Source: MOH and NFNC. 2008. *Nutrition Care and Support for People Living with HIV Training Manual: Participant Handouts*.

4. Counsel a client with opportunistic infections (OIs) or other illnesses which affect nutrient absorption or utilisation on how to manage symptoms through diet and refer her/him to a physician.

5. If the client does not have OIs, assess energy intake. PLHIV should eat at least three meals a day in quantities "reasonably adequate" for age, sex, activity, and physiological state, including a variety of foods from all food groups (energy foods, body-building foods, protective foods, clean water) and one or two high-energy snacks such as enriched porridge or mashed bananas, baked bananas, sweet potatoes, or nuts.

6. If inadequate energy intake is a result of drug-related side effects such as nausea and loss of appetite, discuss dietary management and modify the food-drug timetable to enable increased intake. If side effects continue, refer the client to a physician, who may prescribe appetite stimulants, anti-emetics to prevent vomiting, or anti-diarrhoea medications.

7. If drug-related side effects are not an issue and food is available in the household, counsel the client to eat more energy foods more often or enrich staple foods with fats, oils, sugar, or honey. Help the client identify appealing and affordable foods.

8. If the client lacks access to sufficient food, help identify options, including budgeting food expenditures and accessing food or livelihood support.

9. If dietary intake is adequate and the client has no OIs or drug side effects that affect nutrient absorption but is still losing weight, refer the client to a physician for assessment of metabolic changes or other problems.

10. Counsel the client to get moderate physical exercise (e.g., housework, walking) 3–4 times a week to build muscles. If the client has difficulty exercising, refer to a physiotherapist if available.

11. Allow time to discuss the client's questions and concerns.

12. If improved diet fails to increase weight, refer the client to a physician for further assessment.

13. If the client is overweight (BMI = 25.0–29.9 kg/m^2) or obese (BMI ≥ 30.0 kg/m^2) or gaining weight unintentionally, ask about daily food intake. If fat and energy intake is higher than recommended, help the client identify ways to eat less high-fat and high-energy foods (especially alcohol and foods containing sugar and oil) and to increase physical activity to reach a healthy BMI (18.5–24.9 kg/m^2). If weight gain is a result of metabolic changes rather than dietary intake, refer the client to a physician for further assessment and treatment.

Annex 6. Dietary Management of HIV-Related Symptoms

Illness	Dietary management	Prevention and treatment
Anorexia (appetite loss)	• Stimulate appetite by eating favourite foods. • Eat small amounts of energy-dense food more often. • Avoid strong-smelling foods.	• If appetite loss is a result of illness, seek medical treatment.
Diarrhoea	• Drink a lot of fluids (soups, diluted fruit juices, boiled water, and light herbal teas) to avoid dehydration. • Avoid strong citrus fruits (orange, lemon) because they irritate the stomach • Eat foods rich in fibre (millet, banana, peas, and lentils) to help retain fluids. • Eat fermented foods such as porridge and yoghurt. • Eat easily digestible foods such as rice, bread, millet, maize porridge, potatoes, sweet potatoes, and crackers. • Eat small amounts of food frequently • Continue to eat after illness to recover weight and nutrient loss. • Eat soft fruits and vegetables such as bananas, squash, cooked and mashed green bananas, mashed sweet potato, and mashed carrots. • Drink non-fat milk if there is no problem with lactose. • Boil or steam foods if diarrhoea is associated with fat malabsorption. • Avoid or reduce intake of milk; coffee and tea; alcohol; fatty foods; fried foods; extra oil, lard or butter and gas-forming foods such as cabbage, onions, and carbonated soft drinks.	**Prevention** • Drink clean boiled water. • Wash hands with water and soap before handling, preparing, serving or storing food, after using the latrine, or after cleaning a child after defecation. **Treatment** • Drink more fluids to prevent dehydration, including oral rehydration solutions. • Go to a health facility if symptoms such as severe dehydration (low or no urine), fainting, dizziness, shortness of breath, bloody stools, high fever, vomiting, severe abdominal pain, or diarrhoea persist for more than 3 days.

Illness	Dietary management	Prevention and treatment
Fever	• Eat energy- and nutrient-rich soups made of maize, potatoes, or carrots. • Drink plenty of fluids. • Drink lemon, guava, and gum tree tea. • Eat small, frequent meals as tolerated.	• Drink fluids, especially clean boiled water, to prevent dehydration. • Bathe in cool water. • Rest more. • Take two Panadol with a meal morning, afternoon, and evening. • Go to a health facility if loss of consciousness, severe body pain, yellow eyes, severe diarrhoea, convulsions, and seizures, or fever that lasts several days and is not relieved with aspirin.
Nausea and vomiting	• Eat small frequent meals. • Eat soups, unsweetened porridge, and fruits such as bananas. • Eat lightly salted and dry foods such as crackers to calm the stomach. • Drink herbal teas and lemon juice in hot water • Avoid spicy and fatty foods. • Avoid coffee, tea and alcohol. • Drink liquids, including clean boiled water.	• Avoid an empty stomach, which makes nausea worse. • Avoid lying down immediately after eating—wait at least 20 minutes. • Avoid vomiting. • Rest between meals.
Thrush	• Eat soft, mashed foods, such as carrots, scrambled eggs, mashed potatoes, bananas, soups, and porridge. • Eat foods cold or at room temperature • Avoid spicy, salty, or sticky foods that may irritate mouth sores. • Avoid sugary foods that cause yeast to grow. • Avoid strong citrus fruits and juices that may irritate mouth sores. • Avoid alcohol and drink plenty of fluids.	• Seek medical treatment. • Use a spoon or cup to eat small amounts of foods. • Tilt your head back when eating to help swallowing. • Rinse your mouth with boiled warm, salty water after eating to reduce irritation and keep infected areas clean so yeast cannot grow.

Illness	Dietary management	Prevention and treatment
Constipation	• Eat more high-fibre foods, such as maize, whole wheat bread, green vegetables, and washed fruits with the peel. • Drink plenty of liquids. • Avoid processed and refined foods.	• Avoid cleansing practices such as enemas and medications. • Drink plenty of fluids, including boiled water.
Anaemia	• Eat more iron-rich foods (eggs; fish; meat; liver; green leafy vegetables such as collard greens or spinach; legumes such as beans, lentils, or groundnuts; nuts; oil seeds; and fortified cereals • Take iron supplements	• Take a daily iron tablet with a source of vitamin C, such as tomatoes or orange juice, to help absorption. • Drink fluids to avoid constipation. • Treat malaria and hookworm.
Muscle wasting	• Eat more and eat more often. • Improve the quality and quantity of foods by eating a variety of foods. • Increase protein in the diet. • Increase intake of starchy foods in cereals and other staples. • Eat small frequent meals.	• Exercise and do physical activity to enhance protein utilisation.
Bloating or heartburn	• Eat small, frequent meals. • Avoid gas-forming foods, such as cabbage and soda. • Drink plenty of fluids.	• Eat long enough before sleeping that food can digest.
Tuberculosis	• Eat foods high in protein, energy, iron and vitamins.	• Seek medical attention immediately. • If taking Isoniazid, take a vitamin B6 supplement to avoid deficiency.
Loss of taste or abnormal taste	• Eat small, frequent meals. • Do regular weight-bearing exercise to build muscles. • Use flavour enhancers such as salt, spices, herbs, and lemon. • Chew food well and move it around in the mouth to stimulate receptors.	
Dyslipidaemia	• Eat more fruits and vegetables, fish, and plant sources of omega-3 fatty acids. • Eat fewer mono- and polyunsaturated fats, refined carbohydrates, sugar, and saturated fats.	• Get regular physical activity. • Stop smoking. • Decrease or stop alcohol consumption. • Maintain a healthy body weight (BMI 20–25 kg/m^2).

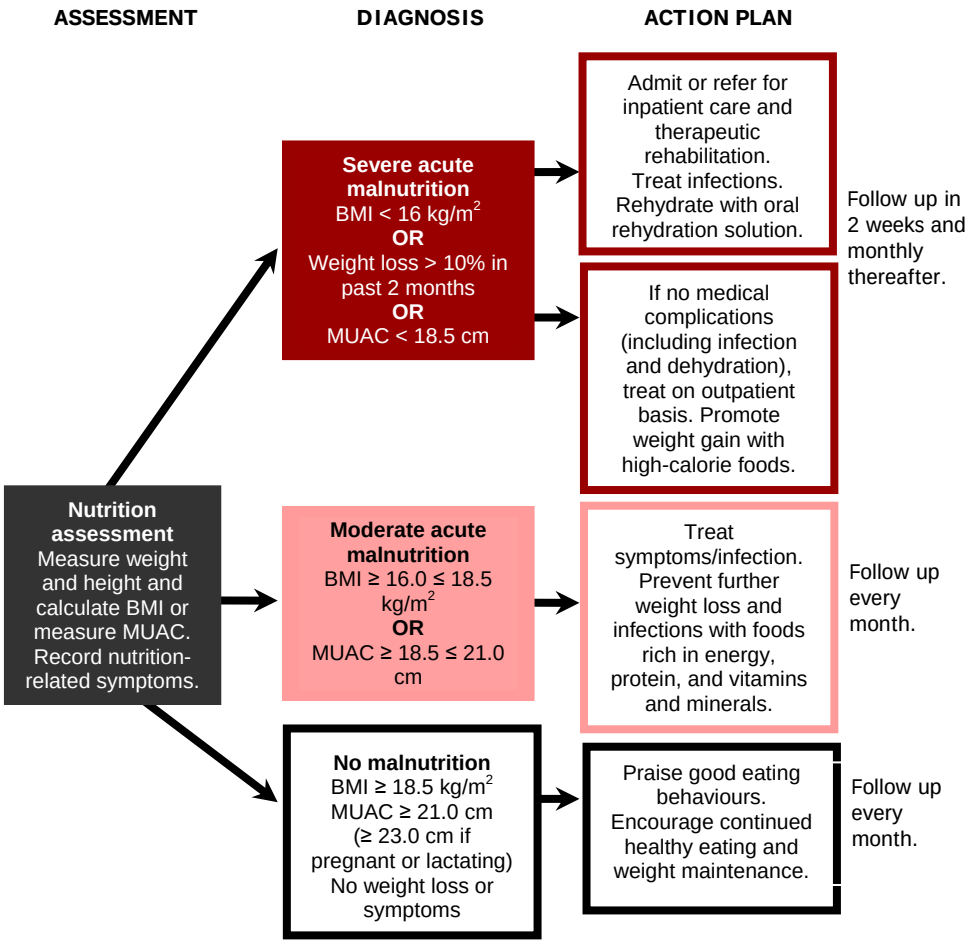
Annex 7. Entry, Transition, and Exit Criteria for Specialised Food Support for PLHIV

Target and entry criteria	Intervention	Exit/transition criteria
Orphans and vulnerable children (OVC) 6–23 months old		
Provide specialised foods regardless of HIV status or nutritional status. **Severe acute malnutrition (SAM)** **Bilateral pitting oedema** of any grade **OR** **Weight for height (WFH)** < -3 z-score using 2006 WHO median reference value **OR** **Mid-upper arm circumference (MUAC)** < 11.5 cm **OR** **MUAC for age or BMI for age** < –3 z-score using 2006 WHO median reference value **Moderate acute malnutrition (MAM)** **WFH** > –3 to < – 2 z-score OR **MUAC** ≥ 11.5 cm to < 12.5 cm	**SAM** 200 kcal/kg/day of ready-to-use therapeutic food (RUTF) Inpatient vs. outpatient Admit or refer for inpatient treatment if a) Severe bilateral pitting oedema (+ + +) **OR** b) Any SAM entry criteria and ANY of the following: anorexia; intractable vomiting; lethargy; convulsions; unconsciousness; lower respiratory tract infection; fever > 39° C; severe anaemia; severe dehydration; shock; hypoglycaemia or hypothermia < 35° C; malaria; no appetite; pneumonia; or active TB or chest in-drawing according to MOH, WHO, and Integrated Management of Childhood Illness (IMCI) guidelines. If child does not meet a) or b) above and has an appetite, treat as outpatient. Discharge from inpatient to outpatient care if appetite returns (child eats at least 75% of RUTF), medical complications are controlled, bilateral pitting oedema is decreasing, and child is clinically well and alert. **MAM, no undernutrition, vulnerability** 100 g/day of high-energy protein supplement (HEPS). If child with MAM is of **unknown HIV status but HIV exposed**, give 250–500 kcal/day of RUTF in addition to HEPS.	If gaining weight (3–5 g/kg/ day), review every 2 weeks. If child is not gaining weight or is losing weight for more than 3 weeks or has worsening oedema, consider admission for inpatient care. Transition to MAM regimen if WFH z-score > –3 **OR** MUAC > 11.0 cm **AND** 15% weight gain **AND** No oedema for more than 2 consecutive weeks **AND** Has received therapeutic feeding for at least 8 weeks. Exit at the age of 24 months. If malnourished at 24 months, follow criteria below for SAM and MAM.

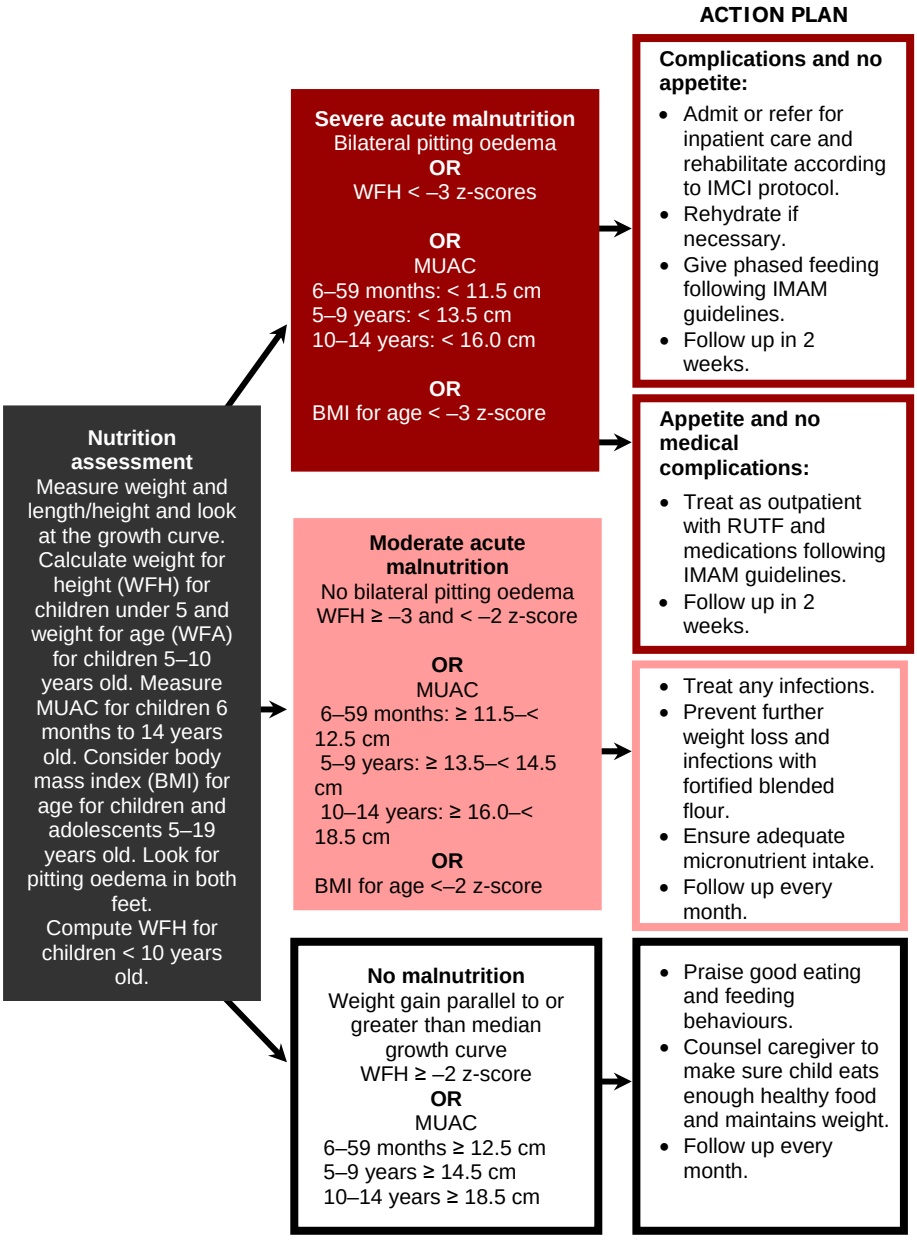
Target and entry criteria	Intervention	Exit/transition criteria
OVC 24 months–17 years old		
SAM **Bilateral pitting oedema** of any grade **OR** **WFH** < –3 z-score **OR** **MUAC** 24–59 months: < 11.5 cm 5–9 years: < 13.5 cm 10–14 years: < 16.0 cm **OR** **MUAC for age or BMI for age** < –3 z-score	24–59 months: **200 kcal/kg/day** 6–10 years: **75–100 kcal/kg/day** 11–17 years: **60–90 kcal/kg/day** See food quantities in table 3. Inpatient vs. Outpatient Admit or refer for inpatient treatment if a) Severe bilateral pitting oedema (+ + +) **OR** b) Any SAM entry criteria and ANY of the following: anorexia; intractable vomiting; convulsions; lethargy; unconsciousness; lower respiratory tract infection; high fever > 39^{o} C; severe dehydration; severe anaemia; hypoglycaemia or hypothermia < 35^{o} C; shock; malaria; lack of appetite; pneumonia; active TB or chest in-drawing according to MOH, WHO, and IMCI guidelines. If the child does not meet a) or b) above and has an appetite, treat as outpatient. Discharge from inpatient to outpatient care if appetite returns (child eats at least 75% of RUTF), medical complications are controlled, bilateral pitting oedema is decreasing, and child is clinically well and alert.	If gaining weight (3–5 g/kg/ day), review every 2 weeks. If not gaining weight, losing weight for more than 3 weeks, or experiencing worsening oedema, consider admission for inpatient care. Transition to MAM regimen if WFH z-score > –3 (or MUAC ≥ 11.5 cm and < 12.5 cm). **AND** 15% weight gain **AND** No oedema for more than 2 consecutive weeks **AND** Has received therapeutic feeding for at least 8 weeks.
MAM **WFH** z-score > –3 to < –2 **OR** **MUAC** ≥ 11.5 cm and < 12.5 cm	220–300 g/day of HEPS	MUAC ≥ 12.5 cm

Target and entry criteria	Intervention	Exit/transition criteria
Malnourished ART and pre-ART (non-pregnant/post-partum) adults and adolescents, inpatient and outpatient		
SAM **BMI < 16 kg/m^2** **OR** If client cannot stand straight for height measurement, **MUAC < 18.5 cm** **OR** **Bilateral pitting oedema and BMI < 18.5 kg/m^2**	276 g/day of RUTF plus 400 g/day of HEPS About 3,100 kcal/day from a combination of RUTF and HEPS (e.g., 1,500 kcal from RUTF + 1,600 kcal from HEPS)	BMI > 16.0 kg/m^2 (transition to supplementary protocol below) **AND** 15% weight gain **AND** No oedema for 2 consecutive visits at least 10 days apart
MAM BMI > 16.0 kg/m^2 but < 18.5 kg/ m^2	1,600 kcal/day of HEPS	BMI > 18.5 kg/m^2 **AND** 10% weight gain
HIV-positive pregnant or post-partum women (with infants under 6 months old)		
SAM **MUAC < 21.0 cm**	1,500 kcal/day of RUTF plus 1600 kcal/day of HEPS	MUAC > 21.0 cm (transition)
MAM MUAC > 21.0 cm but < 23.0 cm **OR** Weight loss in past 2 weighings if pregnant	1,500 kcal/day of HEPS	MUAC > 23.0 cm **OR** Infant reaches the age of 6 months.
Infant 6 months old or older	Apply ART/pre-ART criteria (BMI). If mother is still losing weight, refer to other support or home-based care.	

Annex 8. Algorithm for Management of Acute Malnutrition in Adults



Annex 9. Algorithm for Management of Acute Malnutrition in Children



Annex 10. Food Recommendations for and Possible Side Effects of Common HIV Medications Used in Zambia

Drug	Food recommendation	Avoid	Possible side effects
Abacavir (Ziagen, ABC)	• Take with or without food (taking with food can decrease side effects).	• Alcohol	• Nausea, vomiting, fever, anorexia, diarrhoea, anaemia, rash, dizziness, hyper-sensitivity, cough, headache, allergic reactions, pancreatitis
Amprenavir	• Take with or without food (avoid taking with a high-fat meal).	• Alcohol	
Atazanavir	• Take with food to increase drug absorption and reduce stomach upset.	• Alcohol	• Stomach upset
Atazanavir	• Take with food to increase drug absorption and reduce stomach upset.	• Alcohol	
Combivir (3TC/AZT)	• Take with food to decrease nausea.		• Nausea, vomiting, taste changes, fatigue, abdominal pain, taste changes (increased or decreased), anaemia, constipation, weight gain, diarrhoea
Delavirdine	• Take with or without food. • Avoid antacids, which can decrease absorption.		• Dry mouth, stomatitis, taste changes, tongue oedema, bleeding gums, dysphagia, GI bleeding, colitis, diarrhoea, dyspepsia, constipation

Drug	Food recommendation	Avoid	Possible side effects
Didanosine (DDI, Videx)	• Take on an empty stomach (1 hour before or 2 hours after a meal). • Take with water only (food reduces absorption).	• Alcohol • Juice • Antacids or supplements that contain aluminium or magnesium	• Nausea, dizziness, diarrhoea, anorexia, vomiting, dry mouth, loss of taste, constipation, anaemia, headache, insomnia, stomatitis, fever, pancreatitis. peripheral neuropathy, lactic acidosis
Duranivir	• Take with food.		
Efavirenz (Stocrin)	• Take with or without food. • Avoid high-fat meals because too much fat increases absorption to potentially harmful levels.	• Alcohol • St John's wort • Do not give to clients with known psychiatric disease	• Anorexia, nausea, vomiting, diarrhoea, mouth sores, fatigue, dizziness, rash, drowsiness, sleep disturbances, dyspepsia, abdominal pain, flatulence, elevated blood cholesterol and triglyceride levels
Emtricitabine	• Take with or without food.		
Indinavir (Crixivan, IDV)	• Take 1 hour before or 2 hours after a meal or with a light non-fat meal (3 grams) or low-protein snack (6 grams) of 300 kcal. • Take with at least 1.5 litres of fluids daily to prevent kidney stones.	• Grapefruit • St John's wort	• Nausea, dizziness, diarrhoea, insomnia, vomiting, abdominal pain, regurgitation, fever, fatigue, dry mouth, taste changes, sore throat, pancreatitis, muscle pain, nasal symptoms, headache, ascites, stomatitis, kidney stones, possible increased risk of lipodystrophy

Drug	Food recommendation	Avoid	Possible side effects
Isoniazid (for TB)	• Take 1 hour before or 2 hours after a meal. • Supplement with 50 mg Pyridoxine in clients with TB and HIV to prevent peripheral neuropathy and anaemia.	• Alcohol	• Peripheral neuropathy, hepatoxicity, anorexia, diarrhoea; may interfere with vitamin B6 metabolism
Kaletra (Lopinavir/ Ritonavir)	• Take with a high-fat meal.	• St John's wort	• Abdominal pain, nausea, diarrhoea, headache, weakness, change in taste, anorexia, high blood sugar, rash, hyperlipidaemia, possible increased risk of lipodystrophy
Lamivudine (3TC)/ Emtricitabine FTC)	• Take with or without food, but taking with food can decrease side effects.	• Alcohol	• Nausea, diarrhoea, headache, dizziness, vomiting, anaemia, fever, abdominal pain, nasal symptoms, muscle pain, insomnia, pancreatitis, stomatitis, peripheral neuropathy
Lopinavir/Ritonavir	• Take with food to aid absorption and reduce stomach upset.	• St. John's wort	• Stomach upset
Nelfinavir (Viracept, NFV)	• Take with a meal that includes protein. • Take with high-fat food for better absorption.	• St John's wort • Bowel irritants	• Diarrhoea, flatulence, nausea, abdominal pain, rash, glucose and lactose intolerance, hyperlipidaemia, possible increased risk of lipodystrophy
Nevirapine (Viramune, NVP)	• Take with or without food.	• St John's wort	• Nausea, vomiting, rash, fever, headache, fatigue, abdominal pain, drowsiness, stomatitis, hepatotoxicity

Drug	Food recommendation	Avoid	Possible side effects
Rifampicin (for TB)	• Take on an empty stomach 1 hour before or 2 hours after a meal.	• Alcohol • Concomitant use with PIs or Nevirapine	• Nausea, vomiting, diarrhoea, loss of appetite, pink urine/tears, rash, hepatoxicity
Saquinavir (Invirase, Fortovase,SQV)	• Take with a meal or light snack. • Take within 2 hours of a high-fat or high-calcium meal. High-fat foods increase the area under the plasma concentration-time curve (AUC)	• St John's wort • Garlic supplements • Grapefruit juice (increases drug concentration) • Alcohol	• Mouth ulcers, taste changes, nausea, vomiting, abdominal pain, diarrhoea, constipation, flatulence, rash, weakness, headache, insomnia, hepatic impairment, high blood sugar, hyperlipidaemia, increased risk of lipodystrophy
Stavudine (Zerit d4T)	• Take with or without food, but taking with food can decrease side effects.	• Limit alcohol consumption.	• Nausea, headache, dizziness, diarrhoea, insomnia, anorexia, anaemia, stomatitis, fever, ppancreatitis, chills and fever, peripheral neuropathy, bone marrow suppression, lipodystrophy, lactic acidosis
Sulfonamides: sulfamethoxazole, Cotrimoxazole (antibiotic for treatment/ prophylaxis of pneumonia and toxoplasmosis)	• Take with food.		• Nausea, vomiting, abdominal pain, bone marrow suppression, hypersensitivity including Stevens Johnson's syndrome
Tenofovir (Viread, TDF)	• Take with meals to increase the AUC and bioavailability.	• Alcohol	• Abdominal pain, headache, fatigue, dizziness, renal toxicity
Tipranavir	• Take with or without food, but taking with food may reduce stomach upset.	• Alcohol	• Stomach upset

Drug	Food recommendation	Avoid	Possible side effects
Trizivir (ABC, 3TC, AZT)	• Take with a low-fat meal.	• Alcohol	• Nausea, vomiting, taste changes, fatigue, abdominal pain, taste changes (increased or decreased), anaemia, constipation, weight gain, diarrhoea, anorexia, weakness, insomnia
Zidovudine Retrovir (ZDV/AZT)	• Take without food or with a low-fat meal if nausea or stomach problems. • High-fat foods decrease absorption. • May require zinc and copper supplementation	• Alcohol • Do not give to a client with an Hb < 8 g/dL.	• Anorexia, anaemia, nausea, vomiting, fatigue, constipation, mouth sores, dizziness, fever, bone marrow suppression, headache, dyspepsia, dyspnoea, insomnia, and muscle pain, rash

Sources: AIDS Project Los Angeles. 2002. “HIV Nutrition Education. Nutrition Fact Sheet”. Available at http://www.apla.org; Kenya National AIDS and STI Control Programme (NASCOP). 2001. “Guidelines for Anti-retroviral Drug Therapy in Kenya, Nairobi”; WHO. 2003. “Scaling Up Anti-retroviral Therapy in Resource Limited Settings: Guidelines for a Public Health Approach”. Geneva; Castleman, T., E. Seumo-Fosso and B. Cogill. 2003. “Food and Nutrition Implications of Antiretroviral Therapy in Resource-Limited Settings”. Washington, DC. FANTA Technical Note No. 7; Caribbean Food and Nutrition Institute. 2005. “Drug-Food Interactions”. *Cajanus, the Caribbean Food & Nutrition Institute Quarterly* 38 (1): 28–29.

Annex 11. Counselling PLHIV on Nutrition and Antiretroviral Drugs

1. Explain that good nutrition for people on antiretroviral drugs (ARVs) can:
   - Strengthen ability to fight disease.
   - Reduce opportunistic infections and may slow progression of HIV to AIDS.
   - Complement ARV actions.
   - Improve the effectiveness of medication.
   - Help manage side effects.

2. Explain how HIV affects the nutrition of PLHIV.
   - HIV increases the body's nutritional requirements.
   - HIV leads to opportunistic infections, which are often associated with increased nutrition requirements and decreased food intake.
   - Drug side effects can reduce food intake or nutrient absorption.
   - Increased nutrient requirements coupled with poor food intake and absorption may lead to poor nutritional status.

3. Explain that there may be interactions between food and ARVs.
   - ARV side effects can reduce nutrient intake and absorption and adherence to ARVs.
   - Some ARVs affect nutrient availability, absorption, and utilisation.
   - Some ARVs cause metabolic side effects such as overweight, obesity, and non-communicable diseases that have nutrition implications.
   - Some foods taken with ARVs may reduce drug effectiveness and worsen side effects.

4. Ask whether the client knows what drugs he or she is taking because this can help:
   - Ensure compliance with the recommended timing and dosage.
   - Identify possible drug-food interactions.

5. Explain the dietary recommendations for each drug the client is taking.

6. Stress the importance of using clean and safe water to take medicines.
   - PLHIV are vulnerable to water-borne infections.
   - Some ARVs call for drinking plenty of water to avoid side effects.

7. Explain that not all symptoms are the result of drug side effects and that PLHIV should consult a health service provider whenever they have any symptoms.

8. Help the client make a drug-food plan/timetable to maximise the effectiveness of the drugs, ensure good nutrition and minimise side effects. For each time of day, list or draw foods the client can eat and list the drugs

to take. Ensure that the mix of foods provides a balanced diet in adequate quantities for the stage of infection and that the timing of meals is appropriate for the drugs. Discuss with the client the need to change eating patterns (e.g., frequency of meals, timing of meals in relation to taking the drugs, and methods of food preparation such as limiting fats and oils) to promote the effectiveness of ARVs,

Annex 12. Common Herbs and Spices

Herbs and spices can improve digestion, stimulate appetite, and preserve foods. The following table lists common herbs and spices, beneficial effects reported by clients living with HIV, and their recommended uses.

Herb or spice	Benefits reported by PLHIV	How to use
Aloe	Helps relieve constipation	Use as extract; boil and drink the concentrated water. Use in limited amounts and stop immediately if it causes cramps or diarrhoea.
Basil	Helps relieve nausea and aid digestion; has an antiseptic function for mouth sores	Add to food to treat nausea and digestive problems. Use as gargle for mouth sores.
Calendula	Flower heads have antiseptic, anti-inflammatory, and healing effects; helps with infections of the upper digestive tract	Use as a compress to treat infected wounds. Prepare as tea to help digestion.
Cardamom	Helps relieve digestive problems, pain, diarrhoea, nausea, vomiting, and loss of appetite	Add to food during cooking or prepare as tea.
Cayenne	Stimulates appetite, helps fight infection, and heals ulcers and intestinal inflammation	Add a pinch to cooked or raw foods. For an energising drink, add to fruit juice or water.
Camomile	Helps digestion and relieves nausea	Prepare tea from the leaves and flowers and drink several cups throughout the day.
Cinnamon	Relieves colds, weakness after colds or flu, chills, diarrhoea, and nausea; stimulates appetite; gently stimulates digestive juices, encouraging bowel movements	Add to meals or prepare as tea with ginger for chest colds or TB.
Clove	Stimulates appetite; helps weak digestion; and relieves diarrhoea, nausea, and vomiting	Use in soups, stews, warmed fruit juice, and tea.
Coriander	Helps increase appetite and reduce flatulence and controls bacteria and fungi	Add to meals.

Herb or spice	Benefits reported by PLHIV	How to use
Eucalyptus	Has an antibacterial effect, particularly for lungs and during bronchitis; eucalyptus oil from leaves increases blood flow and reduces the symptoms of inflammation	Prepare tea from the leaves or extract.
Fennel	Helps increase appetite, combat flatulence, and expel gas	Add as spice to foods or prepare tea from the seeds. Use a limited amount.
Garlic	Has antibacterial, antiviral and antifungal effects, particularly in the gut, intestines, lungs, and vagina; helps digestion and relieves weakness; is also good for thrush, throat infections, herpes and diarrhoea	Prepare tea or energy drink or use in food.
Ginger	Improves digestion, energises, relieves diarrhoea, and stimulates appetite; used for treating common colds, flu, and nausea	Use as a spice in meals or boil in water to prepare tea.
Lemon	Is antibacterial and helps digestion	Add juice to food or drinks.
Lemon grass	Has a calming effect as well as soothing digestion and alleviating stress	Use as tea.
Mint	Has an anti-inflammatory effect and helps digestion	Use as tea or gargle for mouth sores; chew leaves to aid digestion.
Neem	Brings down fever	Cut a fresh twig, remove the leaves, boil the bark in water; drink as tea. The bark can also be chewed.
Parsley	Reduces intestinal colic, stimulates stomach secretions and activity, and produces a feeling of hunger; seed is used to remove excess water from the body	Add raw or cooked to food.
Peppermint	May help nausea, reduces colic (abdominal pain and cramps), helps control diarrhoea and stop vomiting, and relieves tension and sleeplessness	Prepare as tea by boiling the leaves for about 10 minutes. Add to food.

Herb or spice	Benefits reported by PLHIV	How to use
Thyme	Has antiseptic and antifungal effects, relaxes nervous coughing, and increases mucosal secretions (particularly effective in the gut); stimulates digestion and growth of good intestinal flora	Use as gargle or mouthwash, as a vaginal douche, or as tea.
Turmeric/yellow root	Aids digestion and has antiseptic and antioxidant effects	Use powdered in rice, cereals, etc.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