

FOOD AND
NUTRITION
TECHNICAL
ASSISTANCE

HIV/AIDS:
A Guide for Nutritional
Care and Support
2004



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Acronyms

3TC	Lamivudine
ABC	Abacavir
AED	Academy for Educational Development
AFASS	Acceptable, Feasible, Affordable, Sustainable, and Safe
AIDS	Acquired Immune Deficiency Syndrome
ART	Antiretroviral Therapy
ARV	Antiretroviral Drug
AZT	Azidothymidine or Zidovudine (ZDV)
BMI	Body Mass Index
BMR	Basal Metabolic Rate
CBCC	Community-based Child Centers
CRS	Catholic Relief Services
CSB	Corn Soy Blend
CTC	Community Therapeutic Care
d4T	Stavudine
DAP	Development Assistance Program
ddl	Didanosine
DHS	Demographic and Health Surveys
EFZ	Efavirenz
FANTA	Food and Nutrition Technical Assistance Project
HAART	Highly Active Antiretroviral Therapy
HIV	Human Immunodeficiency Virus
IDV	Indinavir
ITN	Insecticide-treated Bednet
IUGR	Intrauterine Growth Restriction
IVACG	International Vitamin A Consultative Group
KG	Kilogram
LBW	Low Birth Weight
LPV	Lopinavir
M	Meter
MM	Multiple Micronutrient
MTCT	Mother-to-child Transmission
MUAC	Mid-upper-arm Circumference
NFV	Nelfinavir
NNRTI	Non-nucleoside Reverse Transcriptase Inhibitor
NRTI	Nucleoside Reverse Transcriptase Inhibitor
NtRTI	Nucleotide Reverse Transcriptase Inhibitor
NVP	Nevirapine
ORS	Oral Rehydration Salts
OVC	Orphans and Vulnerable Children
PAHO	Pan-American Health Organization
PEM	Protein-energy Malnutrition
PEPFAR	Presidential Emergency Plan for AIDS Relief
PI	Protease Inhibitor
PLWHA	Person Living with HIV/AIDS
pMTCT	Prevention of Mother-to-child Transmission
RDA	Recommended Dietary Allowance
RTV	Ritonavir
RUTF	Ready-to-use Therapeutic Food
SQV	Saquinavir
TB	Tuberculosis
TDF	Tenofovir
UHT	Ultra High-temperature
UNICEF	United Nations Children's Fund
USAID	United States Agency for International Development
VCT	Voluntary Counseling and Testing
WFP	World Food Programme
WHO	World Health Organization
ZDV	Zidovudine or Azidothymidine (AZT)

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Introduction

This guide provides information for human immunodeficiency virus (HIV)/acquired immune deficiency syndrome (AIDS)-affected households and communities on how nutrition can help HIV-positive people live healthier lives throughout the progression of HIV disease. Malnutrition is a common complication of HIV infection and plays a significant and independent role in its morbidity and mortality. Malnutrition was one of the earliest complications of AIDS to be recognized and has been used to clinically diagnose AIDS.

There is still a great deal we do not know about the relationship between HIV/AIDS and nutrition. Research does suggest that the chance of infection with the HIV virus might be reduced in individuals who have good nutritional status; the onset of the disease and death might be delayed where HIV-positive individuals are well-nourished; and nutrient-rich diets might reduce the risks of HIV transmission from mother to fetus or baby during pregnancy or birth. This guide is an interpretation of the best available evidence to date from multiple sources, especially the World Health Organization (WHO), and a broad range of experts. This guide was extensively revised from its earlier version and was peer reviewed.

Purpose

The purpose of this guide is to assist program managers and health workers make recommendations on food management and nutritional issues for households with members who are HIV-infected or living with AIDS. The guide refers to the nutritional care and support needs of individuals *infected* with HIV; that is, persons who have the virus with or without symptoms of AIDS. The guide is also designed for individuals, families, and communities *affected* by HIV; that is, they may or may not be HIV-infected but are experiencing the social, economic, and health consequences of the virus. The guide is designed with the view that sound nutrition practices will benefit both infected and affected populations.

Food and nutrition recommendations are for both adults and children and emphasize the use of locally available food products, complemented by appropriate foods obtained through external donation programs, such as the United States Agency for International Development's (USAID's) Title II Program¹ and the World Food Programme (WFP).

¹ The United States Title II Program is managed by the U.S. Agency for International Development (USAID) Bureau for Democracy, Conflict and Humanitarian Affairs, Office of Food for Peace. Cooperating agencies, such as private voluntary organizations and nongovernmental organizations, can solicit requests for donated U.S. food commodities to use in their programs. For information, visit USAID's website at www.usaid.gov.

Audience

This guide is targeted primarily at four types of audiences:

1. Program managers and technical staff who work in food aid, food security, health, and nutrition programs in HIV-affected areas;
2. Local health workers in areas affected by HIV/AIDS;
3. Community-based organizations working in high prevalent HIV/AIDS areas; and
4. Institutions caring for PLWHAs or orphans and other vulnerable children infected or affected by HIV/AIDS.

How To Use This Guide

The guide highlights thematic issues related to HIV/AIDS and nutrition. The guide can be translated and adapted to meet local needs and serve as a resource to develop educational materials that are shared with communities and households. The six chapters are:

Chapter 1. Nutrition and HIV/AIDS: Basic Facts

This chapter provides basic information on HIV/AIDS, the relationship between HIV/AIDS and nutrition, and guidance on nutrition.

Chapter 2. Managing HIV Disease Through Nutrition Interventions

This chapter provides guidelines for helping HIV-infected adults maintain overall good nutrition status and a healthy body weight. The chapter includes dietary recommendations for adults coping with HIV/AIDS-related symptoms and illnesses.

Chapter 3. Nutritional Issues Associated With Modern and Traditional Therapies

This chapter describes the nutritional issues associated with therapies controlling virus replication and treating AIDS-related illnesses and symptoms. It provides guidelines on the food and nutrition responses that can be used to ensure efficacy of and adherence to the therapy and maintain good nutritional status.

Chapter 4. Nutritional Care and Support for Pregnant and Lactating Women and Adolescent Girls

This chapter provides dietary guidelines to ensure proper nutrition for pregnant and lactating women and adolescent girls in the context of HIV/AIDS.

Chapter 5. Nutrition and Care Recommendations for Infants and Children

This chapter provides information on feeding guidelines to improve nutrition for children, whether infected with HIV or not, to reduce transmission of the virus, boost immune system functioning, and improve the dietary management of HIV-related complications.

Chapter 6. A Food-based Approach to Support HIV/AIDS-affected Households and Communities

This chapter provides information on the selection, composition, and size of food commodities distributed to HIV-affected communities.

Nutrition and HIV/AIDS: Basic Facts

This chapter provides basic facts on HIV/AIDS, the relationship between HIV/AIDS and nutrition, and guidelines for maintaining overall nutritional status and a healthy body weight. This chapter is designed to provide

program managers with basic information to share directly with households and communities. The information is focused on resource limited settings commonly found in developing countries.

What is HIV? What is AIDS?

- H** = Human (who is affected)
- I** = Immunodeficiency (the result)
- V** = Virus (the causal agent)
- A** = Acquired (from bodily fluids through a behavior or action, including from the mother during pregnancy, during delivery, or through breastmilk)
- I** = Immune (where the virus attacks)
- D** = Deficiency (resulting effect of virus)
- S** = Syndrome (series of illnesses)

Acquired Immune Deficiency Syndrome, or AIDS, is a disease of the immune system that makes the individual highly vulnerable to life-threatening infections and diseases, such as tuberculosis (TB) and certain types of cancer. AIDS is caused by a retrovirus known as the human immunodeficiency virus, or HIV, which attacks and impairs the body's natural defense system against disease and infection. HIV is a slow-acting virus that may take years to produce illness in a person. An HIV-infected person's defense system is impaired and,

over time, other viruses, bacteria, fungi, and parasites take advantage of this opportunity to further weaken the body and cause various illnesses and conditions, such as pneumonia, TB, cancer, oral thrush, diarrhea, oral herpes sores, and muscle wasting. This is why the infections and conditions found in HIV-infected individuals are called opportunistic.

A person has AIDS when that person starts having opportunistic infections, or when CD4 count is below 200 cells/mm in the presence of HIV infection. The amount of time it takes for HIV infection to become full-blown AIDS depends on the type and strain of the virus and host factors, including age, co-infections, and some genetic factors, as well as the general health and nutritional status before and during the time of HIV infection.

Currently, there is no cure for HIV/AIDS or vaccine to prevent HIV infection. Some therapies can prevent, treat, or even cure many of the opportunistic infections and relieve the symptoms associated with HIV/AIDS, which include fever, coughing, itching, poor appetite,

difficulty breathing or swallowing, and chronic diarrhea. A group of drugs referred to as antiretroviral drugs (ARVs) directly attack the HIV virus and significantly reduce the rate of replication of the virus in the body of the HIV-infected person. These drugs can

decrease the viral load and slow down the progression of HIV disease. The cost of ARV drugs is declining, and access to ARVs among people living with HIV/AIDS (PLWHAs) is increasing in resource limited settings.

How HIV Is Transmitted

HIV is transmitted via three primary routes:

1. Having unprotected sex with a person already carrying the HIV virus;
2. Transfusions of contaminated blood and its by-products or use of non-sterilized instruments, such as shared needles, razors, and other surgical tools; and
3. From an infected mother to her child, or mother-to-child transmission (MTCT), during pregnancy, childbirth, or breastfeeding.

In most of the developing world, HIV is transmitted primarily through sexual contact with an infected person. Women are at greater risk of HIV infection than men. Infants and children are also at risk. A pregnant woman who is HIV-infected has about a 15 to 40 percent risk of infecting her baby with HIV in the absence of antiretroviral therapy (ART). Of infants who become infected, 60 percent will contract HIV during pregnancy or labor, and 40 percent through breastfeeding.

How HIV Is Not Transmitted

HIV is not transmitted through:

- Handshakes;
- Hugs;
- Food eaten from the plate of or drinks shared with an HIV-infected person;
- Mosquitoes or other insects;
- Kisses; or
- Latrines.

Many people do not know that they are infected with the virus. They may appear healthy but are still capable of transmitting the virus through unprotected sexual intercourse or by reusing contaminated needles, razors, or other devices or, in the case of a pregnant or lactating mother, during labor and delivery or through breastfeeding.

Stages of HIV/AIDS

WHO categorizes HIV infection by four stages. These stages are summarized in Table 1.1. with the opportunistic infections that characterize each stage. Details of each stage

can be found in Appendix E of WHO's Scaling Up Antiretroviral Therapy in Resource-Limited Settings: Treatment Guidelines for a Public Health Approach, published in 2003.

Table I.1. WHO Clinical Classification System of HIV

Stage	Symptomatic or Asymptomatic	Characteristics
Stage 1	Asymptomatic	<ul style="list-style-type: none"> • Persistent generalized swelling of the lymph nodes
Stage 2	Symptomatic	<ul style="list-style-type: none"> • Weight loss < 10 percent of body weight • Minor mucocutaneous manifestations such as seborrhoeic dermatitis, prurigo, fungal nail infections, recurrent oral ulcerations, angular cheilitis. • Herpes zoster within last five years • Recurrent upper respiratory tract infections such as bacterial sinusitis.
Stage 3	Symptomatic	<ul style="list-style-type: none"> • Bedridden for < 50 percent of the day during the last month <p>AND</p> <ul style="list-style-type: none"> • Weight loss > 10 percent of body weight • Unexplained chronic diarrhea > 1 month • Unexplained prolonged fever (intermittent or constant > 1 month. • Oral candidiasis (thrush) • Oral hairy leukoplakia • Pulmonary tuberculosis • Severe bacterial infections such as pneumonia or pyomyositis
Stage 4	Symptomatic	<ul style="list-style-type: none"> • Bedridden for > 50 percent of the day during the last month <p>AND</p> <ul style="list-style-type: none"> • HIV Wasting Syndrome • Candidiasis of the oesophagus, trachea, bronchi or lungs • Cryptococcus, extrapulmonary • Cryptosporidiosis with diarrhoea for > 1 month • Cytomegalovirus disease of an organ other than the liver, spleen or lymph nodes • Herpes simplex virus infection, mucocutaneous for > 1 month or visceral for any duration • HIV dementia (encephalopathy) • Kaposi's sarcoma • Lymphoma • Extrapulmonary tuberculosis • Atypical mycobacteriosis, disseminated or pulmonary • Any disseminated endemic mycosis • Pneumocystis carinii pneumonia • Progressive multifocal leukoencephalopathy • Salmonella septicaemia (non-typhoidal) • Toxoplasmosis of the brain

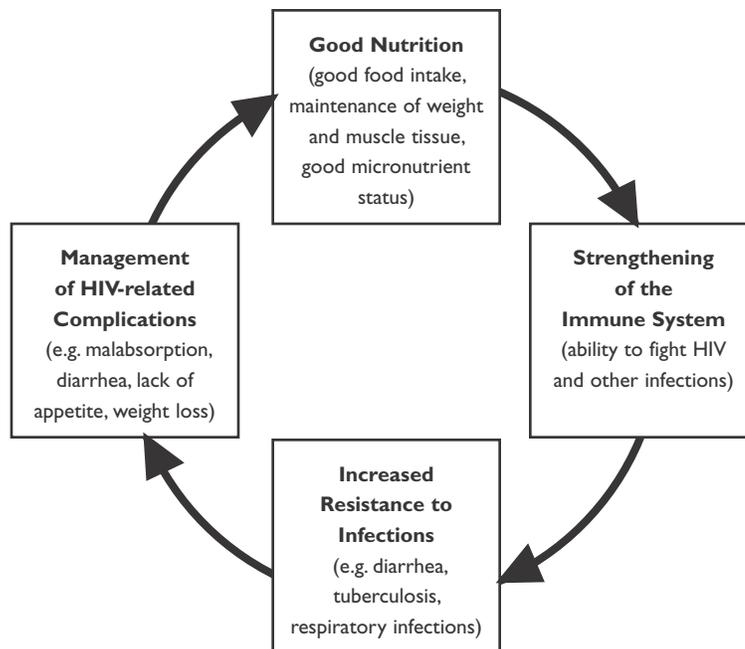
Nutrition and HIV/AIDS

Nutrition and HIV are linked. Any immune impairment as a result of HIV/AIDS can contribute to malnutrition. Malnutrition leads to immune impairment, worsens the effects of HIV, and contributes to a more rapid progression of the disease. Thus, malnutrition both contributes to and is a result of HIV disease progression.

A person who is malnourished and then acquires HIV is more likely to progress faster to AIDS because the body is already weak and cannot fight co-infections, particularly without access to ARVs and prophylactic medications. A well-nourished person has a stronger immune system for coping with HIV and fighting illness. Figure 1.1. illustrates the relationship between good nutrition and resistance to infection in the context of HIV/AIDS.

Timely improvement in nutritional status can help strengthen the immune system, thereby reducing the incidence of infections, preventing loss of weight and lean body mass, and delaying disease progression, so that HIV has less chance to develop in a person who is well nourished (see figure 1.1.). Some nutritional deficiencies can be reversed by timely and adequate nutritional therapy. Nutritional care and support helps people living with HIV to manage HIV-related complications, promotes good responses to medical treatment, and improves the person's quality of life by maintaining strength, comfort, level of functioning, and human dignity. Nutritional care and support is especially effective for those HIV-positive people who have not yet progressed to the stage requiring ARV treatment.

Figure 1.1. The Cycle of Good Nutrition and Resistance to Infection in the Context of HIV/AIDS



Adapted from Ellen G. Piwoz and Elizabeth A. Preble, *HIV/AIDS and Nutrition: A Review of the Literature and Recommendations for Nutritional Care and Support in Sub-Saharan Africa*. Washington, D.C.: Academy for Educational Development (AED), 2000.

Malnutrition and HIV/AIDS

HIV infection affects nutrition through increases in resting energy expenditure, reductions in food intake, nutrient malabsorption and loss, and complex metabolic alterations that culminate in weight loss and wasting common in AIDS. The effect of HIV on nutrition begins early in the course of the disease, even before an individual may be aware that he or she is infected with the virus.

The impact of pre-existing malnutrition on HIV susceptibility and disease progression is not yet understood. Early studies showed that weight loss and wasting were associated with increased risk of opportunistic infections and shorter survival time in HIV-positive adults, independent of their immune status. Other studies showed that clinical outcome was poorer and risk of death was higher in HIV-positive adults with compromised micronutrient intake or status.

AIDS-wasting syndrome is defined as a 10 percent weight loss of baseline body weight plus either chronic diarrhea (i.e., two loose stools per day for more than 30 days) or chronic weakness and documented fever for 30 days or more, intermittent or constant, in the absence of a concurrent illness or a condition other than HIV infection. Wasting is characterized by a loss of lean tissues. Lean tissues in the body are responsible for most of the body's metabolic functions including processing medications. The body starts to lose its major functions as damage to the immune system and weight loss progress.

The following symptoms and illnesses commonly caused by HIV infection have nutritional consequences that can lead to malnutrition.

Anorexia. Anorexia, or loss of appetite, may occur with the onset of infection and when fever is present, or as a side effect of medications. It leads to general weight loss and is common when individuals are depressed or living in socially and emotionally unfavorable environments.

Diarrhea. A person with diarrhea has several watery or loose bowel movements in a day. There are several causes for diarrhea including bacterial and viral infections, parasites, and as a side effect of some medical treatments. It results in losses of water and nutrients and leaves a person at greater risk of dehydration. Diarrhea also reduces appetite and leads to poor nutrient absorption. Severe malnutrition can occur following a prolonged period of diarrhea.

Fever. Fever is a body temperature above 37 degrees Celsius. People with acute or chronic fever may have chills, sweat excessively, have muscle and joint aches, or be fatigued. Fever is common in PLWHAs and does not necessarily indicate a serious illness. The reasons for fever vary, and it is often hard to determine whether fever is due to HIV or another illness, such as malaria or untreated opportunistic infections. The body's energy expenditure increases with fever, causing increased energy requirements.

Nausea and Frequent Vomiting. Nausea and vomiting can result from the drugs used to treat HIV/AIDS or from opportunistic infections. Nausea also may cause reduced appetite and voluntary restriction of food, and vomiting lowers the amount of nutrients available to the body.

Thrush. Thrush is a fungal infection caused by the *Candida* fungus and is common in HIV-infected people. Thrush refers to whitish spots on the inside of the mouth, tongue, esophagus, intestines, vagina, or anus. Although these sores are uncomfortable, they are not life-threatening. These sores can result in difficulty eating foods, loss of appetite, reduced food intake, and malabsorption, leading to weight loss.

Anemia. Anemia is a low level of hemoglobin in the blood. It results from an inadequate number or quality of red blood cells that are important for carrying oxygen and feeling well. Iron deficiency from poor dietary intake and/or absorption of iron causes approximately

50 percent of global anemia. Other causes include infectious diseases such as malaria, tuberculosis, and HIV/AIDS, helminth infections such as hookworm, other vitamin deficiencies (e.g., B12 and folic acid), genetic blood diseases, contraceptive methods (e.g., intrauterine devices), and closely spaced pregnancies. Pregnant women and young children are especially prone to anemia.

Persons who are anemic often experience tiredness and weakness and may have pallor (i.e., paleness) in the eyes, tongue, palms, and nail-beds. The relationship between HIV and anemia is not clearly understood, although it is known that HIV-infected persons who are anemic generally progress faster to AIDS than those who are not.

Nutrient Requirements of PLWHAs

Good nutrition for all individuals, but especially PLWHAs, requires the consumption of an adequate amount in the appropriate proportions of macronutrients (e.g., proteins, carbohydrates, fats) and micronutrients (e.g., vitamins, minerals). It is important to remember that many people in resource limited settings are experiencing pre-existing malnutrition and that HIV will worsen the situation.

The nutritional needs of HIV-infected persons depend on the stage of disease progression. Required intake levels are suggested based on the absence or presence of symptoms such as fever, diarrhea, weight loss, and wasting.

Energy Requirements. The HIV-infected person has additional energy needs because of:

- Energy used for HIV infection and opportunistic infections;
- Nutrient malabsorption; and
- Altered metabolism.

The various phases of the infection are marked by an increase in metabolism, increased energy needs, and nutrient depletion. These effects of infection often occur synergistically and result in weight loss and wasting.

In the absence of AIDS symptoms (WHO stage 1), HIV-infected persons should increase energy intake by 10 percent over the level of energy intake recommended for healthy non-HIV-infected persons of the same age, sex, and physical activity level.

In the presence of symptoms (WHO stage 2 and above), HIV-infected persons should increase energy intake by 20 to 30 percent over the level of energy intake recommended for healthy non-HIV-infected persons of the same age, sex, and physical activity level.

These recommendations are for HIV-infected persons, including those taking HIV-related medications such as ARVs.

Protein Requirements. According to WHO's *Nutrient Requirements for People Living with HIV/AIDS*, "[D]ata are insufficient to support an increase in protein requirements due to HIV infection." HIV-infected persons do not require more protein than the level recommended for healthy non-HIV-infected persons of the same age, sex, and physical activity level.

At the onset of opportunistic infections, the body loses nitrogen, which suggests a need for increased protein intake if opportunistic infections remain untreated. Studies have not demonstrated, however, that improved clinical outcomes occur from increased protein intake among HIV-infected individuals. Further research is needed on the optimal protein requirements of HIV-infected persons during the course of HIV disease. HIV-infected people often have pre-existing protein-energy malnutrition. Protein-energy malnutrition (PEM) results from inadequate intake or poor utilization of food and energy, not a deficiency of one nutrient and not usually simply a lack of dietary protein. Programs may need to address the deficiency by increasing intakes to meet the recommended levels.

Fat Requirements. According to the recent WHO guidelines, there is no evidence that fat requirements are different because of HIV infection. However, certain ARVs or certain infection symptoms such as diarrhea may require changes in the timing or quantity of fat intake in some cases.

Micronutrient Requirements. WHO does not recommend micronutrients beyond the level of recommended micronutrients for healthy non-HIV-infected persons of the same age, sex, and physical activity level.

However, micronutrient deficiencies are common in areas where HIV is prevalent. Deficiencies of vitamins and minerals such as vitamins A, B-complex, C, E, selenium, and zinc, which are needed by the immune system to fight infection, are common in people living with HIV. Deficiencies of anti-oxidant vitamins and minerals contribute to oxidative stress, a condition that may accelerate cell death and increase the rate of HIV replication.

Good nutrition is best achieved by consuming a diverse diet with foods rich in micronutrients, especially vitamins A, B6, B12, and selenium, iron and zinc. If the HIV-infected person presents signs of a specific or multiple micronutrient deficiencies, the deficiency should be addressed using the standard protocols.

Multivitamin Supplementation and HIV

The findings of a recent study conducted in Tanzania raises important issues about the role of specific multivitamin supplementation on the progression and mortality of HIV disease in pregnant women (Fawzi et al., 2004).

Nutrition is an important component of comprehensive care, particularly in resource-limited settings where malnutrition and food insecurity are common. Deficiencies of vitamins and minerals, such as vitamins A, B-complex, C and E, as well as selenium, zinc and other micronutrients needed by the immune system have been commonly observed in people living with HIV. The effect of supplementation with these micronutrients on disease progression and mortality are now being studied. There is insufficient evidence to recommend high-dosage micronutrient supplementation in high HIV prevalent population. Results from some studies raise concerns that some specific micronutrients supplements such as vitamin A, zinc and iron may be detrimental in HIV-infected populations in terms of disease outcomes and transmission.

Ideally, an adequate micronutrient intake should be achieved through an adequate diet. In areas where there are multiple micronutrients deficiencies, multiple micronutrient supplements may be needed in pregnancy and lactation.

There is a need, however, for guidance on micronutrient supplementation and the therapeutic and prophylactic use of multivitamins. WHO and UNICEF are taking the lead in this guidance. For now, HIV-infected women during pregnancy and lactation, micronutrient intakes should be at the standard recommended levels. Dietary and clinical nutritional assessment should be undertaken before initiating ART. In addition, patients should be evaluated and counselled with regard to dietary modifications in response to any side effect associated with ART.

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Managing HIV Disease through Nutrition Interventions

2.

CHAPTER

The purpose of this chapter is to provide dietary recommendations that may help PLWHAs manage HIV disease, achieve maximum benefit from medications, maintain body weight, and enhance quality of life by improving nutritional status. The first section of this chapter provides general

guidance on how to support a healthy body through nutrition interventions, which include both dietary approaches and micronutrient supplementation. The second section addresses the dietary management of specific AIDS-related symptoms.

General Nutritional Care and Support of PLWHAs

This section discusses guidance for the nutrition-related care and support of HIV-infected asymptomatic men and women (i.e., those who have a positive reaction to one of several tests for HIV antibodies but who show no clinical symptoms of the disease) and HIV-infected symptomatic men and women. Specific guidance for the nutrition-related care and support of HIV-infected pregnant and lactating women can be found in Chapter 4, and Chapter 5 contains guidance for the nutrition-related care and support of HIV-infected children.

Any person living with HIV will benefit from healthful eating habits to maintain a normal body weight and prevent co-infections.

Good Dietary Practices

Good dietary practices play an important role in maintaining a healthy lifestyle and healthy body. An HIV-infected person already has a weakened immune system. A nutritious diet can help maintain the proper functioning of the

immune system and provides needed energy, protein, and micronutrients during all stages of the HIV infection. Program managers can promote a number of dietary practices that HIV-infected individuals and their families can follow. The following suggestions are provided as general principles in responding to the nutritional needs of HIV-affected populations.

Maintaining adequate nutritional status means consuming a variety and adequate quantity of foods to meet energy, protein, and micronutrients needs. PLWHAs should eat a balanced and diverse diet consisting of starchy staples (e.g., rice, maize, potato, cassava, banana, yam) with cooked legumes (e.g., beans, peas), nuts and nut butters, animal foods, fat and oil, fruits, and vegetables. A balanced diet will ensure that the individual consumes sufficient nutrients to maintain energy, normalize weight, and ensure the body's proper functioning. The main types of food people need to live a healthy life include energy-providing foods (i.e., carbohydrates,

fats), body-building foods (i.e., proteins, minerals), and protective foods (i.e., vitamins, minerals).

Carbohydrates (i.e., sugars, starches) and fats provide the body with energy. These foods:

- Provide energy to make bodies work and keep active;
- Are found in various starchy staple foods such as maize, rice, sorghum, millet, and green banana and roots and tubers such as cassava, taro, potato, and sweet potato; and
- Are usually more affordable and available than high-protein foods.

HIV-infected people have increased energy requirements because of HIV disease and co-infections. Consuming a variety of foods from each of the main groups of energy sources on a daily basis is important to maintaining good nutritional status to help fight illness. In addition, good nutritional status may ensure that a person is able to survive an opportunistic infection such as TB or pneumonia without further compromising health and nutritional status.

Proteins and minerals are found in body-building foods. These foods:

- Contain proteins for cell repair and growth nutrients such as iron for blood and calcium and phosphorus for strong bones;
- Help build bones and cells important for growth and development;
- Help fight infection and repair the body during times of illness; and
- Are obtained from legumes (e.g., beans, lentils, cowpeas, pigeon peas, groundnuts, nuts), milk products (e.g., cow or goat milk, yogurt, cheese, human breastmilk), animal foods (e.g., fish, eggs, chicken, pork, beef, birds, rodents, other meat products, insects), whole grains and cereals (e.g., wheat, maize, millet, sorghum, rice). Animal products are important sources of nutrients but may not be feasible to consume every day because they are usually more expensive

than vegetable protein sources. Daily consumption of a cereal with a protein source such as legumes is recommended.

Foods rich in micronutrients (e.g., vitamins A, B, C, D, E) and minerals (e.g., iodine, selenium, zinc, iron) are called protective foods. Micronutrient-rich foods:

- Help the body absorb and utilize protein and carbohydrates;
- Help fight infections and digest and absorb other nutrients; and
- Are found in dark green, leafy vegetables (e.g., collard greens, cassava and potato leaves, spinach, callaloo, pumpkin leaves, cabbage) and yellow and orange fruits and vegetables (e.g., mango, papaya or paw paw, sweet potato, pumpkin, carrots, tomato, avocado, oranges, lemons, bananas).

Table 2.1. describes the role of various micronutrients and their importance for maintaining a healthy body and provides examples of foods that are rich sources of micronutrients. Some of the foods listed are available only during specific seasons.

Food Safety and Hygiene. PLWHAs are more vulnerable to infection because their immune systems have already been weakened. Properly handling food and water is especially important to avoid infections caused by bacteria and viruses in contaminated food and water. Listed below are guidelines for handling water, animal products, fruits, and vegetables and general food storage, as well as some general hygiene guidelines.

Water

- Be sure water is clean. Guidance on the length of boiling time for preparation of safe drinking/food preparation water varies from boiling water vigorously for a few seconds to 10 minutes.
- Keep boiled water stored in a clean container with a lid.
- Do not dip hands or cups into the container. Instead, pour water from the container.
- The best container is one with a tap.

Table 2.1. The Role and Source of Selected Micronutrients

Micronutrient	Role	Food sources
Vitamin A	Growth and function of T and B cells for immunity; maintenance of mucosal epithelial cells, including the lining of the respiratory, gastrointestinal and gastrourinary tracts; vitamin A deficiency is associated with increased adult mortality, higher infant mortality, and child growth failure	Liver and dairy products, kidney, egg, some fishes, yellow sweet potato, pumpkin, palm oil, carrot, dark green leafy vegetables, fruits, such as papaya and mango
Thiamine Vitamin B1	Important for energy metabolism; support appetite and nervous system functions	Whole-grain cereals, beans, meat, fish, chicken, egg
Riboflavin Vitamin B2	Important for energy metabolism; support normal vision, health, and integrity of skin	Milk, egg, liver, yogurt, meat, dark green leafy vegetables, whole-grain cereals, fish, and beans
Niacin Vitamin B3	Essential for energy metabolism; support health and integrity of skin and nervous and digestive systems	Milk, egg, meat, poultry, peanuts, groundnuts, whole-grain cereals, fish
Pyridoxine Vitamin B6	Facilitates metabolism and absorption of fats and proteins; helps make red blood cells	Sweet potato, white beans, avocado, cabbage, broccoli, meat, fish, green leafy vegetables
Cobalamin Vitamin B12	Important for new cell development and maintenance of the nerve cells	Red meat, fish, chicken, shellfish, cheese, eggs, milk, fermented products
Ascorbic Acid Vitamin C	Important for protein metabolism, and immune function and iron absorption; increases resistance to infections	Citrus fruits, such as orange, lemon, tangerine, guava, baobab, tomato
Vitamin E	Protects cell structures and facilitates resistance against diseases	Leafy vegetables, vegetable oils, peanut, egg yolk, vegetables, nuts, seeds, and liver
Calcium	Builds strong bones and teeth; important for functioning of heart and muscle functions, blood clotting and pressure and immune defenses	Milk, dark green leafy vegetables, shrimp, dried fish, beans, lentils, peas, whole grain millet, oil seeds, okra
Iodine	Ensures the development and proper functioning of the brain and of the nervous system; important for growth development and metabolism	Fish and other seafood, salt with iodine
Iron	Transports oxygen to the blood, eliminates old red blood cells and builds new cells; required for utilization of energy and metabolism by cells	Red meat, poultry, shellfish, egg, peanut, groundnuts, leafy vegetables, lentils, beans, some cereals, dried fruits
Magnesium	Strengthens the muscles; important for nervous system function; involved in bone development, maintenance of teeth	Cereal, dark green vegetables, seafood, nuts, legumes, groundnuts
Selenium	Prevents impairment of the heart muscle; enhances the body's antibacterial and antiviral defenses	Seafood, liver, meat, nuts, unrefined grains, brown rice, wheat germ, whole-grain cereals, carrot, onion, milk, egg

Adapted from Network of African People Living with HIV/AIDS (November 1997). Program managers in each country are encouraged to develop and disseminate information on locally available food sources of micronutrients.

- Always wash hands with soap before and after touching foods and using the latrine.

Animal Products

- Cook all animal products (i.e., meat, chicken, pork, fish, eggs) until thoroughly cooked and well done.
- Do not eat meat that still has red juice.
- Do not eat soft-boiled eggs, raw eggs, cracked eggs, or any foods containing raw eggs.
- Thoroughly wash hands and all utensils and surfaces that have touched uncooked foods, particularly meats, before handling other foods.
- Cover meat, poultry, and fish with a clear cover or cloth. Keep meat, poultry and fish separate from other foods to avoid contamination with bacteria and other disease-causing agents.

Fruits and Vegetables

- Use boiled, clean water to thoroughly wash all fruits and vegetables that are to be eaten raw to avoid contamination.
- If it is not possible to wash fruits and vegetables properly, remove the skin to avoid contamination.
- Remove the bruised parts of fruits and vegetables to remove any molds and bacteria growing there.
- Boil thoroughly, but do not overcook vegetables as vitamins will get lost.

General Foods Storage and Handling

- Make sure that all food preparation and consumption areas are free of flies and other insects.
- Keep all food preparation surfaces clean.
- Use clean dishes and utensils to store, prepare, and eat food.
- Cover and store food in containers to avoid contamination.
- Keep hot foods hot and cold foods cold before eating.
- Throw away foods that have gone bad or are well past the “sell-by” or expiration date.
- Avoid storing leftovers unless they can be kept in a cool place or refrigerator. Always re-heat them at a high temperature.

Always boil them for at least five minutes before eating leftovers.

- Do not store raw food, especially meat, close to cooked food.
- Store food in a cool, dry place or refrigerator.
- Be very careful about eating prepared foods purchased from vendors in the marketplace.

General Hygiene

- Always wash hands with clean water and soap or ashes before, during, and after preparing food, eating, or visiting the latrine.
- Cover all wounds to prevent contamination of food during preparation and handling.
- Use a latrine and keep it clean and free from flies.
- Keep the areas surrounding food preparation and eating areas and latrines clean.
- Wash clothes, bedding, and surfaces that might have been contaminated with feces in hot water and soap.

Dietary Practices and Nutrition for Adult PLWHAs Living with HIV- and AIDS-related Symptoms

This section provides specific nutrition information and suggestions for improved dietary practices including menu-planning for adults coping with HIV- and AIDS-related symptoms and illnesses.

The goal of the dietary management of HIV and AIDS-related symptoms is to prevent malnutrition and improve the overall health and nutritional status of PLWHAs, thereby slowing the progression of the disease and enabling greater comfort and productive activity. Dietary management of AIDS-related symptoms refers to the strategy of using food and dietary practices to alleviate the effects of AIDS-related symptoms on food intake and nutrient absorption.

Dietary management of AIDS-related symptoms can:

- Ensure adequate food intake by adding more flavor, encouraging PLWHAs to take small but frequent quantities of food, and/or by presenting foods with a texture that can be easily eaten by PLWHAs;
- Contribute to increased comfort while eating;
- Provide more nutrients to compensate for nutrient losses and/or increased nutrient requirements;
- Maintain body weight measured in kilograms or sometimes expressed as a body mass index (BMI) of at least 18.5 kg/m². BMI is used to define a person's current nutritional status and uses the following formula to determine BMI: weight in kilograms divided by height in meters², also shown as kg/m²;
- Prevent dehydration that occurs due to diarrhea and fever;
- Complement medical treatment, including the provision of ARVs;
- Reduce the severity of symptoms by providing specific nutrient needs
- Strengthen the immune system; and
- Manage specific symptoms (e.g., nausea, constipation).

Table 2.2. on the following page provides information on how to manage AIDS-related symptoms. The dietary advice provided has been successfully used in some countries but should be adapted to specific food habits, regional constraints, and availability.

Table 2.2. Caring for Symptoms and Illnesses Associated with HIV in Adults

Illness	Diet	Care Practices
Anorexia (appetite loss)	<ul style="list-style-type: none"> • Try to stimulate appetite by eating favorite foods. • Eat small amounts of food more frequently. • Eat favorite foods. • Select foods that are more energy dense. • Avoid strong smelling foods. 	<ul style="list-style-type: none"> • If loss of appetite is due to illness, seek medical treatment.
Diarrhea	<ul style="list-style-type: none"> • Drink lots of fluids to avoid dehydration (e.g., soups, diluted fruit juices, boiled water, herbal teas). • Drink juices such as passion fruit; avoid strong citrus (e.g., orange, lemon) because it may irritate the stomach. • Consume foods rich in soluble fiber to help to retain fluids (e.g., millet, banana, peas, lentils). • Eat starchy foods like rice, maize, sorghum, bread, potato, cassava and blended foods like corn-soy blend (CSB). • For protein, eat eggs, meat, chicken or fish. • Boil or steam foods. • Consume fermented foods like porridges and yogurt. • Eat small amounts of food frequently and continue to eat following illness to recuperate from weight and nutrient loss. • Eat soft fruits and vegetables like bananas, squash, banana matoke, mashed sweet potato, mashed carrots. <p><i>Foods to avoid/reduce intake:</i></p> <ul style="list-style-type: none"> • Some dairy products such as milk if lactose intolerant. • Caffeine (e.g., coffee, teas) and alcohol. • Fatty foods including fried foods and extra oil, lard or butter. • Gas-forming food such as cabbage, onions, and carbonated soft drinks (e.g., sodas). 	<p><i>Prevention</i></p> <ul style="list-style-type: none"> • Drink plenty of clean, boiled water. • Wash hands with soap and water before handling, preparing, serving or storing foods. • Wash hands with soap and water after using a toilet or latrine or cleaning a child after defecation. <p><i>Treatment</i></p> <ul style="list-style-type: none"> • Drink more fluids to prevent dehydration. Prepare rehydration solutions using oral rehydration salt packets or a home-made solution of one liter of boiled water, four teaspoons sugar, and a half teaspoon of iodized salt. • Go to a health center if symptoms such as severe dehydration persist (e.g., low or no urine output, fainting, dizziness, shortness of breath, bloody stools, high fever, vomiting, severe abdominal pain or diarrhea).
Fever	<ul style="list-style-type: none"> • Eat soups that are rich in foods that give energy and nutrients, like maize, potatoes, and carrots. • Drink plenty of liquids, more than usual beyond thirst. 	<ul style="list-style-type: none"> • Bathe in cool water. • Rest. • Continue to eat small frequent meals as tolerated. • Go to the health center in case of: fever that lasts several days and is not relieved with aspirin; loss of consciousness; severe body pain; yellow eyes; severe diarrhea; and fits.
Nausea and Vomiting	<ul style="list-style-type: none"> • Eat small and frequent meals. • Eat foods like soups, unsweetened porridge and fruits like bananas. • Eat lightly salty and dry foods like crackers to calm the stomach. • Drink liquids, such as clean boiled water. • Avoid spicy and fatty foods. • Avoid caffeine (e.g., coffee, tea) and alcohol. • Avoid overly sweets foods. • Avoid having empty stomach; nausea is worse if nothing is in the stomach. • Avoid lying down immediately after eating; wait at least 20 minutes to avoid vomiting. • Rest between meals. 	<ul style="list-style-type: none"> • Eat small frequent meals. Nausea is worse if there is nothing in the stomach. • Avoid lying down immediately after eating; wait at least 20 minutes to avoid vomiting. • Rest between meals.

Illness	Diet	Care Practices
Thrush	<ul style="list-style-type: none"> • Eat soft mashed foods, such as carrot, scrambled eggs, mashed potatoes, bananas, soups, porridge. • If available, use a spoon or cup to eat small amounts of foods. • Eat cold or room temperature foods. • Drink plenty of fluids. • Avoid spicy, salty, or sticky foods; these may irritate mouth sores. • Avoid sugary foods; these cause yeast to grow. • Avoid strong citrus fruits and juices which may irritate mouth sores. • Avoid alcohol. 	<ul style="list-style-type: none"> • Seek medical treatment. • Rinse mouth with boiled warm salt water after eating to reduce irritation and keep infected areas clean so yeast cannot grow. • Tilt head back when eating to help with swallowing.
Anemia	<ul style="list-style-type: none"> • Eat more iron- and folic acid-rich foods such as animal products (e.g., eggs, fish, meat, liver), green leafy vegetables (e.g., collard greens, spinach), legumes (e.g., beans, lentils, groundnuts), and fortified cereals. • Consume vitamin C-rich foods (e.g., citrus fruits, green leafy vegetables) at meal times to improve iron absorption. • Do not drink tea, coffee, milk and cocoa at meal times; these inhibit iron absorption. • Take iron folate supplements as recommended by a health worker. 	<ul style="list-style-type: none"> • Seek treatment for malaria and hookworm.
Muscle Wasting	<ul style="list-style-type: none"> • Increase food intake by increasing quantity of food and frequency of consumption. • Increase protein in diet by eating animal products, cereals, and legumes. • Improve quality and quantity of foods by providing a variety of foods. • Eat small frequent meals. 	<ul style="list-style-type: none"> • Eat small frequent meals. • Eat soft liquid food if mouth sores present. • Slowly introduce fat in the diet. • Increase intake of starchy foods in cereals and other staples. • Use fortified foods. • Maintain regular exercise. It is the only way to build muscles.
Constipation	<ul style="list-style-type: none"> • Eat more foods that are high in fiber content, such as maize, whole-wheat bread, green vegetables, and washed fruits with the peel remaining. • Drink plenty of liquids including boiled water. • Avoid processed or refined foods. 	<ul style="list-style-type: none"> • Maintain regular exercise. • Drink water, juices, and nectars every day.
Bloatedness/ Heartburn	<ul style="list-style-type: none"> • Eat small, frequent meals. • Avoid gas-forming foods (e.g., cabbage, soda) and spicy foods. • Drink fluids between meals. 	<ul style="list-style-type: none"> • Eat small, frequent meals. • Eat long enough before sleeping so food can digest. • Avoid lying down immediately after eating.
Tuberculosis	<ul style="list-style-type: none"> • Consume foods high in protein, energy, iron and vitamins. 	<ul style="list-style-type: none"> • Consult medical personnel about taking food with medications. • If taking isoniazid for treatment, take a vitamin B6 supplement to avoid deficiency of this micronutrient.
Loss of Taste and/or Abnormal Taste	<ul style="list-style-type: none"> • Use flavor enhancers (e.g., salt, spices, herbs, lemon). 	<ul style="list-style-type: none"> • Chew food well and move around mouth to stimulate receptors.

Planning Meals for PLWHAs

It is important to work with households to select foods that are easily available, acceptable, and affordable to prepare. In planning meals, the following elements should be considered:

- The nutrient value and variety of the available foods (e.g., animal foods, legumes, nuts, fruits, vegetables, staples, and fats);
- The nutritional needs of the person(s), including the additional energy requirements due to infections and stage in the life cycle (e.g., pregnancy, lactation, childhood, adolescence);
- The personal food preferences of the PLWHAs;
- The effects of taking drugs, such as ARVs, on diet or drug food interactions—see Chapter 3 for more information on nutrition and ARVs;
- The time required for food preparation; and
- The cost and availability of food.

Persons caring for PLWHAs need to plan meals that are adequate and satisfy their physical and emotional needs. Compared to the requirements of healthy, non-HIV-infected people of the same age, sex, and physical activity level, HIV-infected asymptomatic persons need 10 percent more energy and HIV-infected symptomatic persons need 20 to 30 percent more energy. Meals should contribute to good health, be visually appealing, and provide aromas and tastes that stimulate the appetite.

In planning a meal for an HIV-infected individual, follow three steps:

1. Begin by assessing the stage in the disease based on the presence or absence of symptoms and opportunistic infections, the medications being taken, the food preferences and dietary practices of the PLWHAs, the quantity of food consumed, the frequency of meals, and the types of foods that are regularly consumed including staple foods.
2. Identify and reinforce good dietary practices. Identify the nutrients not adequately covered through food consumption. Analyze the reasons for the inadequacy and opportunities to meet these needs.
3. Based on the assessment, plan a varied diet with the client. Work with households to select foods that are easily available, acceptable, and affordable.

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www.who.int/hiv/en/

Nutritional Issues Associated with Modern and Traditional Therapies

3.

CHAPTER

The purpose of this chapter is to provide information on:

- The nutritional issues related to modern and traditional therapies used by PLWHAs; and
- The dietary responses that can be used to manage medication side effects and medication-food interactions.

People infected with HIV may take various modern medications, including antibiotics to treat opportunistic infections, ARVs to treat HIV/AIDS, and anti-malarial, anti-helminthe, and anti-fungal medications to treat other conditions such as malaria, intestinal parasites, and thrush. Often, these medications interact with specific nutrients or types of foods and have a positive or negative impact on health and nutritional status. The interaction can affect the efficacy of the medication by reducing its potency. Additional dietary supplements, such as mineral tonic and vitamin pills, are also often used and should be considered when evaluating possible harmful effects or interactions. Some people may stop taking the medication due to an adverse reaction. To minimize the negative effects of food-medication interactions and to maximize benefits of available medications and nutrients, it is important to develop various food-medication management strategies using locally available resources.

Foods and medications can interact in a number of ways to create health and nutritional positive and negative outcomes in PLWHAs. Interactions between modern medications and food and nutrition can involve:

- The effect of certain foods on how drugs work in the body;
- The effect of certain drugs on how food is used in the body;
- The side effects of a medication, which, in turn, can affect food intake and nutrient absorption; and
- Unhealthy side effects caused by combinations of certain medications and foods.

In the first section of this chapter, the medication-food interactions and the side effects of modern medications are explained, followed by approaches to minimize the negative impact on diet and nutrition.

The second section of this chapter focuses on the nutritional implications of traditional and alternative therapies for HIV/AIDS. Traditional therapies usually include the use of foods, plants, animal or mineral substances, clays, and herbs that are believed to have preventive, healing, or curative properties. However, because many traditional therapies are not well documented or understood, the nutritional and medical effects are mostly

unknown. To maximize the positive benefits of these treatments and to minimize the negative effects, program managers and health workers are encouraged to collaborate with traditional healers to help identify any harmful effects of traditional therapies as well as interactions with modern medications and foods.

Antiretroviral Drugs

Antiretroviral drugs (ARVs) are medications used to treat HIV/AIDS. Although ARVs do not completely destroy HIV, they significantly reduce the replication of the virus in the blood, which slows down progression of the disease to AIDS.

The main types of ARVs include:

- Non-nucleoside reverse transcriptase inhibitors (NNRTIs);
- Nucleoside analogues or nucleoside reverse transcriptase inhibitors (NRTIs); and
- Protease inhibitors (PIs).

Fusion inhibitors are a new type of ARV that prevent HIV from binding to the surface of the T-cell and infecting the T-cell. HIV-positive people who have become resistant to NNRTIs, NRTIs, and PIs will likely benefit from fusion

inhibitors, which are a different type of ARV not yet available in resource limited settings and, therefore, not discussed in this chapter.

Table 3.1. provides examples of medications in the major types of ARVs available in resource limited settings:

Each type of ARV is active at different stages of the virus in the replication cycle. Combining two or more ARVs enhances drug efficacy, which is referred to as combination therapy or highly active antiretroviral therapy (HAART). For example, the action of the ARV zidovudine is enhanced if used in combination with lamivudine or didanosine. It is likely that a person receiving ART will take a combination of ARVs to best prevent replication of the HIV virus. WHO recommends four first-line HAART regimens for adults and adolescents in resource limited settings listed in the box on the following page.

Table 3.1. Classes and Types of ARVs

Class	Type	Examples of Drugs
Reverse Transcriptase Inhibitor	Non-nucleoside reverse transcriptase inhibitor (NNRTI)	efavirenz (EFZ) nevirapine (NVP)
	Nucleoside reverse transcriptase inhibitor (NRTI)	abacavir (ABC) didanosine (ddI) lamivudine (3TC) stavudine (d4T) zidovudine (ZDV)
	Nucleotide reverse transcriptase inhibitor (NtRTI)	tenofovir (TDF)
Protease Inhibitor	Protease Inhibitor (PI)	indinavir (IDV) lopinavir (LPV) nelfinavir (NFV) ritonavir (RTV) saquinavir (SQV)

First-Line ARV Regimens Recommended by WHO for Resource Limited Settings

1. stavudine + lamivudine + nevirapine
2. zidovudine + lamivudine + nevirapine
3. stavudine + lamivudine + efavirenz
4. zidovudine + lamivudine + efavirenz

Source: World Health Organization (WHO). *Scaling Up Antiretroviral Therapy in Resource-Limited Settings: Guidelines for a Public Health Approach*. Geneva, Switzerland: WHO, 2003.

ART is not required at all stages of HIV. Generally, ART is used when the virus has begun to significantly damage the immune system. WHO recommends a person begin ART when that person meets any of the following three conditions—see Table 1.1. for definitions of WHO stages of HIV:

- WHO stage 4 of HIV regardless of CD4 count
- WHO stage 3 of HIV with a CD4 count below 350/mm³
- WHO stages 1 or 2 of HIV with CD4 count below 200/mm³

Or if CD4 testing is unavailable, WHO recommends a person begin ART when that person meets any of the following three conditions:

- WHO stage 4 of HIV regardless of total lymphocyte count
- WHO stage 3 disease regardless of total lymphocyte count
- WHO Stage 2 disease with a total lymphocyte below 1200/mm³

Because many ARVs may negatively interact with certain foods and nutrients, dietary management of ARV-food interactions can help improve the efficacy of ARVs while also minimizing their negative nutritional impact and enhancing adherence to drug regimens.

Access to New Information

Since knowledge in the area of ARVs is recent and continues to evolve, it is important for health workers and program planners to remain up-to-date as new ARVs become available or as new information emerges about existing ARVs. An important component of this process is to identify sources of information about ARVs and other drug-food interactions and to develop communication channels to ensure that this information reaches caregivers and PLWHAs in an easily comprehensible form. Sources of information may include ministries of health, AIDS service organizations, drug product information, pharmaceutical services, and journals or other periodicals.

ARVs and Pre-existing Malnutrition

Most existing recommendations on ARVs are based on research with well nourished, relatively food secure population groups. The dietary implications for individuals suffering from pre-existing protein energy malnutrition and micronutrient deficiencies may be different, such as in resource limited settings. This relates both to drug efficacy and nutrient absorption and metabolism. For example, what is the effect of pre-existing malnutrition on the absorption or metabolism of ARVs? Given that malnutrition adversely affects medication efficacy, are there specific nutritional responses that can mitigate these effects? Conversely, what is the impact of medication on malnourished individuals? These questions, as yet, do not have answers.

ARVs and Breastfeeding

Breastfeeding is strongly encouraged and commonly practiced in resource limited settings, including by HIV positive women. WHO recommends that: “When replacement feeding is acceptable, feasible, affordable, sustainable, and safe, avoidance of all breastfeeding by HIV-infected mothers is recommended. Otherwise, exclusive breastfeeding is recommended during the first months of life. To minimize HIV transmission risk, breastfeeding should be discontinued as soon as feasible, taking into account

local circumstances, the individual woman’s situation, and the risks of replacement feeding (including infections other than HIV and malnutrition).” Since some ARVs can affect fat metabolism, the effects of ARVs on breastmilk composition are not known. These effects may have implications for the health of infants as well as the health of HIV-positive mothers taking ARVs.

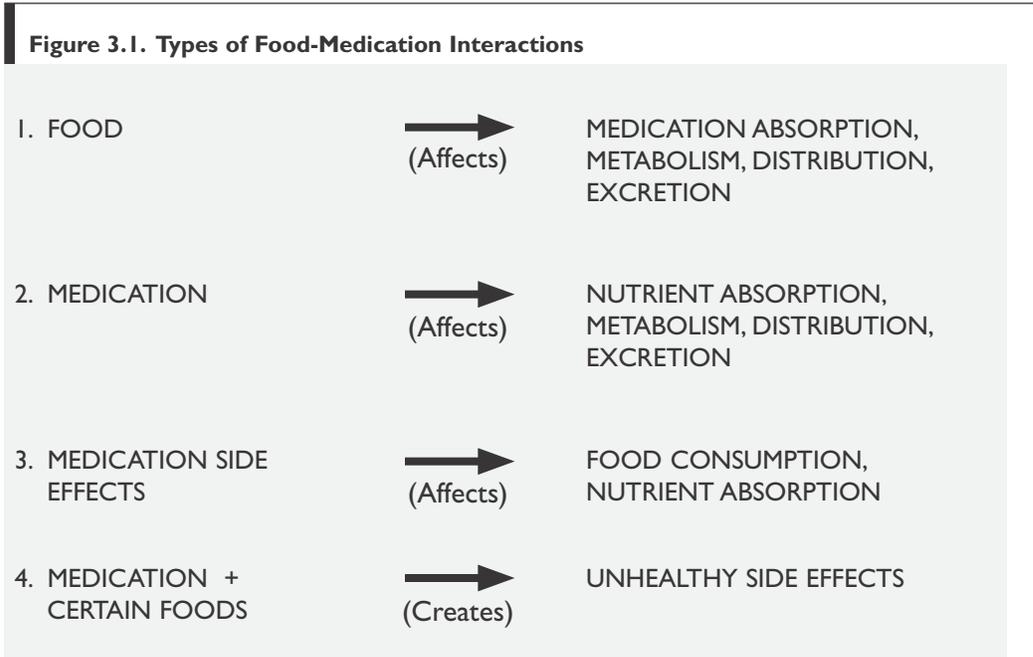
There is a need for further research on these issues, especially as access to ARVs increases in resource limited settings. Until further findings emerge, however, recommendations should be based on existing knowledge and basic health and nutritional principles.

For more information on breastfeeding and other infant feeding options, please see Chapter 5, Nutritional Care Recommendations for Infants and Children.

Nutritional Issues Associated with ARVs and Other Modern Medications

Modern medications can interact with food in four major ways as illustrated in Figure 3.1. Proper dietary management interventions can help manage some of these negative effects and can help PLWHAs maintain adequate food intake and compensate for affected

nutrients. Table 3.2. includes the side effects of some common modern medications as well as dietary management interventions to encourage adherence to the prescribed drug regimen and minimize the side effects that negatively affect nutritional status.



Food Affects Medication Efficacy

Food can enhance or inhibit the absorption, metabolism, distribution, and excretion of medication and, therefore, affect the medication's efficacy. This type of interaction varies from drug to drug and requires tailored dietary responses, which can improve the efficacy of the drug as well as encourage clients to adhere to the prescribed drug regimen.

For example:

- Food reduces the absorption of isoniazid, which is used to treat TB, a common opportunistic infection. Therefore, isoniazid should be taken at least one hour before or two hours after a meal.
- Rifampin is also used to treat TB and, like isoniazid, its absorption is reduced by food. Rifampin should be taken one or two hours after a meal to increase the drug's absorption.
- Food enhances absorption or metabolism of some ARVs and inhibits absorption or metabolism of others. For example, a high calorie, high fat, high protein meal decreases absorption of the protease inhibitor indinavir. A high fat meal increases the bioavailability of tenofovir and reduces the absorption of zidovudine. Zidovudine should not be taken with high fat meals (i.e., more than 40 g of fat or three tablespoons of margarine or oil).

Medication Effects on Nutrient Absorption, Metabolism, Distribution, and Excretion

Certain modern medications can affect health and nutritional outcome by inhibiting or enhancing nutrient absorption, metabolism, and excretion. Dietary management may require nutrient supplements or increased food intake, if there is a need to compensate for a depleted nutrient.

TB is an opportunistic infection that affects 30 percent of PLWHAs in resource limited settings. The TB medication isoniazid inhibits the metabolism of vitamin B6, which is important for the metabolism of fats and proteins. Therefore, vitamin B6 supplementation is recommended. The

antibiotic and anti-TB medication rifampin may increase vitamin D metabolism, resulting in weakened bones. Therefore, vitamin D supplementation may be required. Treatment of TB should be accompanied by a vitamin B6 or vitamin D supplement, depending on the type of antibiotic used.

Some ARVs can lead to lipodystrophy syndrome or fat maldistribution, which is characterized by either fat accumulation (e.g., breasts, upper back, visceral fat) or fat loss (e.g., face, extremities). Depending on the ARV drug, patients may experience changes in fat distribution in the body and levels of triglycerides and cholesterol in the blood.

It is important to maintain a healthy weight, eat a variety of foods, reduce intake of refined sugar and excessive carbohydrates, increase intake of fiber, avoid alcoholic beverages and smoking, exercise regularly, and take medications to lower harmful fats in the blood.

The effective management of lipodystrophy syndrome has not yet been established. Potential approaches include diet and exercise, use of medications, and change in the ARV regimen.

Some protease inhibitors, such as indinavir, may affect glucose or sugar metabolism and cause insulin resistance. Insulin resistance is associated with increased risk of diabetes. In case of diabetes, a specific carbohydrate controlled diet, reduced intake of refined sugar and saturated fat, exercise, and anti-diabetic medications are recommended.

The Side Effects of Modern Medications

Modern medications may have side effects that affect food intake and nutrient absorption. Many of these side effects may be managed by dietary responses. Proper nutritional management of these side effects will contribute to improved adherence to the regimen. When not properly managed, side effects of medications often lead to the interruption of treatment and contribute to poor adherence. Health workers and counselors should provide clients with dietary guidance that is specific to local situations.

Side effects of medication, such as taste changes, loss of appetite (i.e., anorexia), nausea, bloating, heartburn, constipation, vomiting, and diarrhea, indirectly affect nutritional status by causing a reduction in food intake or nutrient absorption. Reduced food intake and poor nutrient absorption can lead to weight loss and continuing impairment of the immune system, which, in turn, allows HIV to more quickly progress to AIDS. Dietary management of these side effects can help maintain food intake, compensate for nutrient losses, and prevent weight loss. Some side effects of medications can be similar to certain AIDS-related symptoms and call for similar dietary management. The following are examples:

- **Changes in taste.** The protease inhibitors saquinavir and ritonavir cause changes in taste and can cause food to taste metallic, sweeter, sourer, or too salty, which, in turn, may cause an individual to consume less food. This can be addressed by using flavor enhancers such as salt, sugar, spices, vinegar, or lemon to stimulate the taste buds, increase taste acuity, and mask any unpleasant flavors. Adding simple foods like onions to soup will boost flavor and can help to improve intake.
- **Anorexia.** Several medications, such as isoniazid and the ARVs lamivudine and stavudine, may cause anorexia and lead to reduced food intake. The dietary management of anorexia requires eating small and frequent meals and favorite foods. PLWHAs who experience anorexia should eat five to six meals a day and should include energy- and nutrient-dense foods at each small meal to ensure adequate nutrient intake. It is also important to maintain as much physical activity as possible, such as walking in fresh air, which also helps to stimulate appetite.

Some ARVs have been associated with increased risk of osteoporosis and weakening of bones that may require medical and dietary responses. For osteoporosis, a balanced diet with high calcium foods, such as milk, yogurt, cheese, and vitamin D supplement, is recommended, along with medical care.

Again, check with local medical authorities to ensure proper management of weakened bones.

Some side effects of ARVs are similar to symptoms of opportunistic infections, such as diarrhea. Therefore, the health worker must continue to be alert to recognize symptoms of infections and treat these infections appropriately.

Multiple Medications

Treatment of AIDS may require taking many pills on a daily basis, which can make it difficult to maintain food intake. If medications make it difficult to eat, a person is less likely to strictly adhere to the drug regimen, which can create drug resistance, especially in the case of ARVs. It is vital that health workers explain the necessity of healthy eating to the furthest extent possible, while also adhering to the drug regimen.

Multiple medications have multiple food-drug interactions and side effects that require setting specific timing, identifying recommended foods, and avoided foods for each drug. Health workers should spend enough time with the PLWHAs, to list all the drugs taken and counsel on the dietary management of the side effects and the interactions with food.

Drug-Drug Interactions

Drug interactions need to be managed adequately in order to ensure that the prescribed drug combination does not diminish drug efficacy, increase side effects, and affect nutritional status. For example, the ARV didanosine reacts with antacid medications containing magnesium and aluminum, leading to increased side effects of didanosine. Therefore, didanosine should not be taken at the same time with the antacid medications containing magnesium and aluminum.

Medication and Food Can Cause Unhealthy Side Effects

The combination of some medications and food can create unhealthy side effects or reduce the positive impacts of the drugs. Table 3.2. lists some of the medications used in resource

limited settings. The table shows their purpose, potential side effects, and recommended ways of taking the medications. Program planners are encouraged to add or update the list as medications become available.

Table 3.2. Modern Medications and Recommended Food Intakes and Side Effects

<i>Medication</i>	<i>Purpose</i>	<i>Nutrition Recommendations</i>	<i>Food/ Beverages/ Herbs to Avoid</i>	<i>Potential Side Effects*</i>
Sulfonamides: Sulfamethoxazole, Cotrimoxazole (Bactrim® Septra®)	Antibiotic for treating pneumonia and toxoplasmosis	Take with food		Nausea, vomiting, abdominal pain
Rifampin	Treatment of TB	On an empty stomach one hour before or two hours after meals	Alcohol	Nausea, vomiting, diarrhea, loss of appetite
Isoniazid	Treatment of TB	One hour before or two hours after meals Supplement with 10 mg vitamin B6 daily	Alcohol	Anorexia, diarrhea; may cause possible reactions with foods such as bananas, beer, avocados, liver, smoked or pickled fish, yeast, yogurt; may interfere with vitamin B6 metabolism, therefore will require vitamin B6 supplement to prevent peripheral neuropathy and anemia
Quinine	Treatment of malaria	With food		Abdominal or stomach pain, diarrhea, nausea, vomiting; lower blood sugar
Sulfadoxine and Pyrimethamine (Fansidar®)	Treatment of malaria Pyrimethamine is also used to treat toxoplasmosis	With food and consume large quantities of water Supplement daily with folic acid (leucovorin), the active form of folate (5-10 mg/ day)		Nausea, vomiting, taste loss and diarrhea; not recommended if folate deficient; not recommended for breastfeeding women
Chloroquine	Treatment of malaria	With food		Stomach pain, loss of appetite, nausea, vomiting; not recommended for breastfeeding women

Medication	Purpose	Nutrition Recommendations	Food/ Beverages/ Herbs to Avoid	Potential Side Effects*
Fluconazole	Treatment of thrush	With food		Nausea, vomiting, diarrhea; can be used during breastfeeding
Nystatin ®	Treatment of thrush	With food		Infrequent occurrence of diarrhea, vomiting, nausea
Antiretroviral drugs				
Abacavir (ABC) NNRTI	Antiretroviral	Can be taken without regard to food		Nausea, vomiting, fever, allergic reaction, anorexia, abdominal pain, diarrhea, anemia, rash, hypotension, pancreatitis, dyspnea, weakness and insomnia, cough, headache
Didanosine (ddl) NNRTI	Antiretroviral	Take one hour before or two hours after eating with water only	Alcohol, juice	Anorexia, diarrhea, nausea, vomiting, pain, headache, weakness, insomnia, rash, dry mouth, lost of taste, constipation, stomatitis, anemia, fever, dizziness, pancreatitis; do not take with antacid containing aluminum or magnesium
Lamivudine (3TC) NNRTI	Antiretroviral	Can be taken without regard to food	Alcohol	Nausea, vomiting, headache, dizziness, diarrhea, abdominal pain, nasal symptoms, cough, fatigue, pancreatitis, anemia, insomnia, muscle pain, and rash
Stavudine (d4T) NNRTI	Antiretroviral	Can be taken without regard to food	Limit alcohol	Nausea, vomiting, diarrhea, peripheral neuropathy, chills and fever, anorexia, stomatitis, diarrhea, anemia, headaches, rash, bone marrow, and pancreatitis
Tenofovir (TDF) NNRTI	Antiretroviral	With food	Alcohol	Abdominal pain, headache, fatigue, and dizziness.
Zidovudine (AZT) NNRTI	Antiretroviral	Can be taken with food, but do not take with a high fat meal	Alcohol	Anorexia, anemia, nausea, vomiting, bone marrow suppression, headache, fatigue, constipation, fever dizziness, dyspnea, insomnia, muscle pain, rash
Efavirenz NRTI	Antiretroviral	Can be taken with food, but do not take with a high fat meal	Alcohol	Elevated blood cholesterol levels, elevated triglycerides levels, rash, dizziness, anorexia, nausea, vomiting, diarrhea, dyspepsia, abdominal pain, flatulence
Nevirapine (NVP) NRTI	Antiretroviral	Can be taken without regard to food	St John's wort	Nausea, vomiting rash, fever, headache, skin reactions, fatigue, stomatitis, abdominal pain, drowsiness, paresthesia; high hepatotoxicity

Medication	Purpose	Nutrition Recommendations	Food/ Beverages/ Herbs to Avoid	Potential Side Effects*
Indinavir (IDV) PI	Antiretroviral	Take the drug one hour before or two hours after meal; drink at least 1,500 mL of fluid daily	St John's wort	Nausea, abdominal pain, headache, kidney stones, taste changes, vomiting, vomiting, diarrhea, insomnia, ascites, weakness, dizziness; may increase the risk of lipodystrophy; do not consume grapefruit as it may lower the level of medicine in the blood
Lopinavir PI	Antiretroviral	Can be taken without regard to food	St John's wort	Abdominal pain, diarrhea, headaches, headache, weakness, nausea; may increase the risk of lipodystrophy and or diabetes
Nelfinavir PI	Antiretroviral	Take with meal or light snack	St John's wort	Diarrhea, flatulence, nausea, abdominal pain, rash; may increase the risk of lipodystrophy
Ritonavir PI	Antiretroviral	Take with meal if possible	St John's wort	Nausea, vomiting, diarrhea, hepatitis, jaundice, weakness, anorexia, abdominal pain, fever, diabetes, headache, dizziness; may increase the risk of lipodystrophy
Saquinavir PI	Antiretroviral	Take with meal or light snack; take within two hours of a high fat meal and high calcium meal	Garlic supplements St John's wort	Mouth ulceration, taste changes, nausea, vomiting, abdominal pain, diarrhea, constipation, flatulence, weakness rash, headache; may increase the risk of lipodystrophy

This list is not comprehensive.

*For nutritional management of side effects, refer to Table 2.2. in Chapter 2.

Sources: a) Pronsky, Meyer, and Fields-Gardner. *HIV Medications Food Interactions*. 2001.
 b) Nerad, Romeyn, Silverman, Allen-Reid, Dietrich, Merchant, Pelletier, Tinnerello, Fenton, "General Nutrition Management in Patients Infected with Human Immunodeficiency Virus." Clinical Infectious Disease 36 (2003).
 c) World Health Organization (WHO). *Scaling Up Antiretroviral Therapy in Resource-Limited Settings: Guidelines for a Public Health Approach*. Geneva, Switzerland:WHO, 2003.

Table 3.3. Food Interactions and Side Effects of Isoniazid

Medication	Dietary Interactions and the Medication Side Effects	Dietary Responses/Instructions for PLWHAs
Isoniazid TB treatment	Food reduces absorption of isoniazid	Do not take isoniazid during meals. Take one hour before or two hours after meals.
	May affect vitamin B6 metabolism	Daily consumption of food sources of vitamin B6 such as white beans, maize avocado, meat, and fish, or vitamin B6 (25 to 50 mg daily) supplementation is recommended.
	Increased risk of hepatitis when combined with alcohol	Avoid alcohol.
	Anorexia (i.e., loss of appetite)	Eat small and frequent meals. Eat favorite foods.
	Diarrhea	Drink plenty of fluids and eat energy- and nutrient-rich food. Avoid fried foods.

Multiple Food Interactions of a Drug

The various drug-food interactions require specifically tailored dietary responses according to medication and nutrition needs. Table 3.3., for example, shows the various food interactions and side effects associated with the TB treatment drug isoniazid.

Traditional Therapies

Many traditional approaches are not well documented and their nutritional effects are mostly unknown. Most of these therapies have not been subjected to clinical research and, thus, their effect on the course of HIV disease is unknown. People widely use traditional medicines and trust them. However, it is important to recognize that:

- Traditional therapies may be beneficial or detrimental to a person's health;
- They may need to manage interactions between traditional therapies and food and nutrition;
- There is a cost associated with traditional therapies, which people are willing to pay;
- Dietary management of side effects still apply when using traditional medications; and
- It is important to be knowledgeable about the common traditional therapies that are used in the program area.

It is very important for program managers and traditional healers to work together to ensure that all the treatment options available to PLWHAs.

There are often locally available remedies for treating illnesses common to PLWHAs, such as mild diarrhea, fever, cough, headaches, sore throats, and thrush. A number of dietary approaches as well as some alternative or traditional ways of dealing with common illnesses are described in the Table 3.4. The remedies listed are sometimes used in East and Southern Africa. Program managers are encouraged to compile an expanded list of treatments used to alleviate symptoms associated with AIDS. However, scientific evidence of their efficacy is limited and some may have side effects.

As the effects of food on the efficacy of the medication are drug-specific, the nutritional assessment by the health worker should include an assessment of all the medications

the client is taking, including ARVs, and the food commonly eaten. The health worker should work with PLWHAs to identify the most appropriate dietary interventions with regards to timing of meals and what types of foods to consume or avoid to ensure the efficacy of the medication and optimize the metabolism of nutrients.

Nutritional Issues Associated with Traditional Therapies

Traditional therapies and modern therapies can interact and affect both drugs' efficacy. For example, studies have shown that the blood concentration of the PI saquinavir decreases by 50 percent in the presence of garlic supplement, which is taken as a traditional therapy to strengthen the immune system. Saquinavir should not be taken with a garlic supplement. To promote consistent dietary guidance, program planners should encourage dialogue and consultation between modern and traditional practitioners.

Traditional therapies vary widely and are specific to local circumstances and practitioners. Therefore, health workers and program planners should learn about local remedies by asking traditional healers and their clients about commonly treated illnesses. Program planners, in consultation with modern and traditional therapists, should assess the benefits and disadvantages of available treatments, and ensure that approaches are consistent with the nutritional guidelines presented in this guide. In situations where treatment is in conflict with sound nutritional or medical approaches, it is necessary to review the recommendations with the traditional healer and health authorities. For example, a traditional healer's recommendation to avoid fluids during bouts of diarrhea is cause for concern. However, if the recommendation is for a tea made with boiling water and a local herb, the benefit is likely to be positive.

Program planners may also consider involving modern and traditional providers in the design of guidelines for nutritional management of modern and traditional therapies and food interactions in a specific setting.

Properties of Some Traditional Remedies

Garlic: Used to build a healthy heart; helps soothe symptoms of thrush, mild diarrhea and headaches

Tea made from lemon leaves, guava leaves, or gum or Neem tree leaves: Used to treat sore throats and coughs

Gum tree leaves with vegetable oil: Used to treat minor skin problems

Lavender or geranium, crushed and boiled with water: Used to treat skin rashes associated with shingles

Table 3.4. Examples of Traditional Ways of Dealing with Common Illnesses and Symptoms in AIDS

Illness/ Symptom	Traditional Ways of Dealing with the Illness or Symptom	When to Seek Assistance from Modern Health Services
Diarrhea	<ul style="list-style-type: none"> • Eat fruits such as ripe bananas. • Drink the water from boiled white rice and light porridges made of maize and cassava. • Prepare rice soup. Boil one cup of rice in five to six cups of water and a bit of salt for 1 hour. Drink the soup while it is warm. • Drink fermented milk three to four times a day. Fermented milk does not contain lactose, a sugar that can be associated with abdominal pain during diarrhea. • Drink garlic tea. Chop three or four cloves of garlic and add to one cup of boiling water. Simmer for 10 minutes and then cool slightly before drinking. Drink the tea three to four times per day. 	<ul style="list-style-type: none"> • If there is blood in the stool • If diarrhea is accompanied by fever that cannot be relieved by aspirin or home treatment • If the patient is too weak to eat or very dehydrated and efforts to rehydrate are not working • If diarrhea does not go away after two to three days
Fever	<ul style="list-style-type: none"> • Drink citrus (e.g., lemon, orange) juice several times throughout the day. • Pound lemon or orange peel with a small amount of water. Rub on the patient's back or add to bathwater before bathing. • Pound gum/eucalyptus leaves in a mortar with a small amount of cooking oil. Rub the oil onto the patient's chest. Or place a large number of gum leaves in a pot of boiling water. Leave the pot in the patient's room so the vapors can be inhaled. • Cut a fresh twig from a neem tree (i.e., <i>Azadirachta indica</i>). Remove the leaves, and have the patient chew the bark; or boil some water with the bark and have the patient drink the tea. 	<ul style="list-style-type: none"> • If fever lasts more than three days • If the patient is very hot or delirious • If fever is accompanied by other signs of serious illness
Cough	<ul style="list-style-type: none"> • Crush some fresh gum tree leaves and place them in boiling water. When the water is boiling, remove the pot from the fire. Place a cloth over the person's head and lean over the pot to breathe the vapors. • Place three to four dried gum tree leaves in a cup of hot water and boil for ten minutes. Let the tea cool slightly before drinking. The tea should be consumed two to three times a day. • Tea can also be made with lemon or guava leaves. 	<ul style="list-style-type: none"> • If the person is coughing blood or thick, bad-smelling sputum or mucous • If the cough lasts more than two weeks
Headaches	<ul style="list-style-type: none"> • Crush some lavender leaves with a little cooking oil until a paste is formed. Rub it into the temples and forehead. Also rub some dried lavender leaves in your hands and smell them frequently while you rest. • Make garlic and onion tea. Chop two to three cloves of garlic and one half bulb of onion. Put the chopped garlic and onion into a cup of hot water. Allow the water to simmer for 10 minutes. After 10 minutes, let the tea cool slightly before drinking. 	<ul style="list-style-type: none"> • If the patient's neck is stiff • If the patient also has a high fever • If the headache does not go away after two to three days
Sore Throats	<ul style="list-style-type: none"> • Squeeze a whole lemon and mix with honey. Take a large spoonful as necessary. • Mix a strong solution of salt and warm water. Gargle with this solution several times a day. • Eat raw garlic or make garlic tea. Chop three to four cloves of garlic. Add chopped cloves to one cup of boiling water. Allow water to simmer for 10 minutes. Let it cool before drinking. Add honey or sugar to sweeten if available. 	<ul style="list-style-type: none"> • If the patient cannot swallow or breathe properly • If the patient has a fever that cannot be relieved by aspirin or home treatment • If the patient develops a rash • If the sore throat lasts more than two weeks

Thrush	<ul style="list-style-type: none"> • Eat one to two cloves of raw garlic every three to four hours if available. If the raw garlic is too strong, crush the cloves and mix with a small amount of clean boiled water. Rinse the mouth with this mixture and then swallow the rest. Repeat every three to four hours. • Drink sour/fermented milk. This will help to prevent yeast from growing. • Eat green papaya or paw paw as a relish or side dish. • Gargle with slightly salty, warm, clean water. • Avoid sweet foods and sweet drinks (e.g., carbonated soft drinks), which will increase the soreness and help the yeast to grow. Avoid sugar and honey. 	<ul style="list-style-type: none"> • When a fever is present and cannot be relieved by aspirin or home treatment • If no improvement occurs after a few days • If pain causes a complete loss of appetite
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Source: Malawi National AIDS Control Programme. *Handbook of Herbal Remedies for Some AIDS-Related Illnesses*. Lilongwe, Malawi: Malawi National AIDS Control Programme, 1996.

**Guidance on Effective Nutrition/
Medication Management for
Antiretroviral Therapy (ART)**

The following are guidelines for health workers that can help promote effective nutrition-medication management for ART.

1. Counsel on:
 - Understanding that ARVs are not a cure.
 - Food effects on the medications’ efficacy, medication effects on nutrient absorption and metabolism, and the side effects of the medications.
 - The timing for taking medications and food/meals. Explain the necessity of accurate timing for meals and drugs. Involve PLWHAs and family members in constructing a meal and drug-taking timetable and in selecting the foods available to address the negative effects of medications and food interactions.
 - The dietary management of the medications’ negative effects on nutrient absorption, metabolism, distribution, and excretion and the side effects of the medications. Highlight the foods that should not be taken while taking the medications and provide appropriate guidance.
2. Provide psychosocial support at the onset of treatment.
3. Assess any difficulties that PLWHAs may be having in following the planned diet and timetable due to food access or availability, taste, or other reasons

and whether there have been positive or negative changes in symptoms, side effects, or drug adherence. Consult with PLWHAs and suggest other options when recommended foods are not available.

Assessments help identify the most effective communications channels for disseminating the updated recommendations on dietary management of food and medication interactions to program planners, health workers, caregivers, and PLWHAs. Below are a series of questions that can guide health workers in carrying out an assessment:

- What ARVs and other medications are used?
- What are the specific ARV and medication-food interactions in the local context?
- What are the common side effects of these ARVs and medications? What known foods aggravate or alleviate the symptoms? What are the dietary responses?
- What medications, including modern and traditional, are taken for the treatment of opportunistic infections and the diseases common to the area? What are the drug-drug interactions? What are the drug-food interactions?
- What are the nutritional implications and the food recommendations to manage the side effects (e.g., nausea, loss of taste, changes in nutrient absorption)? What is the effect of the medication on nutrient

- absorption and metabolism?
- What suggestions for specialized diets will be difficult to implement because of food insecurity, food habits, or other reasons? How can these constraints be addressed?
- What are the most effective communications channels to keep PLWHAs, caregivers, counselors, and program managers informed about ARVs and other medications and their implications for nutrition.

Other Issues to Consider

Limited Access to Sufficient Food for PLWHAs

Due to the scarcity of food in many resource limited settings, people with HIV/AIDS may be unable to follow recommendations to manage the effects of food-medication interactions. Health workers should involve PLWHAs in identifying feasible options for the nutritional management of food and drug interactions, which may also contribute to maintaining drug adherence by generating ownership and interest in the continuation of the treatment.

Food insecurity is aggravated by the economic consequences of HIV/AIDS, such as loss of earnings of a sick household member, depletion of assets and savings in order to pay for healthcare, or reduced availability of household labor to produce food. Program implementers should work with communities to identify ways for food insecure PLWHAs to access the sufficient quantity and quality of food needed. For more information, please refer to Chapter 6.

Stigma and Discrimination Faced by PLWHAs

The stigma directed at PLWHAs can cause anxiety and depression in affected individuals, which may cause a reduction in appetite and food intake. Stigma can also create additional obstacles and challenges for HIV-infected people trying to follow recommended feeding practices. Involving HIV-positive people in the program design and implementation has been shown to reduce stigma and engage communities.

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Nutritional Care and Support for Pregnant and Lactating Women and Adolescent Girls

4.

CHAPTER

The purpose of this chapter is to provide nutritional care and support guidelines to help ensure adequate nutrition for pregnant and lactating women in the context of HIV/AIDS.

At the end of 2003, 58 percent of those living with HIV in Sub-Saharan Africa were women. Young women 15 to 24 years old are two-and-a-half times more likely to be infected than young men of the same age. HIV-infected pregnant and lactating women have increased

nutritional requirements compared to their healthy HIV-negative counterparts due to a combination of the virus replication process and disease symptoms that limit dietary intake and reduce nutrient absorption. Medications used to treat HIV and associated infections can also create side effects that cause an individual to reduce food intake, while opportunistic infections associated with HIV contribute to additional nutrient losses.

Nutritional Care and Support for Pregnant Women and Adolescents Regardless of HIV Status

Good nutrition is important for all pregnant women and contributes to maternal health and optimal birth outcomes. Inadequate food intake, poor dietary quality, and untreated infections before and during pregnancy increase the risk of maternal mortality and morbidity and are risk factors for negative birth outcomes such as infants with low birth weight (LBW) or intrauterine growth restriction (IUGR). Because the nutritional requirements of women are greater during pregnancy, they need to consume adequate quantities of nutritionally dense foods to meet their own nutritional requirements and the requirements of the growing fetus and prepare for lactation. This section presents a brief review of the nutritional requirements of all pregnant women in the context of HIV/

AIDS and provides dietary recommendations to ensure women's health and improve birth outcomes.

A healthy and normally active pregnant woman requires approximately 285 additional kcal each day. She also needs to eat increased amounts of protein and take a daily supplement containing 60 mg of iron and 400 mg of folate, according to national protocols. A diverse, micronutrient-rich diet should be consumed, including fortified foods if available. A daily multimicronutrient supplement containing up to 1 recommended dietary allowance (RDA)² of all essential nutrients may be recommended when an adequate and balanced diet is not available. A pregnant woman should gain approximately 12.5 kg during the pregnancy.

² Recommended Dietary Allowance (RDA): The amounts of specific micronutrients needed to meet the nutrient requirements of approximately 98 percent of the healthy individuals in a specific age and gender group. RDA's guide individuals to achieve adequate nutrient intake aimed at decreasing the risk of chronic disease. They are based on estimating an average requirement plus an increase to account for the variation within a particular group.

Ensuring Good Nutrition for all Pregnant Women and Adolescent Girls

Benefits for the mothers

- Decreases the risk of complications during pregnancy and delivery;
- Prevents or controls anemia in the mother; lowers the risk of mortality/morbidity during delivery and in the early postpartum period; and
- Ensures energy storage for lactation.

Benefits for the infant

- Prevents intrauterine growth restriction (IUGR), micronutrient deficiencies, and LBW and contributes to healthy growth and development.

Benefits for the household

- Well-nourished, healthy mothers are more available for child care and contribute more fully to the functioning of the family; and
- Improved work productivity is associated with improved nutritional status.

Benefits for the community and the nation

- Increases productivity; and
- Decreases maternal and infant morbidity and mortality.

Birth weight is one of the most important determinants of a child's survival and is highly influenced by the mother's nutritional status before and during pregnancy. A low pre-pregnancy weight and inadequate weight gain during pregnancy are the most significant predictors of IUGR and/or LBW. Short stature is also a risk factor for delivery of an infant with IUGR and/or LBW. An average weight gain of 12.5 kg during pregnancy is a common international recommendation. According to the Institute of Medicine in 1990, women who begin their pregnancy with a body mass index (BMI) of less than 19.8 must increase their daily energy intake to gain more than 12.5 kg. To calculate the BMI, divide weight

in kilograms by height squared in meters (kg/m^2). For example, a 48.4 kg woman with a height of 155 cm or 1.55 m would have a BMI of 20.14 ($\text{BMI}=(48.4/(1.55*1.55))$). If highly overweight (i.e., BMI is greater than 29 at the beginning of the pregnancy), the woman should not gain more than 7 kg. Table 4.1. provides recommended total weight gain during pregnancy and the recommended weekly weight gain during the second and third trimesters, depending on a woman's BMI at the beginning of the pregnancy. The minimum pregnancy weight gain recommended by for all women in developing countries is 6 kg (i.e., 1 kg per month during the second and third trimesters of pregnancy).

Table 4.1. Recommended Weight Gain during Pregnancy

<i>Pre-pregnancy category BMI</i>	<i>Recommended total gain (kg)</i>	<i>Recommended weekly weight gain, second and third trimesters</i>
BMI less than 19.8	12.5 to 18.0	slightly more than 0.5 kg
BMI 19.8 to 25.9	11.5 to 16.0	0.5 kg
BMI 26.0 to 29.0	7.0 to 11.5	0.3 kg
BMI more than 29.0	less than 7	0.3 kg

Source: Institute of Medicine (1990)

Energy Requirements. Healthy pregnant women need an extra 285 kcal per day if the pre-pregnancy activity level is maintained. The additional 285 kcal per day translates approximately into one additional serving of the staple food each day. The extra daily energy requirement is reduced to 200 kcal per day if the activity level is reduced.

Protein Requirements. A pregnant woman requires more protein for the development of fetal and maternal tissue, including the placenta, and an increased red blood cell mass. Non-pregnant women need 0.8 g protein/kg per day, while pregnant women require 1.1 g/kg per day, or approximately 71 g each day³.

In addition to the consumption of staple foods, pregnant women should eat foods that provide protein, such as pulses (e.g., chickpeas, lentils, cowpeas, beans), oil seeds (e.g., pumpkin, sunflower, melon), and foods of animal origin (e.g., meat, eggs, milk). Foods of animal origin provide protein, zinc, selenium, and iron that is more bio-available than the same nutrients derived from plant sources. Pregnant women need to eat a variety of foods to meet their macronutrient and micronutrient requirements.

Micronutrient Requirements. Many micronutrient requirements increase with pregnancy. Pregnant women have higher iron requirements because of the mother's increased red blood cell mass and the iron needed by the developing fetus. They are therefore at higher risk of developing iron deficiency anemia than non-pregnant women. In order to meet both fetal and maternal iron requirements, an adequate dietary intake of iron plus supplementation with iron/folate is necessary for pregnant women.

Anemia and Iron. Anemia in pregnant women is associated with pre-term delivery, LBW, and increased perinatal mortality. The risk of maternal mortality is increased in pregnant women with decreasing hemoglobin levels. In resource limited settings, anemia affects half or more of all pregnant women. WHO recommends that pregnant women consume a supplement containing 60 mg of iron and 400 micrograms of folic acid on a daily basis for six months during pregnancy where the prevalence of anemia is less than 40 percent and for an additional three months postpartum where anemia prevalence is equal to or greater than 40 percent to prevent anemia.

³ The National Academies. Dietary Reference Intakes for Energy, Carbohydrate, Fiber, Fat, Fatty Acids, Cholesterol, Protein, and Amino Acids. Washington D.C.: The National Academies, 2002.

Take an Integrated Approach to Anemia Prevention and Control Services for Pregnant Women

- Provide iron or iron/folate supplements to pregnant women according to international or national protocols.
- Promote animal sources of iron, iron-fortified foods, and enhanced bioavailability of iron in the diet.
- Deliver malaria prevention and treatment services to pregnant women, especially in first and second pregnancies.
- Provide helminth control—once in the second trimester with hookworm prevalence 20 to 30 percent; repeat once in third trimester with prevalence greater than 50 percent—in areas with endemic helminth infections:
 - Albendazole—400 mg single dose;
 - Mebendazole—500 mg single dose or 100 mg twice daily for three days;
 - Levamisole—2.5 mg/kg single dose; best if dose repeated on next two consecutive days; and
 - Pryantel—10 mg/kg single dose, best if dose repeated on next two consecutive days.
- Treat other infectious diseases.
- Provide birth spacing information and access to modern family planning methods.

Vitamin A. Pregnant women are particularly vulnerable to vitamin A deficiency, making them more susceptible to infection and, in one study in Nepal, increasing the risk of maternal death. In addition, low maternal stores of vitamin A compromise breastmilk quality and negatively affect the vitamin A stores of their infants. Improving vitamin A status may also contribute to a reduction of anemia. See Chapter 2 for more information.

Iodine. In areas where iodine deficiency is a problem, women are more likely to miscarry or give birth to stillborn children. Both the mental and physical growth and development of children may be impaired and children born to iodine deficient women may suffer irreversible mental retardation. Universal consumption of iodized salt by all household members should be encouraged.

Additional micronutrients of particular importance to pregnant women are zinc, folate, calcium, and vitamin D. Eating a varied diet including locally available fruits and vegetables will help pregnant women meet their micronutrient requirements and add fiber to their diet. Micronutrient-fortified staple foods such as wheat also help to increase the dietary sources of micronutrients for women. Table 2.1. in Chapter 2 provides information on sources of selected micronutrients.

Pregnancy's Discomforts

Pregnancy may be accompanied by changes in eating habits. Some pregnant women have cravings for or aversions to specific foods. Additionally, many women suffer from nausea, vomiting, and constipation at different points in pregnancy. Though normal, the body's reaction to pregnancy can be of special concern in HIV-infected women since the virus places an added stress on their bodies.

Cravings and Aversions. Craving and eating only specific foods and avoiding others because of the flavor, odor, or color may lead to nutrient deficiencies. Some pregnant women eat unusual items such as clay, chalk, and cola nut leaves that can be harmful for the mother and the infant. Health workers can help women identify nutrients that may be

Tips for Pregnant Women Suffering from Frequent Nausea and Vomiting

- Eat small and frequent meals. Nausea is worse if nothing is in the stomach.
- Eat dry food such as dry bread, roasted or boiled groundnut, plantain, yam, potato, or any other available tuber before getting out of bed.
- Drink fluids between meals rather than with meals.
- Avoid drinking beverages containing alcohol and caffeine.
- Avoid lying down for at least twenty minutes after eating.
- Rest between meals.

missing from their diets and suggest healthful alternatives to the unusual substances being consumed to correct the deficiency.

Nausea. Some women suffer from nausea and vomiting during the first trimester of the pregnancy, which may lead to reduced food intake and limited gestational weight gain. Health workers can counsel women on how to manage nausea and vomiting during pregnancy so that they are able to maintain or increase food intake and meet their nutritional requirements.

Constipation. Constipation may result from a reduction in activity level, a change in eating habits or as a side effect of iron/folate supplements. Health workers should encourage women to drink plenty of fluids, eat a variety of locally available fruits and vegetables every day, and maintain physical activity as much as possible.

Special Considerations for Adolescent Pregnancy

A pregnancy during adolescence often increases the risk for malnutrition, complications during pregnancy and delivery, and poor birth outcomes, including death of the mother and child. This section will address nutritional considerations for pregnancy during adolescence.

The nutritional requirements of pregnant adolescent girls are greater than the requirements of pregnant adult women because an adolescent is usually still growing. Her daily intake must satisfy both the requirements of the developing girl and those of the developing fetus. Completion of linear growth may take up to seven years after menarche, and pelvic bone growth continues even after full height is achieved. This places pregnant adolescents at increased risk for prolonged and/or obstructed labor leading to increased maternal and

Pregnant adolescent girls are at a very high risk for mortality. For adolescent girls less than 18 years, the risk of dying in childbirth is 2 to 5 times greater than for women between the ages of 18 and 25.

infant mortality as well as the potential for crippling injuries such as vaginal fistulae. Adolescent mothers are also more likely to have LBW babies because of the competition for nutrients between mother and fetus, as well as poorer placental function. This perpetuates the intergenerational cycle of malnutrition. By addressing the special requirements of adolescents—before they become pregnant as well as during pregnancy—there is a potential opportunity to break the cycle.

Nutritional Care and Support for HIV-infected Pregnant Women and Adolescents

This section presents nutritional care practices recommended for HIV-infected pregnant women and adolescent girls.

HIV-infected pregnant women may develop AIDS-related symptoms. The dietary management of these symptoms in pregnant women is similar to that of other adults and is described in Chapter 2.

HIV-infected pregnant women and adolescent girls, like other PLWHAs, have increased energy requirements due to infection with HIV. Attention to nutrition for HIV-infected pregnant women and adolescent girls is doubly important in order to maintain weight, prevent weight loss, and continue adequate weight gain during pregnancy. Improved nutritional status will help to maintain a strong immune system, decrease susceptibility to infections, and slow the progression to AIDS.

It is important that health workers are able to provide guidance to HIV-infected pregnant

women and adolescent girls on the range of locally available nutrient dense foods that they can eat to meet their daily increased energy and overall nutrient requirements. This means being familiar with the energy and micronutrient content of local foods. Health workers may need to work with agencies in the community to find ways to meet the nutritional requirements of HIV-affected women and their families to improve or maintain their health and nutritional status. Options include the direct provision of food rations, either on-site or take-home, distributed through maternal and child health programs, food-for-work and food-for-training programs. Income generation activities may be funded through limited cash resources from food-assistance programs to improve household food security and the means to acquire food.

Energy Requirements. Energy requirements of HIV-infected pregnant adolescents and adult women vary according to the stage of the disease.

HIV-infected asymptomatic pregnant adolescents and adults (WHO stage 1) **should increase energy intake** over the level recommended for healthy non HIV-infected pregnant adolescents and adult women by an amount equaling **10 percent** of the intake level recommended for non-pregnant adolescents or women of the same age and activity level plus the additional energy (i.e., approximately 285 kcal per day) needed to support pregnancy.

HIV-infected symptomatic pregnant adolescents and adults (WHO stage 2 and above) should **increase energy intake** over the level recommended for healthy non HIV-infected pregnant adolescents and adult women by an amount equaling **20 to 30 percent** of the intake level recommended for non-pregnant adolescents or women of the same age and activity level plus the additional energy needed to support pregnancy.

The amount of increased energy is the same for HIV-infected persons taking ARVs. The level of additional energy intake for the HIV-infected pregnant woman depends on the presence and severity of symptoms.

Table 4.2. illustrates the changes in recommended energy intake of pregnant women based on the stage of the disease.

Protein Requirements. At this time, there is not enough evidence to suggest that HIV-infected pregnant women require more protein than the level recommended for healthy non-HIV-infected pregnant woman. Meeting the protein requirements of HIV-infected pregnant women will help prevent muscle wasting and support the additional protein demands of pregnancy including the growth of the placenta and increased red blood cell mass.

Micronutrient Requirements. Micronutrients play important roles in the healthy functioning of the immune system and therefore are particularly important for PLWHAs. At the same time, in populations with high AIDS prevalence, micronutrient deficiencies are often common. Current recommendations from the expert consultation to the World Health Organization advise HIV-infected

pregnant adolescents and adult women to consume varied diets to ensure that they meet the RDAs for micronutrients.

The results of vitamin A supplementation trials for HIV-infected women are mixed. The current WHO guidelines advise that vitamin A intake by HIV-infected pregnant and lactating women not exceed the existing RDAs. No additional vitamin A should be provided. In areas of endemic vitamin A deficiency, WHO continues to recommend administration of a single high dose (i.e., 200,000 IU) vitamin A supplement within the first six to eight weeks⁴ of delivery to the new mother. The iron/folate supplementation schedule also remains the same as for non-HIV-infected women, described in Section 4.1.

Although a varied, nutritionally adequate diet is the best source for micronutrients, there will be women for whom a multiple micronutrient supplement is recommended. Some studies have shown improvements from specific multivitamin and mineral supplements to HIV-infected women for a range of outcomes, including increased maternal weight gain during pregnancy, increased hemoglobin concentration, HIV progression to AIDS and improved CD4 cell counts. For children, improved birth weight, reduced postnatal transmission of HIV, and decreased mortality have been shown, particularly among nutritionally vulnerable women with advanced HIV disease. The optimal composition of multiple micronutrient supplements for HIV-infected women has yet to be determined and is currently being studied.

ART and Other Medications

Some HIV-infected pregnant women may take ARV medications to prevent MTCT and reduce their viral loads. There are different types of ARV regimens that may be administered.

Single and medium course regimens over a period of three to six weeks are used to prevent MTCT, whereas long-course regimens are used to reduce the viral load in the mother and prevent MTCT.

⁴ By six weeks after delivery if a woman is not breastfeeding to avoid any risk of harm to a new fetus; by eight weeks after delivery if she is breastfeeding.

Table 4.2. Estimated Changes in the Daily Energy Intake (kcal) of a 28 Year Old, Moderately Active HIV-infected Woman, According to the Stage in the Disease

Stage in the disease	Average daily energy intake for moderately active* adult women (kcal)	Additional energy due to HIV** (kcal)	Additional daily energy required by the pregnancy (kcal)	Total (kcal)
Asymptomatic	+ 2140	+ 214	+ 285	2639
Early symptomatic	+ 2140	+ 428	+ 285	2853
Symptomatic	+ 2140	+ 642	+ 285	3067

* Daily energy intake for a 28 year old moderately active woman Multiply Basal Metabolic Rate (BMR) by adjustment factor for the activity level = $1305 \times 1.64 = 2140$ kcal

** 10 percent daily energy intake increase during the asymptomatic phase = 10 percent (2140); 20 percent daily energy intake increase at the early symptomatic phase = 20 percent (2140); and 30 percent daily energy intake increase during the symptomatic phase = 30 percent (2140).

Single-course regimens such as nevirapine may have minimal food and drug interactions. Food and drug interactions may occur more often with medium- and long-course regimens and the side effects of these interactions can negatively impact the nutritional status of HIV-infected pregnant women. Appropriate dietary management can help to maintain food intake and the efficacy of the medication.

HIV-infected pregnant women may also take other medications in combination with ARVs to treat opportunistic infections. These medications may interact with food and the side effects may cause decreased food intake,

thus affecting nutritional status and the efficacy of the medication or medications. For example, pregnant and/or HIV-infected women are more susceptible to the side effects of the TB drug, isoniazid. HIV-infected pregnant women who are also being treated for TB may be advised to take vitamin B6 (i.e., pyridoxine) supplements to prevent or treat drug-induced peripheral neuropathies (e.g., numbness or burning in the feet). The recommended preventive dose is 10 mg B6/day; 100 mg B6/day is prescribed for treatment. Chapter 3 describes guidelines for the dietary management of other medication side effects and food interactions.

Additional Recommended Care Practices

Types of Regimens Used to Help Prevent MTCT of HIV

- Nevirapine (NVP), single dose to the mother at the onset of labor and a single dose to the infant within 72 hours.
- Zidovudine (AZT), starting at 36 weeks of the pregnancy and during labor.

For greater efficacy, new combinations include nevirapine+zidovudine, and nevirapine+zidovudine+lamivudine is also being introduced and used.

Food Safety and Handling. Proper food handling and safety practices for HIV-infected pregnant women are the same for all PLWHAs and are described in Chapter 2. Remind HIV-infected women and adolescent girls that they are more susceptible to harmful bacteria and viruses in contaminated food and water as a result of their infection with HIV. Food poisoning can cause weight loss and further lower their resistance to future infections. Hygienic food handling should be accompanied by sanitary disposal of feces, good personal hygiene, including hand washing and covering of wounds, and the use of clean water for drinking and food preparation. Guidance on

the length of boiling time for preparation of safe drinking/food preparation water varies from boiling water vigorously for a few seconds to 10 minutes.

Psychosocial Support. HIV-infected pregnant women and adolescent girls need special care and attention. In addition to dealing with a life-threatening disease, they must also deal with the usual discomforts that can accompany pregnancy. They may also have to confront discrimination and stigmatization by their family and community. Psychosocial support from caregivers and health workers is important. Mental health interventions may be needed to address depression. Program staff should work with communities to raise awareness about the need to support HIV-infected pregnant women to improve pregnancy outcomes and the survival of the mother.

Safer Sex Practices. Unprotected sex may expose HIV-infected pregnant adolescents and adult women to sexually transmitted diseases and/or re-exposure (i.e., surinfection) to HIV, resulting in an increased viral load. This, in turn, results in an increased risk of MTCT and can speed up the disease's progression to AIDS by further weakening the immune system. Unprotected sex can also expose women's partners to infection. Health workers should advise HIV-infected mothers on safer sex practices, such as abstinence, involvement with one committed partner who has tested negative for HIV and remains faithful and use of condoms during every sexual contact.

Other Issues to Consider

The Low Social Status of Women. Poor health and nutritional status of girls and women, especially in limited resource settings, may be due in part to gender inequality and the low status of women in certain societies. Women may need the approval of husbands or mothers-in-law to obtain nutrition and health services. Differential access to education and income generation opportunities for adolescent girls and women may be a barrier to their ability to improve dietary intake and/or treat and control infections. Community-level program staff should carry out a situation

analysis of women's health and nutrition and identify and address problems that affect their nutritional status, especially during pregnancy and lactation.

Food Insecurity in the Context of HIV/AIDS. In many resource limited settings that have been hit hard by the HIV/AIDS epidemic, access to sufficient food may be limited, especially for families affected directly by HIV/AIDS. Strengthen linkages and refer women to programs that provide nutritional care and support and support food security and coping strategies of HIV/AIDS-affected households and individuals.

Inequity in Intra-household Food Distribution. In many cultures, women frequently serve themselves last at meals. Husbands and male children are often the first to get food and mothers and girls eat what remains. For HIV-infected pregnant women and adolescent girls, problematic intrahousehold food distribution patterns may compound already existing inadequate nutritional intake due to increased energy needs of HIV infection and pregnancy.

Food Taboos. Pregnant women may observe culturally dictated dietary guidelines that prohibit certain foods. These food taboos may restrict nutrient dense foods, such as eggs or a specific type of meat. Avoiding such foods deprives pregnant women of an important source of protein and micronutrients and can contribute to malnutrition. Although culturally sensitive, programs should work with communities to address taboos that may deprive women of foods they need to ensure good nutritional status and birth outcomes.

Cultural Beliefs: Fear of Having a "Big Baby." In some cultures, women restrict food intake during the final months of the pregnancy. This limits weight gain to reduce the size of the baby and, thus, decrease the risk of obstructed labor. In addition to LBW, inadequate diets can contribute to a weakened immune status of the mother with resulting increased risk of morbidity and possibly mortality of both mother and baby.

High Physical Activity Workloads. Women in resource limited settings routinely have heavy workloads that do not diminish with pregnancy. To compensate for the high amounts of energy expended on household and agricultural work, in addition to the energy used by the virus and by the growing baby, HIV-infected pregnant women must increase their energy intake. Alternatively, their workloads can be reduced and periods of rest can be added to reduce their energy expenditure. However, continued physical activity at usual/moderate levels remains important for HIV-infected women to preserve lean body mass.

The Perception of the Pregnancy. Pregnancy may be viewed in some settings as a condition that does not require special attention. The need for increased energy intake and/or decreased energy expenditure may go unrecognized, as could the need for improved dietary quality or the importance of accessing antenatal care

services. Raising the awareness of household and community members about the nutritional requirements of pregnancy and lactation and the importance of health care during these periods may help women gain access to the food and health/nutrition services that they need to remain healthy and improve birth outcomes.

Stigma and Discrimination. Family members or other community members may stigmatize HIV-infected pregnant women and adolescent girls. Stigmatization may result in neglect by or estrangement from the family, which can cause the health of these women to decline rapidly. Communities and family members may be particularly intolerant of pregnancy or HIV in adolescent girls leading to the need for programs to target HIV-infected pregnant adolescents for specialized services that may include supplementary food.

Nutritional Care and Support for Lactating Women and Adolescents whose HIV Status is Unknown or who are HIV-negative

Energy Requirements. Lactating women need extra energy to support the production of breastmilk. The extra energy required for lactating women is about 500 kcal per day for the first six months, assuming that their nutritional requirements were met during pregnancy. This translates approximately into eating an extra meal each day. A woman who has been able to consume the recommended quantities of energy and nutrients during pregnancy will have stored adequate amounts of fat, which is used for lactation. The same recommendation, an extra 500 kcal per day, applies to the second six months of breastfeeding when children have begun to consume complementary foods in addition to breastmilk.

If energy requirements were not met during pregnancy, which is often the case with women who were undernourished prior to pregnancy, a lactating woman may need up to an additional 700 kcal per day to produce the necessary quantity of milk without affecting her own nutritional status. The energy requirements

for lactating adolescent girls are greater than for adult women of the same size and activity level because of their continuing growth.

Protein Requirements. Protein requirements are the same for lactation and pregnancy: approximately 71 g per day or 1.1 g/kg of maternal weight per day, according to the U.S. National Academies of Science in 2002.

Micronutrient Requirements. Micronutrient requirements are also increased during lactation because of the transfer of micronutrients to breastmilk. Lactating women should eat a variety of fruits and vegetables, and foods from animal origin daily to meet their micronutrient requirements.

In areas of endemic vitamin A deficiency, lactating women should be provided with a high dose vitamin A supplement within the first eight weeks postpartum to increase the vitamin A content of their breastmilk. Current WHO recommendations are to provide 200,000 IU vitamin A in a single dose.⁵ The safe infertile

⁵ In 2002, the International Vitamin A Consultative Group (IVACG) recommended an increased dosage for postpartum vitamin A supplementation: 400,000 IU as two doses of 200,000 IU at least one day apart and/or 10,000 IU daily or 25,000 weekly as soon after delivery as possible and not more than six weeks later and/or during the first six months after delivery. WHO has not yet adopted these recommendations.

period for breastfeeding mothers to receive a high-dose vitamin A supplement is within eight weeks of delivery; within six weeks of delivery for non-breastfeeding women.

Although the recommended intake of most micronutrients is increased over the intakes for pregnancy to cover the additional amounts secreted in breastmilk, iron is needed in lower amounts except for women who have lost large amounts of blood during delivery. However, in areas of high anemia prevalence (i.e., equal to or greater than 40 percent), it is recommended that women continue to take

supplements containing 60 mg of iron and 400 micrograms of folate for an additional three months post partum.

The micronutrient deficiencies of greatest concern for quality of breastmilk include: vitamin A, thiamin, riboflavin, vitamins B6 and B12, iodine, and selenium. Low maternal intakes of these micronutrients reduce the level in breastmilk and adversely affect the infant. Of lower priority are vitamin D, folic acid, calcium, iron, copper, and zinc. Maternal intakes and stores of these nutrients have little effect on human milk concentrations.

Nutritional Care and Support for HIV-infected Lactating Women and Adolescents

Like all adults living with HIV/AIDS, HIV-infected lactating women and adolescents have additional energy requirements. They also need special care to prevent food and water contamination, and proper dietary management to alleviate the side effects of medications and address negative effects of food and medication interactions, in order to maintain good nutritional status and prevent weight loss and wasting.

Energy Requirements. The energy requirements of HIV-infected lactating mothers vary according to the stage of the disease.

HIV-infected asymptomatic (WHO stage 1) lactating adolescents and adults ***should increase energy intake*** over the level recommended for healthy non-HIV-infected lactating adolescents and adult women by an amount equaling **10 percent** of the intake level recommended for non-lactating adolescents or women of the same age and activity level plus the additional 500 kcal to support lactation.

HIV-infected symptomatic (WHO stage 2 and above) lactating adolescents and adults ***should increase energy intake*** over the level recommended for healthy non HIV-infected lactating adolescents and adult women by an amount equaling **20 to 30 percent** of the intake level recommended for non-lactating adolescents or women of the same age and activity level plus the additional 500 kcal to support lactation.

The necessary energy intake increase is the same whether or not the HIV-infected person takes ARVs. The level of additional energy intake for the HIV-infected pregnant woman depends on the presence and severity of symptoms.

Table 4.3. shows the amounts of energy needed, depending on the stage of HIV/AIDS.

Protein Requirements. HIV-infected lactating women and adolescents need the same level of daily protein intake as healthy HIV-negative lactating women, which is estimated to be 1.1 g/kg body weight per day or approximately 71 g of protein per day, according to the U.S. National Academies of Science in 2002.

Micronutrient Requirements. HIV-infected lactating women and adolescents need the same amounts of micronutrients as healthy HIV-negative lactating women—see Section 4.2. HIV-infected lactating women should be encouraged to eat a variety of foods, including animal products, fruits, and vegetables, to help ensure adequate micronutrient intake.

Table 4.3. Recommended Energy Intake of 28 Year Old HIV-infected Moderately Active Lactating Women, According to the Stage in the Disease

Stage in the disease	Average daily energy intake (kcal)*	Additional energy due to HIV** (kcal)	Additional energy for Lactation (kcal)	Total (kcal)
Asymptomatic	+ 2140	+ 214	+ 500	= 2854
Early symptomatic	+ 2140	+ 428	+ 500	= 3068
Mid symptomatic	+ 2140	+ 642	+ 500	= 3282

* Daily energy intake for a 28-year-old moderately active woman: multiply Basal Metabolic Rate (BMR) by adjustment factor for the activity level = $1305 \times 1.64 = 2140$ kcal

** 10 percent daily energy intake increase during the asymptomatic phase = 10 percent (2140)
20 percent daily energy intake increase at the early symptomatic phase = 20 percent (2140)
30 percent daily energy intake increase in the mid symptomatic phase = 30 percent (2140)

Additional Recommended Care Practices

Breast Health Management. Cracked nipples, mastitis, and breast abscesses increase the risk of HIV transmission through breastmilk. Health workers should demonstrate proper latching-on techniques to prevent the development of cracked nipples and counsel on how to prevent and manage other types of breast problems such as mastitis.

Safer Infant Feeding Practices. Refer to Chapter 5, Nutritional Care Recommendations for Infants and Children.

Other Issues to Consider

Integration of components addressing the nutritional requirements of HIV-infected pregnant and lactating women can strengthen the effectiveness of maternal and child health programs operating in areas with high prevalence of HIV.

Programs aimed at improving maternal nutrition in the context of HIV may consider including the following components:

- Advocacy, community mobilization, and male involvement to improve the health and nutrition of adolescent girls and women;

- Building the capacity of health workers and promoters to provide nutrition counseling to pregnant and/or lactating adolescent girls and women;
- Promoting good nutrition for girls and adolescents for better pregnancy outcomes;
- Promoting better collaboration between modern health providers and traditional resource persons who have historically provided nutrition and health counseling services to mothers, such as traditional birth attendants, traditional practitioners, and grandmothers;
- Formative research and behavior change communication for improving the nutrition of adolescent girls and women;
- Improving food access, including food distribution to food insecure households with HIV-infected pregnant or lactating women on ART;
- Promoting home gardening and income generating activities to improve food access; and
- Designing and implementing water and sanitation interventions.

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Nutritional Care Recommendations for Infants and Children

5.

CHAPTER

This chapter provides guidance on feeding for infants and young children in the context of HIV/AIDS to ensure their optimal growth and development, boost immune system functioning, and reduce transmission of HIV. The recent LINKAGES/AED publication, *Infant Feeding Options in the Context of HIV*, published in 2004, and the most recent WHO guidelines, *HIV and Infant Feeding: A Guide for Health-care Managers and Supervisors*, published in 2003 are the primary sources for the recommendations. The chapter addresses nutritional care for:

- 1.1. Infants and young children of HIV-negative women or women whose status is unknown;
- 1.2. Infants and young children of HIV-positive women; and
- 1.3. Young children with HIV disease.

Breastmilk is widely recognized as the best source of nutrition for infants, and exclusive breastfeeding is recommended for the first six months of an infant's life. In addition to essential nutrients, breastmilk contains antibodies and enzymes that protect against infections and strengthens the infant's immune system. However, HIV may also be transmitted to an infant during breastfeeding. On average, approximately one out of seven infants born to an HIV-infected mother will become infected through breastfeeding up to 24 months.

WHO, the United Nations Children's Fund (UNICEF) and other United Nations agencies currently recommend that *HIV-positive mothers avoid breastfeeding if replacement feeding from birth is acceptable, feasible, affordable, sustainable, and safe (AFASS). If these conditions are not met, then it is recommended that HIV-positive mothers practice exclusive breastfeeding for the first months of life. If circumstances change and the AFASS criteria can be met, shortening the period of exclusive breastfeeding and transitioning as quickly as possible to another breastmilk option or replacement feeding will reduce the risk of exposure to HIV.*

The caregiver's choice of feeding method: HIV-positive mothers should be made aware of the risks and benefits of different infant feeding options, including the risk of transmission of HIV through breastfeeding. Mothers who can provide replacement feeding that is acceptable, feasible, affordable, sustainable, and safe are advised to do so. When these criteria cannot be met through family or community resources, particularly in resource-limited settings, women are advised to exclusively breastfeed.

"Position of the American Dietetic Association and Dietitians of Canada: Nutrition intervention in the care of persons with human immunodeficiency virus infection." *Journal of the American Dietetic Association* 104 (2004): 1145-1441.

AFASS: Acceptable, Feasible, Affordable, Sustainable, and Safe

These terms should be adapted in the light of local conditions and formative research. The following may serve as a starting point:

Acceptable: The mother perceives no barrier to replacement feeding. Barriers may have cultural or social reasons, or be due to fear of stigma or discrimination. According to this concept the mother is under no social or cultural pressure not to use replacement feeding; and she is supported by family and community in opting for replacement feeding, or she will be able to cope with pressure from family and friends to breastfeed, and she can deal with possible stigma attached to being seen with replacement food.

Feasible: The mother or family has adequate time, knowledge, skills, and other resources to prepare the replacement food and feed the infant up to 12 times in 24 hours. According to this concept, the mother can understand and follow the instructions for preparing infant formula and, with support from the family, can prepare enough replacement feeds correctly every day and at night, despite disruptions to preparation of family food or other work.

Affordable: The mother and family, with community or health-system support if necessary, can pay the cost of purchasing/producing, preparing, and using replacement feeding, including all ingredients, fuel, clean water, soap, and equipment, without compromising the health and nutrition of the family. This concept also includes access to medical care if necessary for diarrhea and the cost of such care.

Sustainable: Availability of a continuous and uninterrupted supply and a dependable system of distribution for all ingredients and products needed for safe replacement feeding for as long as the infant needs it, up to one year of age or longer. According to this concept there is little risk that formula will ever be unavailable or inaccessible, and another person is available to feed the child in the mother's absence and can prepare and give replacement foods.

Safe: Replacement foods are correctly and hygienically prepared and stored and fed in nutritionally adequate quantities, with clean hands, and using clean utensils, preferably by cup. This concept means that the mother or caregiver:

- Has access to a reliable supply of safe water (e.g., from a piped or protected-well source);
- Prepares replacement feeds that are nutritionally sound and free of pathogens;
- Is able to wash hands and utensils thoroughly with soap and regularly boil the utensils to sterilize them;
- Can boil water for preparing each of the baby's feeds; and
- Can store unprepared feeds in clean, covered containers and protect them from rodents, insects, and other animals.

Source: WHO, *What are the Options? Using formative research to adapt global recommendations on HIV and infant feeding to the local context*, 2004.

When to Counsel on Infant Feeding Options

- After an HIV-positive test, but prior to delivery, to assist the mother to select the best option for her infant
- Within 10 days of delivery to assess the ability of the mother to successfully implement her infant feeding choice
- At routine postpartum visits, well-child checks, and sick-child service delivery points
- When mothers plan to change her current feeding practice

Source: WHO, *HIV and Infant Feeding: A guide for healthcare managers and supervisors*, 2003.

Nutritional Care Recommendations for Infants and Children Born to HIV-negative Women or Women whose Status is Unknown

For All Children

- Ensure that the infant has received all vaccinations by one year of age, according to national protocols.
- If the prevalence of anemia in children six to 24 months in the community is less than 40 percent, give 2 mg iron/kg body weight +50 µg folic acid each day from six through 11 months of age. If anemia prevalence is equal to or higher than 40 percent, give 2 mg iron/kg body weight +50 µg folic acid daily from six through 23 months of age.
- In vitamin A-deficiency risk areas, encourage the intake of vitamin A-rich foods. Supplement children, including HIV-infected children, according to the chart on the following page.
- Encourage the intake of iron- and vitamin C-rich foods.
- During diarrhea, continue breastfeeding and give children extra fluids and oral rehydration salts (ORS) properly mixed with clean boiled water.
- Seek appropriate healthcare for fever, diarrhea, chronic cough, malaria, hookworm, and other parasitic infections.

Infants from Birth through Five Months Born to HIV-negative Women or Women whose Status is Unknown

Exclusive breastfeeding, with its nutritional, health, and psychosocial benefits for the child, is recommended for the first six months of life. Infants should be breastfed exclusively up to the age of six months. Listed below are some suggestions for the mother to successfully practice exclusive breastfeeding:

- Initiate skin contact immediately and breastfeed within one hour after birth.
- Establish good breastfeeding positioning and attachment.
- Breastfeed frequently (i.e., eight to 12 or more times daily) and on demand during the day and night.

- Mother should offer the second breast after the child releases the first breast.
- Breastfeed exclusively for the first six months with no other liquids or solid foods introduced.
- Participate in monthly growth monitoring and promotion sessions to check on adequacy of the infant's weight gain/growth.
- Breastfeed more frequently during and after the illness to ensure catch-up growth.
- Practice safer sex to avoid sexually transmitted infections, including HIV.

Infants Six through Eight Months Born to HIV-negative Women or Women whose Status is Unknown

According to the recent Pan-American Health Organization (PAHO)/WHO *Guiding Principles for Complementary Feeding of the Breastfed Child*, published in 2003, when an infant reaches six months, breastmilk alone is generally not enough to provide all the energy, protein, and micronutrients to meet a growing child's nutritional needs. At six months of age, children should begin to receive increasing amounts of semi-solid and solid complementary foods in addition to frequent breastfeeding.

Guiding Principles for Complementary Feeding of the Breastfed Child recommend that mothers and caregivers:

- Continue to breastfeed on demand while introducing complementary foods at six months;
- Practice responsive feeding by feeding younger infants directly and encouraging them to feed themselves as they grow; feed slowly and encourage but do not force eating; experiment with different textures and tastes; talk to children and make eye contact to encourage learning; minimize distractions;

- Practice good hygiene and safe food handling/preparation (e.g., washing caregivers' and children's hands, store foods safely and serve prepared food immediately, use clean utensils for preparation and feeding, avoid use of bottles);
- Use of complementary foods should increase over time to provide an additional 200 kcal per day. Complementary food can be mixtures of cereals or starches, fruits, vegetables, and a protein source such as beans, groundnut paste, eggs, or meat, when possible;
- Feed complementary foods two to three times per day, plus one or two snacks as desired;
- Feed mashed and semi-solid foods such as porridge enriched with energy-dense and protein-rich foods such as groundnut paste, cooked egg, or ground meat;
- Introduce foods that children can eat by themselves at eight months, such as pieces of mango, paw paw, and banana;
- Meat, fish, poultry, or eggs should be eaten daily or as often as possible. Vegetarian diets must be supplemented with fortified products or nutrient supplements. Feed vitamin A-rich foods daily. Limit juice intake and avoid drinks such as tea, coffee, and sugary drinks such as soda; and
- During illness, breastfeed more frequently and encourage the sick child to eat soft, varied, appetizing, favorite foods. After the illness, offer food more often and encourage the child to eat more in order to promote catch up growth.

Depending on availability of services, encourage mothers to participate in monthly growth monitoring and promotion sessions to check on the adequacy of the infant's weight gain and growth for the first two years.

Infants Nine through 11 Months Born to HIV-negative Women or Women whose Status is Unknown

Follow the guidance for six through eight month old infants with increased amounts of complementary foods and greater frequency of meals.

- Provide an additional 300 kcal per day from complementary foods.
- Feed solid foods three to four times daily with one to two snacks offered as desired.
- Continue to encourage increasing independence in self-feeding.

Children 12 through 23 Months Born to HIV-negative Women or Women whose Status is Unknown

Continue to follow the guidance for younger infants with increased amounts of complementary foods. By 12 months, most children can independently consume the same foods as the family unless they are highly spicy.

- Provide an additional 550 kcal daily from complementary foods.
- Feed three to four times per day from a separate plate, plus one to two snacks as desired.
- Avoid family foods that might pose a choking risk.

Children 24 Months through Five Years Born to HIV-negative Women or Women whose Status is Unknown

- Feed a variety of fruits, vegetables, legumes, animal products, and fortified foods.
- Feed a variety of foods at least five to six times per day (i.e., three meals plus snacks such as mangos, bananas, bread with nut spread, chappatti).
- After illness, feed more frequently to ensure catch-up growth.

WHO (2003) Schedule of Vitamin A Supplementation

Time	Infant
Six to 12 months	100,000 IU every four to six months
>12 to 59 months	200,000 IU every six months

Note: IVACG added a recommendation for infants in 2002: 150,000 IU as three doses of 50,000 IU with at least a one month interval between doses for infants at birth through five months; the single dose of 100,000 IU should begin at six months, not nine. However, WHO has not yet endorsed IVACG's recommendations.

Nutritional Care Recommendations for Infants and Children of HIV-positive Women

As noted above, for infants of HIV-positive mothers, WHO (2003) advises that:

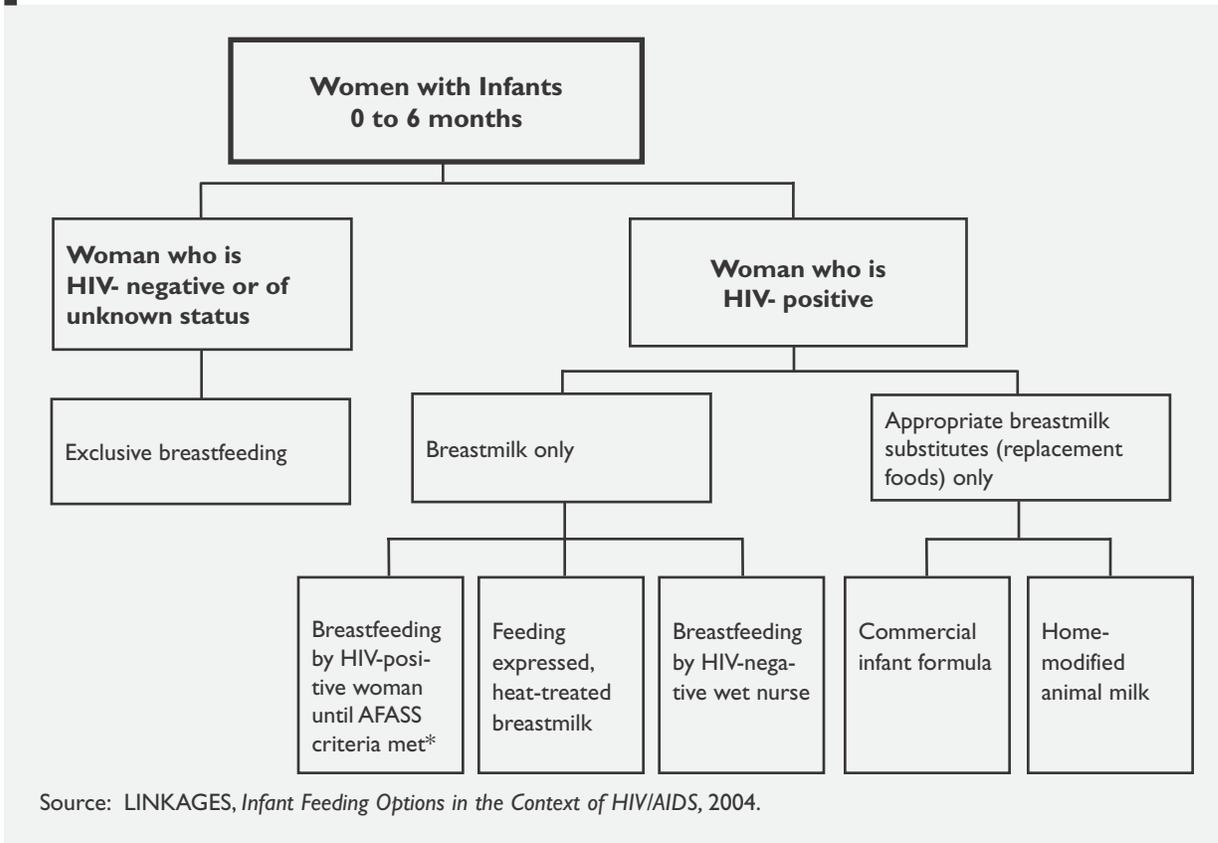
When replacement feeding is acceptable, feasible, affordable, sustainable and safe, avoidance of all breastfeeding by HIV-positive mothers is recommended. Otherwise, exclusive breastfeeding is recommended during the first months of life. To minimize HIV transmission risk, breastfeeding should be discontinued as soon as feasible, taking into account local conditions, the individual woman's situation and the issues of replacement feeding including infections other than HIV and malnutrition.

When HIV-positive mothers choose not to breastfeed from birth or stop breastfeeding later, they should be provided with specific guidance for at least the first two years of the child's life to ensure adequate replacement feeding.

WHO Recommendations Result in the Need for the Following Actions:

- Provide HIV-positive mothers with information on different infant feeding options to enable them to make an informed choice for their infants.
- Inform HIV-positive mothers of the advantages and the risks associated with the infant feeding option they have chosen.
- Provide HIV-positive mothers with the support required to implement their choice.
- Where possible, involve the mother's partner or other members of the family in the counseling and decision-making process.

Figure 5.1. Infant Feeding Options during the First Six Months



Infants at Birth through Five Months Born to HIV-positive Women: Exclusive Breastfeeding Followed by Replacement Feeding

If the mother decides to breastfeed, she should:

- Breastfeed exclusively for not longer than six months and prevent and manage breast problems and sores in the infant’s mouth to prevent HIV transmission from mother to child during breastfeeding; and
- Transition to replacement feeding when it is AFASS. This means feeding infants who are not receiving breastmilk with a nutritious diet that meets their nutrient requirements until they are old enough to consume a diet of family foods. From birth to six months, replacement feeding is a suitable breastmilk substitute. After

six months, this means giving a breastmilk substitute plus appropriate complementary foods to support optimal growth and development.

Exclusive breastfeeding practices for children of HIV-positive mothers are the same as for children born to HIV-negative mothers or mothers of unknown HIV status. Infants are fed only breastmilk for up to six months. No other foods, teas, water, juices, milks, or infant formula should be given to the infant.

Keeping Breasts Healthy. Mastitis, nipple lesions, and breast abscesses may increase the risk of HIV transmission through breast milk. Health workers should counsel HIV-positive mothers on how to prevent, manage, and seek treatment for breast problems to reduce the risk of HIV transmission to the infant.

Prevention and Treatment of Sores in the Infant's Mouth. Sores in an infant's mouth may increase the risk of HIV transmission from breastmilk. Health workers should show HIV-positive lactating mothers how to check for sores and, if found, advise them to promptly seek medical care. Where possible, refer mothers to a breastfeeding counselor or a breastfeeding support group.

Challenges Posed by Exclusive Breastfeeding in the Context of HIV. Programs must address several challenges to ensure the successful implementation of exclusive breastfeeding by HIV-positive mothers of infants less than six months of age. These challenges include the cultural practice of early mixed feeding, lack of breastfeeding support for mothers, the common perception that malnourished mothers do not have sufficient milk to breastfeed exclusively, and limited access to food for the lactating mothers.

Compliance with Exclusive Breastfeeding. Exclusive breastfeeding for six months is rarely practiced even when programs actively promote and support it. In the context of HIV, the practice of mixed feeding may be especially harmful because of the increased risk of HIV transmission. The exact mechanisms fostering this increased risk are not known but several have been suggested: the gut may become inflamed as a reaction to new food allergens, or germs from the food and water may damage the gut, increasing susceptibility to infection by HIV carried in breastmilk. Exclusive breastfeeding helps to maintain a healthy gut epithelium that acts as a protective barrier against infectious agents. Through awareness-raising activities, counseling, and community mobilization, programs need to create a supportive environment in which mothers can successfully practice exclusive breastfeeding.

Feeding Expressed, Heat-treated Breastmilk. An alternative to exclusive breastfeeding is collecting expressed breastmilk and heat-treating it. This is accomplished by bringing it to a boil and cooling the milk immediately by standing the clean container in cold water. Untreated expressed breastmilk may be stored for up to eight hours at room temperature in a cool place and 72 hours in a refrigerator. Once the milk is heat treated, it must be used

within an hour. The mother or caregiver feeds the heat-treated breastmilk to the infant with a cup in order to avoid the risk of contamination from bottles. This method of feeding infants of HIV-infected mothers requires resources for heating and storing the milk, time to prepare the feeds, and a supportive environment to successfully feed children in this manner.

Breastfeeding by an HIV-negative Wet Nurse. This infant feeding option requires that the mother and family of the child consider wet nursing only if the wet nurse is offered HIV testing and counseling, takes the test voluntarily, and is found to be HIV-negative. She must then practice optimal exclusive breastfeeding and safer sex practices to ensure that she is not infected with HIV while breastfeeding the infant. She will need to be available to feed the infant frequently and on demand throughout the day and night and she must receive services to prevent and treat any problems such as cracked or bleeding nipples, mastitis, or abscesses that may occur.

Factors that Increase Risk of MTCT of HIV

- Mixed feeding in the first 6 months (i.e., combining breastfeeding with breastmilk substitutes)
- Breastfeeding duration (i.e., long term breastfeeding increases the risk of HIV transmission)
- Improper latching and positioning during breastfeeding
- Breast conditions (i.e., fissured and bloody nipples, mastitis, and breast abscess)
- Sores in infant's mouth
- High maternal viral load
- Maternal immune deficiency
- Maternal malnutrition
- New HIV infection

Adapted from World Health Organization (WHO). *HIV and Infant Feeding: A guide for healthcare managers and supervisors*, 2003.

Infants at Birth through Five Months Born to HIV-positive Women: Replacement Feeding with Appropriate Breastmilk Substitutes

HIV-positive mothers who do not breastfeed are advised to exclusively feed their infants with appropriate breastmilk substitutes (i.e., replacement feeding). These can be either commercial infant formula, the most nutritionally complete substitute for breastmilk, or home-modified animal milk.

Early Cessation of Breastfeeding. The risk of HIV transmission during breastfeeding continues for as long as breastfeeding is practiced. Because this risk is cumulative, early breastfeeding cessation is recommended for HIV positive mothers. A transition from exclusive breastfeeding to exclusive replacement feeding will decrease the risk of HIV transmission.

The best time to stop exclusive breastfeeding varies from one situation to another and is dependent on such factors as the mother's health status, the physical environment, economic status of the household, and risk factors for disease and death due to alternative feeding practices. Health workers and mothers should discuss and decide the most appropriate time for transition to replacement feeding based on case-specific circumstances. Health workers should then provide the necessary guidance to make the transition to exclusive replacement feeding as safe as possible.

Transitioning from Breastfeeding to Replacement Feeding. Mothers usually transition gradually from exclusive breastfeeding to breastfeeding plus complementary foods after an infant is six months old. However, in cases where a mother is HIV-positive, it is recommended that the transition from breastfeeding to replacement feeding occur as quickly as possible. While some mixed feeding is usually necessary during the transition, it should be strictly avoided once the baby has switched to replacement feeding.

Healthcare workers can provide guidance and support to mothers when they have decided to make the transition to replacement feeding:

- Begin by expressing breastmilk to familiarize the baby with cup feeding by offering the expressed breastmilk by cup between regular breastfeeds;
- When the infant has accepted cup feeding, eliminate one breastfeed at a time and replace with expressed breastmilk fed by cup;
- Express and discard breastmilk if breasts become engorged during the transition process. Apply cold compresses to reduce swelling;
- Once all feeds are accepted by cup, feed only breastmilk substitutes;
- Health care workers can advise mothers on comforting infants with alternative methods to breastfeeding such as massaging, swaddling, carrying, rocking, singing, sleeping with, and talking to the baby; and
- Counsel women on adequate protection against pregnancy in the absence of the contraceptive protection of breastfeeding.

When using breastmilk substitutes, mothers need to be assisted in the prevention of breast engorgement, plugged milk ducts, or mastitis as lactation is suppressed in the early days following delivery. The infant should not be allowed to suckle; breasts should be well supported but not tightly bound, and mothers can express small amounts of breastmilk to relieve discomfort.

Commercial Infant Formula. Commercial infant formula is usually available as powder and needs to be reconstituted with clean water according to the instructions on the tin before being fed to the infant. Over-concentration can cause health problems such as diarrhea, and over-dilution can lead to malnutrition due to insufficient nutrient intake.

Safe feeding of commercial infant formula includes:

- Utensils for measuring/preparing the formula;
- Clean water to prepare the formula and clean all utensils;
- Fuel in adequate amounts to boil water for reconstituting the formula and cleaning utensils;

- Resources for hand washing and food preparation hygiene;
- Ability to read or follow directions for correct reconstitution of infant formula;
- Caregiver time to prepare at least eight feedings per day if refrigeration is not available; and
- Correct use of cup for feeding prepared infant formula.

Mothers need to have access to consistent and affordable supplies of commercial formula for at least six months. WHO estimates that 20 kg of commercial infant formula are required per infant during the first six months of life for replacement feeding. Programs should assess the types and costs of replacement feeding options that are available in the area as well as the reliability of supply. Many households in resource limited settings may not be able to afford replacement foods. In such cases, programs should work to identify mechanisms to help households access the required foods.

Both commercial and home-prepared formulas require time and knowledge to prepare safe replacement feeds, and equipment and fuel to clean utensils and the preparation environment.

Home-modified Animal Milks. When commercial infant formula is not readily available, too expensive, or otherwise not acceptable, home-prepared modified animal milk can be used as a replacement feeding option. Families need to have access to at least one half liter or the equivalent of animal milk or milk product per day. Home-modified animal milk is used exclusively, and the infant does not receive breastmilk.

Modified animal milks can be made from fresh animal milk, evaporated milk, dried full-cream milk powder, or ultra high-temperature (UHT) milk. All of these milks need to be modified to become suitable for the infant by diluting with water and adding sugar so

Table 5.1. Preparation Guide for Mother/Caregiver

Commercial infant formula	Home-modified animal milk
<ul style="list-style-type: none"> • Wash hands with soap and water. • Clean all utensils, containers, and cups with soap and water. • Read or have someone read instructions on the formula tin. • Boil water vigorously for a few seconds and let it cool. Boil as much water as needed for the whole day and store in a clean covered container. • Measure the amount of milk powder needed for one feed and mix it with the correct amount of boiled water. • Prepare fresh commercial formula before each feed if refrigeration is not available. • Feed the infant by cup about 150 ml of correctly prepared formula per kg per day, divided into six to eight feeds. The infant will have to learn to drink from a cup. 	<ul style="list-style-type: none"> • Wash hands with soap and water. • Clean all utensils, containers, and cups with soap and water. • Boil water vigorously for a few seconds and let it cool. Boil as much water as needed for the whole day and store in a clean, covered container. • Measure the amount of water and milk needed—see Table 5.2. • Measure the exact amount of sugar and mix it with the liquid—see Table 5.2. • Prepare formula before each feed if refrigeration is not available. • Feed the infant by cup the appropriate amount based on the infant’s weight. The infant will have to learn to drink from a cup. • Give the infant multivitamins specially formulated for the non-breastfed child. The multivitamin can be in the form of liquid syrup (i.e., 5 ml per day) or powder. The multivitamin can be mixed with the formula or given separately.

Source: LINKAGES, *Infant Feeding Options in the Context of HIV/AIDS*, 2004.

Table 5.2. Recommended Amounts of Ingredients for Replacement Feeds, First Six Months

Age (months)	Number of Feedings and Daily Milk Requirements	Cow (fresh or UHT), goat, or camel (per feeding)	Sheep and buffalo milk (per feeding)	Evaporated milk (per feeding)	Powdered full cream milk (per feeding)	Commercial formula (per month)
0–<1	8 feeds/day x 60 ml/ feed Total: 480 ml/day	40 ml milk +20 ml water + 4 grams (g) sugar (slightly less than 1 teaspoon)	30 ml milk +30 ml water + 3 g sugar (slightly less than ½ teaspoon)	16 ml milk + 44 ml water + 4 g (level teaspoon) sugar	5 g milk + 60 ml water + 4 g (level teaspoon) sugar	4 x 500-g tins
1–<2	7 feeds/day x 90 ml/ feed Total: 630 ml/day	60 ml milk +30 ml water + 6 g sugar (1¼ teaspoons)	45 ml milk + 45 ml water + 5 g sugar (1 teaspoon)	24 ml milk +66 ml water +6 g (1¼ teaspoons) sugar	7.5 g milk + 90 ml water + 6 g (1¼ teaspoons) sugar	6 x 500-g tins
2–<3	6 feeds/day x 120 ml/ feed Total: 720 ml/day	80 ml milk +40 ml water +8 g sugar (slightly more than 1½ teaspoons)	60 ml milk + 60 ml water + 6 g (1¼ teaspoons)	32 ml milk +88 ml water + 8 g (2 level teaspoons)	10 g milk +120 ml water + 8 g (2 level teaspoons) sugar	7 x 500-g tins
3–<4	6 feeds/day x 120 ml/ feed Total: 720ml/ day	80 ml milk +40 ml water + 8 g sugar (slightly more than 1½ teaspoons)	60 ml milk + 60 ml water + 6 g (1¼ teaspoons)	32 ml milk +88 ml water +8 g (2 level teaspoons) sugar	10 g milk +120 ml water + 8 g (2 level teaspoons) sugar	7 x 500-g tins
4–<5	6 feeds/day x 150 ml/ feed Total: 900ml/ day	100 ml milk +50 ml water + 10 g sugar (2 full teaspoons)	75 ml milk + 75 ml water +8 g sugar (slightly more than 1½ teaspoons)	40 ml milk +110 ml water + 10 g (2 full teaspoons) sugar	12.5 g milk +150 ml water + 10 g (2 full teaspoons) sugar	8 x 500-g tins
5–<6	6 feeds/day x 150 ml/ feed Total: 900ml/ day	100 ml milk +50 ml water + 10 g sugar (2 full teaspoons)	75 ml milk +75 ml water + 8 g sugar (slightly more than 1½ teaspoons)	40 ml milk +110 ml water + 10 g (2 full teaspoons) sugar	12.5 g milk +150 ml water + 10 g (2 full teaspoons) sugar	8 x 500-g tins

Source: LINKAGES, *Infant Feeding Options in the Context of HIV/AIDS*, 2004.

Micronutrients for Home-modified Animal Milk

The minerals and vitamins needed in a micronutrient supplement to fortify 100 kcal of home-modified animal milk (i.e., 100 mL of milk + 10 g sugar = 50 mL water) are listed below.

Minerals:

Manganese	7.5 µg
Iron	1.5 mg
Copper	100 µg
Zinc	205 µg
Iodine	5.6 µg

Vitamins:

Vitamin A	300 IU
Vitamin D	50 IU
Vitamin E	1 IU
Vitamin C	10 mg
Vitamin B1	50 µg
Vitamin B2	80 µg
Niacin	300 µg
Vitamin B6	40 µg
Folic acid	5 µg
Pantothenic acid	400 µg
Vitamin B12	0.2 µg
Vitamin K	5 µg
Biotin	2 µg

Source: WHO, *HIV and Infant Feeding: A guide for healthcare managers and supervisors*, 2003.

that they have protein, fat, and sugar content somewhat similar to breastmilk. The quantity of water and sugar varies from one type of milk to another. Modified animal milks do not provide enough micronutrients to meet the infant/child needs, therefore micronutrient supplementation is essential. Full cream dried milk powder and evaporated milk should be reconstituted using brand-specific instructions before being fed to the infant. See Table 5.2. on the following page for guidance on recommended amounts of ingredients for home-modified replacement feeds.

Unacceptable Options for Replacement Feeding. The following fluids are not acceptable options for use in replacement feeding of infants because of their inadequate

energy and micronutrient content: sweetened condensed milk, skimmed milk, coffee creamers, soy milk, fruit juices, sugar water, or diluted porridges.

Infants and Young Children from Six through 23 Months Born to HIV-positive Mothers: Complementary and Replacement Feeding Foods

Appropriate complementary feeding for children of HIV-positive mothers ages six through 23 months consists of feeding breastmilk or breastmilk substitutes (e.g., milk, milk products) with complementary or additional semi-solid and solid food/liquids. All infants require foods in addition to milk by six months in order to meet their nutritional requirements for energy, protein, and micronutrients. By about six months of age, infants are able to digest undiluted animal milk as well as semi-solid foods, making replacement feeding less difficult and less expensive for mothers than during their child's first six months.

HIV-positive mothers have the following options for feeding their children from six months of age:

- Continued breastfeeding until transition to other options are safe and feasible (e.g., cessation of breastfeeding and transition to breastmilk substitutes), plus appropriate complementary foods;
- Expressing and heat-treating breastmilk plus appropriate complementary foods;
- Wet nursing by an HIV-negative woman plus appropriate complementary foods;
- Breastmilk substitutes (e.g., commercial infant formula, fresh animal milk, powdered full-cream or evaporated milk, UHT milk) plus appropriate semi-solid and solid foods; and
- Appropriate semi-solid and solid foods plus clean drinking water in circumstances where milk is not available.

As discussed earlier in this chapter, complementary foods include a variety of locally available foods and liquids that are fed on a daily basis to children from six months as a complement to breastmilk. Complementary

foods can be mixtures of a staple such as cereals (e.g., rice, wheat, maize, millet) or starch foods (e.g., plantain, banana, cassava, potato) with beans, groundnut paste, meat, chicken, fish, eggs, fats and oils, fruits, and vegetables.

Current draft guidance for the *non-breastfed child*,⁶ recommends that children should receive four to five meals of nutritious foods each day from six months of age, with additional nutrient-rich snacks one to two times a day as desired. Meals may be a combination of milk-only feeds, other foods, or a mix of milk and food. It is optimal to include milk in the diets of children through at least the first year of life.

Mother and Child Relationship. Psychosocial stimulation through skin-to-skin contact may be lacking when a child is fed by replacement feeding. Programs and health workers should discuss with caregivers the importance of psychosocial contact and encourage them to hold, talk, and play with infants to help ensure adequate psychosocial stimulation. Health workers should also discuss with mothers how to avoid breast engorgement following the end of breastfeeding.

Stigma Associated with Replacement Feeding. In many communities, mothers who do not breastfeed or stop breastfeeding early

may be suspected of being HIV-positive and, subsequently, may be discriminated against because of the stigma often associated with HIV. Program managers should assess the socio-cultural acceptability of replacement feeding and work with the community and partners to support mothers who choose replacement feeding. Because of the stigma associated with replacement feeding, mothers who choose replacement feeding may feel compelled to breastfeed in public. This type of mixed feeding may increase the risk of HIV transmission or other infections to the child. Program managers and health workers should work with community support groups to raise awareness about the risks of mixed feeding. Health workers should also provide support and guidance to mothers on how to deal with situations where she may be asked why she stopped breastfeeding her infant.

Replacement Feeding and Child Spacing. Women who do not breastfeed are at a higher risk of becoming pregnant. For an HIV-positive mother, an early pregnancy can put the new baby at risk of malnutrition and increase the energy and other nutrient requirements of the mother. Mothers who decide not to breastfeed should be provided with family planning services to ensure adequate child spacing and all women in the context of HIV need information and support to practice safer sex to avoid sexually transmitted infections including HIV.

Nutritional Care Recommendations for Children with HIV Disease

HIV infection is often difficult to diagnose in very young children. Infants born to HIV-infected mothers have HIV antibodies made by the mother's immune system that cross the placenta to the baby's bloodstream before birth and may persist for up to 18 months. Because these maternal antibodies reflect the mother's but not the infant's infection status, an HIV antibody test is not reliable for children under 15 to 18 months. More definitive tests can determine whether a younger infant is actually infected with HIV but these tests are still expensive and are not typically available in resource-limited settings.

Nutritional Needs for HIV-infected Children

Increased Energy Needs. HIV-infected children have greater energy needs compared to healthy non-HIV-infected children. HIV infection causes increased resting energy expenditure, may reduce food intake, and causes poor nutrient absorption, loss, and metabolic alterations that result in weight loss and wasting. The energy needs of HIV-infected children will vary according to the presence and severity of symptoms.

⁶ Adapted from the United Nations Agencies' *Guiding Principles for Feeding the Non-breastfed Child 6-24 Months of Age*.

The energy requirements of HIV-infected children with no symptoms are increased by 10 percent. During the symptomatic phase without weight loss, energy requirements increase by 20 to 30 percent over the level of energy intake recommended for healthy non-HIV-infected children of the same age. When the child is both symptomatic and losing weight, energy requirements increase by 50 to 100 percent.

Protein and Micronutrient Needs. Protein and micronutrient requirements remain the same for children of the same age, sex, and physical activity, regardless of HIV status. However, if children have pre-existing micronutrient deficiencies or inadequate protein intake, these need to be addressed and may require micronutrient supplementation and/or increased protein intake.

Pre-existing Malnutrition. Many children in resource limited settings are already underweight and malnourished. Healthcare workers will need to help families correct underlying malnutrition as well as address the additional nutritional requirements caused by infection with HIV. It is especially difficult for children to consume 50 to 100 percent more energy when they are fighting opportunistic infections and experiencing weight loss. Help caregivers to encourage children to eat additional energy-dense, micronutrient-rich food when periods of illness subside. According to WHO in 2003 breastfed children who are found to be HIV-infected may benefit from continued breastfeeding as well as complementary feeding, according to the recommendations for the general population.

Management of AIDS-related Symptoms. HIV-positive children often suffer from symptoms such as thrush, fever, nausea, or vomiting, which may affect food intake and nutritional status. The dietary management of HIV/AIDS-related symptoms in children is similar to that of adults and is described in Chapter 2.

Other Issues to Consider

The medications HIV-positive children take to treat opportunistic infections may produce side effects such as taste changes, loss of appetite, vomiting, nausea, and diarrhea, which can negatively affect food intake and nutrient absorption and metabolism. Therefore it is crucial to be aware of potential interactions and negative effects, and to manage such symptoms and side effects to minimize the negative impacts on the child's health and nutritional status.

Medications may also affect nutrient absorption, and food may affect medication efficacy. The dietary management of both medication side effects and food-drug interactions in HIV-positive children is similar to the methods used with adults and described in Chapter 3.

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www.fantaproject.org

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www.fao.org/hivaids/

Joint United Nations Program on HIV/AIDS (UNAIDS)

www.unaids.org

LINKAGES Project

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MOST Project

www.mostproject.org

Support and Analysis for Research in Africa Project (SARA)

<http://sara.aed.org>

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www.unicef.org/aids/index.html

World Health Organization (WHO): HIV/AIDS Program

www.who.int/hiv/en/

A Food-based Approach to Support HIV/AIDS-affected Households and Communities

6.

CHAPTER

Food insecure households frequently struggle to meet ordinary basic needs without the added stress of HIV. Shocks, such as drought, poor harvests and conflict, strain the ability of fragile households to function, and HIV/AIDS further reduces their capacity to cope with these traditional stresses. When PLWHAs are questioned about their priority needs, food—not drugs, health services, or relief from stigma—is often the predominant response. The call for food may reflect the physical lack of food in the household, but it often echoes a lack of means or income to acquire food, despite the availability of food in the community or markets. Food aid can play an important role in bridging short-term food gaps, protecting the income and livelihood capacity of households affected by HIV/AIDS and, consequently, supporting both short- and long-term food security.

This chapter provides guidance to program managers on the use of food and donated food to address HIV/AIDS-affected communities. It explains the steps for doing a community needs assessment. The result of the needs assessment will help define the objectives and specific actions that will determine the type of food ration, the size of the food ration, and who is eligible to receive it. The chapter includes questions to consider when designing a program to address malnutrition and household food insecurity. Suggestions for determining a ration for a household are provided with special attention to the increased

energy needs for household members that are HIV-infected. While the focus is on external food donations for short- and medium-term strategies, this approach is applicable to other community-based care and support.

This guide stresses the importance of consuming a varied diet of sufficient amount for a healthy and productive life. In many communities, people face substantial challenges to acquiring and consuming a good diet. These challenges may be due to livelihoods threatened by environmental, social, cultural, and economic factors that affect the production, purchase, and storage of food. An analysis of food insecurity in a household and community will highlight the barriers and constraints for a varied and quality diet. In many parts of the world, food insecurity translates into challenges for families to meet even their basic needs. HIV/AIDS worsens this already precarious situation.

The HIV/AIDS epidemic accelerates the decline towards food insecurity and destitution in a number of ways. The resilience of families to various shocks is undermined. Money once used to purchase food may be diverted to buy medicines for an ill family member. As the family member's illness worsens, his or her ability to work diminishes. This can lead to reduced income and food production. Children who lose family members to AIDS may drop out of school due to a lack of money for school fees. The HIV/AIDS epidemic increased

vulnerability and presents not only short-term impacts through reduced food production and consumption, but also longer-term impacts, as future generations are less likely to develop skills, leading to lost opportunities for income.

The impact of HIV/AIDS on food security in resource limited settings requires short-, medium-, and long-term strategies to help households and communities deal with the epidemic and maintain their nutritional status and health.

Food can be obtained from external donations or locally. While it is recognized that external food aid is not a sustainable resource, the intent is to make the best use of food to ensure that no harm is done and, eventually, communities will be able to respond to food security shocks. In the long term, sustainable strategies should include local ownership, skills development, infrastructure development, income-generating activities, and sustainable agricultural and natural resource development particularly focused on locally available resources and foods.

In designing programs using food aid, it is important to do a thorough analysis of vulnerability to food insecurity in the specific communities affected by HIV/AIDS. An

analysis should include documentation of all major factors that are contributing to food insecurity, including drought and climactic factors, economic factors, conflict and displacement, and acute or chronic disease, including HIV/AIDS. Livelihood and coping mechanisms and local capacities should also be assessed. Such analyses should be done for programs distributing a general ration, as well as for those targeting PLWHAs and affected individuals, households, and communities. It is important to focus on what communities can do to address the food insecurity impacts of HIV/AIDS and other care issues.

The goals and objectives of nutrition and food interventions for PLWHAs vary according to the disease stage of the individual, and whether or not they are receiving ART and other treatments for secondary infections. Goals and objectives will also vary according to the group being targeted for interventions.

Interventions for which an adequate evidence base currently exists and that should be immediately included in program are listed below. Other interventions, including food aid and food security programs, are likely to be effective in certain situations and may be supported on a pilot basis while further evidence is gathered.

Community-based Care and Support

To use food effectively as a means of providing care and support to HIV-affected households and mitigate the impact of HIV/AIDS, program managers should pursue a four-step process:

1. Facilitate a community-led assessment of local food sources and care practices to determine effective uses of all food;
2. Work with the community stakeholders to design and implement a food strategy based on decisions about the purpose of the food, how food will be delivered and stored, and who is eligible to participate, including an exit or transition strategy phasing down the reliance on food aid;
3. Decide and calculate ration composition and size and frequency of schedule for distribution; and

4. Link communities to other services, including health, hygiene, water, sanitation, growth promotion, and other food security interventions.

Facilitating a Community-led Situation Assessment

In designing a program to address a particular dimension of food insecurity, especially the additional burden of HIV/AIDS, it is necessary to work backwards from the immediate manifestations of food insecurity to the root causes of the problem. Understanding the causes of food insecurity requires a significant amount of information gathering. Normally, quantitative information will be available to begin this analysis from data collected routinely

by the host government agriculture, health, or planning ministries, national survey data sets such as those developed under the USAID-sponsored Demographic and Health Surveys (DHS), and information in existing studies and reports. In addition, it is also typically necessary to conduct field studies using a combination of qualitative and quantitative methods to ensure an understanding of local conditions in the intended program area.

It is advisable to work with the community to ensure that the community conducts its own assessment of the situation and then devises an appropriate action plan based on the findings. In most cases, a series of simple and related questions can provide a very general structure to guide the information-gathering process. While the questions themselves are simple, obtaining their answers may be quite complex, requiring expertise from a variety of relevant technical disciplines. The questions to begin the information gathering process include:

- Where do households get their food?
- What factors limit the ability of households to obtain food from each of these sources?
- How do households obtain their cash income, and what factors limit the ability of households to obtain income from each of these sources?
- What factors limit how well households use their food to meet the dietary needs of the individuals within them?
- Who are the most food insecure or vulnerable population groups?
- What traditional feeding and care practices exist for special needs groups such as PLWHAs, pregnant and lactating women, and orphans and vulnerable children?
- What locally available foods are used for household consumption or sold or traded, and what is their availability throughout the seasons? This should include all items consumed by the family, including insects, herbs, fruits, vegetables, legumes, nuts, and other plant and animal products that are purchased, bartered, grown, or gathered by households.
- What food preparation and storage techniques are commonly used?
- What are the market services, including where people buy food and medicines, micronutrients, or herbal supplements for promoting good health, including traditional medicines?
- What are the links to health services and other government and nongovernmental assistance?
- What are the available sources and types of food aid provided in safety net and other programs?

Involving community leaders, health workers, educators, household members and PLWHAs in both the gathering and analysis of the information is useful for obtaining accurate information and designing an intervention that will be beneficial to all members of the community. Issues that may need to be included are:

- What traditional community feeding and care practices promote good health and nutrition for adults and adolescents and which practices promote appropriate breastfeeding and complementary feeding practices for infants and young children?

Program managers may be able to obtain existing information from governmental and nongovernmental reports, household surveys, and food consumption surveys. Rapid food security assessments and qualitative data-using techniques such as key informant interviews, focus group discussions, and observational studies are some of the methods that can be used to gather and complement this information. This phase is also important for identifying the beneficial and harmful practices that support or undermine good health; knowing these is useful for designing programs and developing messages for good nutrition. The reference section at the end of this chapter contains a list of publications that are useful to program managers to work with communities in assessing the food situation and feeding practices at the household level.

Designing and Implementing a Food Program

The initial assessment should provide an understanding of food security conditions and constraints in a given area. Program managers should continue to work with the community to develop a set of program goals and objectives where the probability of a successful intervention is highest while addressing constraints. A clear and measurable set of goals and objectives is the first step towards developing performance indicators and establishing an effective monitoring and evaluation system.

Once the goals and objectives have been established, it is necessary to agree on how the objectives will be met, including developing a strategy for delivering food and other services. In many instances, it is preferable to work with existing organizations and committees in a community rather than creating entirely new structures. Experience has shown that mobilizing groups for the sole purpose of receiving and distributing external aid often results in weak short-lived structures that are less able and willing to mobilize their own local resources in the long term.

Three basic questions should be considered when using food as an input for a program:

What is the Purpose of Introducing a Food Program to the Community? Food aid can have multiple uses and USAID encourages partners to integrate food-based programs with HIV/AIDS activities where appropriate and that the objectives of food-based programs must be clearly stated. Food aid resources are used to meet the following broad program objectives in both development and relief settings to assist food insecure populations affected by HIV/AIDS:

- Nutritional care and support;
- Incentive for participation in HIV/AIDS-related activities; and
- Income transfers to people infected with or affected by HIV/AIDS.

The broad objectives of food aid programming in the context of HIV/AIDS include:

- Prevent malnutrition and mortality among the *general population* due to deteriorating food security where HIV is one of a number of critical determinants of vulnerability through provision of a general food ration integrated with complementary inputs;
- Prevent nutritional deterioration among *individual PLWHAs* by providing general food rations and specialized foods with specific nutrient profiles and acceptability to improving treatment adherence by helping patients manage gastrointestinal side effects of ARVs;
- Provide incentives as a form of income-in-kind to increase participation in the prevention of mother-to-child transmission (pMTCT), pMTCT+, and other prevention, treatment, or palliative care programs, as well as partial payment for care and increasing enrollment in schools for orphans and vulnerable children; and
- Protect livelihoods through supporting safety net programs, asset protection and food-for-work or training programs such as skill enhancement targeting *communities and households affected by HIV/AIDS*.

In some programs, food serves multiple purposes. For example, in maternal and child health programs, food plays a preventative nutritional role and is an incentive for mothers to participate in key health services such as immunization and counseling. The use of the food will determine its type and quantity, who is eligible, and the likely result. It is important to understand and agree on the use of the food. The use can change over time and in response to a community emergency such as a flood or drought.

In programs to assist HIV-affected households, food is sometimes focused on helping household members maintain their nutritional status. Although this guide provides information on nutritional issues related to HIV/AIDS, the food rations described below are based on the nutritional needs of all household members. This is because most households seriously affected by HIV/AIDS experience chronic food shortages that affect all members. There are examples of specialized foods being promoted to be used by PLWHAs. The

number of specialized foods is growing with claims about their nutritional benefits needing careful review. This guide focuses only on the use of specific food aid commodities to meet nutritional needs; discussions of food choices as an income transfer or incentive can be obtained from other resources listed at the end of this chapter.

The following box describes some potential use of food aid in support of the 2003 U.S. Presidential Emergency Plan for AIDS Relief (PEPFAR) with examples for prevention, treatment, and care and support activities:

Examples of the Uses of Food Aid to Support HIV/AIDS-affected Populations	
Target Group	Uses of Food
Treatment	
PLWHAs, including children	<ul style="list-style-type: none"> • Food to improve adherence to ART • Food to improve treatment efficacy • Food to help manage drug side effects
Prevention	
PLWHAs and household members	<ul style="list-style-type: none"> • Food as an income transfer and asset protection • Food to prevent or reduce high-risk behaviors or reliance on negative coping strategies • Food as an incentive for voluntary testing and counseling • Food as an incentive for participation in pMTCT and pMTCT+
Communities in high prevalence or high risk areas	<ul style="list-style-type: none"> • Food as incentive to participate in HIV/AIDS awareness and behavior change programs • Food as an incentive for voluntary testing and counseling • Food as an income transfer and asset protection and to prevent or reduce high-risk behaviors or reliance on negative coping strategies
Care and Support	
PLWHAs	<ul style="list-style-type: none"> • Food to supplement daily nutritional requirements and special dietary needs, such as increased energy requirements • Food to support nutritional management of symptoms of opportunistic infections (e.g., anorexia, diarrhea, nausea) • Food for use in hospitals and hospices as a part of palliative care • Food to provide safety net and income transfer • Food as an income transfer and asset protection • Food for training in life skills, life planning, alternative livelihood strategies
Affected households and OVCs	<ul style="list-style-type: none"> • Food to supplement daily nutritional requirements of OVCs and other affected household members • Food to provide safety net and income transfer for affected households and guardians • Food for education as a nutritional supplement, income transfer and guardianship incentive • Food as an income transfer and asset protection • Food as an income transfer to encourage school attendance • Food for training in life skills, life planning, alternative livelihood strategies • Food as a bridge for adopting new technologies and practices or establishing new livelihood strategies
OVCs in institutions	<ul style="list-style-type: none"> • Food to supplement daily nutritional requirements • Food as an income transfer to assist with costs of care, free up cash resources for provision of other critical services, and facilitate school and training program attendance
Street children	<ul style="list-style-type: none"> • Food to supplement daily nutritional requirements • Food to encourage attendance at skills training or counseling sessions
Communities in high prevalence or high risk areas	<ul style="list-style-type: none"> • Food as an income transfer or to cover opportunity costs to voluntary care providers • Food for training voluntary care providers • Food as a bridge for establishing community-based social safety nets (e.g., food banks) and care and support services • Food as an income transfer and asset protection and to prevent or reduce high risk behaviors or reliance on negative coping strategies

What is the Appropriate Way to Deliver Food Aid in a Community?

A program manager should work with the community to determine the most effective and efficient means of distributing the food based on the human, financial, and other resources the community can provide. If food is available, two approaches to distribute food are take-home rations and on-site feeding. The decision is between a more flexible and administratively simpler take-home option and the more controlled on-site feeding option. Other approaches, including cash transfers and food stamp programs, are not discussed here.

Take-home Rations. This is the most common method of food distribution, in which food rations are provided to households to be taken home for storage, preparation, and consumption. Take-home rations are targeted to households with the greatest need or provided generally to a community, as in the case of emergencies or natural disasters.

On-site Feeding. Food is prepared at a center, and participants consume the meal or snack, such as biscuits, on site. Snacks provided at schools can help increase school attendance as well as address children's nutritional needs. Providing a meal to all students—not just to orphans—can forestall the stigma and resentment that can arise in community-based feeding programs.

Communities affected by HIV/AIDS have created a variety of institutions to care for and provide services to affected children. Some examples include community schools established especially for OVCs, community day care centers that free caretakers for other tasks and also provide a meal and activities for the children, and orphanages or other residential facilities for children. Food aid has been used to help support such self-help efforts, but programs should be monitored carefully to ensure that they do not undermine community integration or development.

Each method has advantages and disadvantages. Take-home rations generally require fewer resources to manage and take less time to establish a distribution system. In addition, this approach is less time-consuming for recipients, who do not have to travel long

distances to obtain food every day. However, in cases where only certain groups are targeted for food distribution and the program seeks to prevent dilution to other family members, on-site feeding may be more advantageous. It may also be more effective where firewood and cooking utensils are in short supply and households are unable to prepare meals or where the security situation is poor and beneficiaries are at risk when carrying food home.

It is recommended that in each community, an existing group be identified to help manage the food program. This group should already be actively engaged in assisting vulnerable persons in the community, preferably drawing mostly or entirely on locally available resources. If no such group exists, a committee can be organized by the external agency or a partner. If a program wants to provide take-home rations to households with PLWHAs or orphans, a team should be employed to be responsible for the logistics. This includes advance planning and ordering of food, receiving and storing the food from the donor, delivering food to the recipient households, and establishing a simple monitoring system to keep track of the food provided to each household.

In an on-site feeding program, the committee selects community members to be responsible for preparing and serving the meals. An exit strategy that defines more sustainable food interventions should be developed, since food donations will not continue indefinitely. As part of the exit strategy, the committee should also define criteria for deciding when a household should stop receiving donated foods and become involved in other interventions that promote livelihood security.

Who are the Beneficiaries and What are their Energy Needs?

Once the approach for food distribution is decided, it is important to determine who the beneficiaries will be and the appropriate eligibility criteria. A program working with community leaders may want to review whether it will be providing food for all households in a community or targeting specific groups such as households with PLWHAs or orphans or, more specifically, orphans under the age of five. These decisions

Examples of Linking Title II Resources with HIV/AIDS-affected Households

Malawi:

Catholic Relief Services (CRS) implements a Title II Development Assistance Program (DAP) from 2000 to 2005 in Malawi with the aim to improve the food security of households affected by HIV/AIDS. Guardians or families caring for AIDS OVCs receive food rations in order to decrease the financial burden of care, promote retention of OVCs in their own communities, and improve the nutritional status of at-risk children. These households participate in complementary livelihood training programs, which include improved soil fertility, crop diversification, and improved seed. In 2003, 95 percent of direct food distribution beneficiaries also participated in activities aimed at improving productive assets, such as building fish ponds.

CRS established 43 community-based child centers (CBCC) as a way of enhancing child care practices and providing guardians with the opportunity to participate in general development activities. The CBCCs are staffed by community volunteers and provide OVCs with food donated by the communities. Growth monitoring is also conducted at the CBCC to ensure that children who are growth faltering are identified for interventions and, if necessary, referral to a health facility. Title II food commodities are used to encourage OVC school attendance. The DAP also supports community artisan apprenticeship programs to support skills development.

Kenya:

CRS, the Archdiocese of Mombassa, and Pathfinder International distribute monthly rations of Title II CSB and vegetable oil to more than 4,500 households with OVCs. The purpose of the food ration is to meet the short-term food needs of households impacted by HIV and AIDS. CRS trained the staff involved with food distribution, providing information on HIV and AIDS and the role of nutrition, guidelines on palliative care for PLWHAs, and safe food storage and use. Households reported decreased incidence of childhood illnesses, increased school attendance and improved school performance, and increased spending on items such as fuel and school supplies.

While progress has been made, there are continuing program challenges, including the high number of households requiring support, the severe food insecurity of many households leading to dependence on the ration as their only source of food, and the need for therapeutic in addition to supplementary feeding rations for cases of severe malnutrition in the program target communities.

will depend on the prevalence of HIV in the community, awareness about the disease, and whether families or individuals will be stigmatized if they participate in a program.

The first step in determining potential beneficiaries and their energy and protein requirements is to examine the composition of the household and estimate their intake and the gap in meeting their nutritional needs. Table 6.1. shows the energy and protein requirements for healthy adults and children, as well as the added energy increments needed for persons who are HIV-infected or sick with AIDS and pregnant and lactating women. This information can be used to estimate daily household energy and protein requirements in Table 6.5.

A family of nine people is represented in the example in Table 6.5. Each adult is moderately active and an adult male is HIV-infected and symptomatic. The woman is breastfeeding her one year old infant, and two active adolescent orphans are part of the household. The calculation of requirements indicates that the household needs an energy intake of 20,244 kcal and 414 g of protein each day. Note the total consists of the sum of each person's requirements and not the average multiplied by the number of people in the household. In situations where individual age and sex information is not easily available, an average minimum requirement for energy of 2,100 kcal per person per day⁷ and protein of 52.5 g per person per day can be used, irrespective of the age and sex composition of the family. While it is preferred that calculations are based on individual requirements founded in age and sex, it is often not possible to do this in field situations. Make sure whichever method selected is explained.

⁷ The planning figure for food aid programs of 2,100 kcal per day or 8,778 kilojoules per day is used by agencies such as the WFP. The Institute of Medicine in 1995 and WHO in 2000 recommended 2,100 kcal per day for a typical developing country population, but the amount should be adjusted for moderate to heavy physical activity of around 100 to 400 kcal per day and for changes in age and sex structure.

Table 6.1. Daily Energy and Protein Requirements for Adolescents, Adults, and Children⁸

Age	Energy (kcal per day) ^{9, 10}		Protein ¹¹ (g per day)	
	Sexes Combined		Sexes Combined	
0 to 2.9 months	404		12	
3 to 5.9 months	550		14	
6 to 8.9 months	615		14.5	
9 to 11.9 months	686		14	
12 to 23.9 months	894		14	
24 to 35.9 months	1,250		22	
36 to 59.9 months	1,500		26	
5 to 6.9 years	1,710		30	
7 to 9.9 years	1,880		34	
	Males	Females	Males	Females
10 to 11.9 years	2,172	1,894	48	49
12 to 13.9 years	2,437	2,063	59	59
14 to 15.9 years	2,795	2,214	70	64
16 to 17.9 years	3,071	2,275	81	63
18 to 29.9 years	2,925	2,140	55	49
30 to 59.9 years	2,866	2,145	55	49
60+ years	2,382	1,925	55	49
Pregnancy		Add 285		Add 7
Lactation		Add 500		Add 20

Note: The above energy requirements for adults are average across a range of body weights.

Table 6.2. Average Energy and Protein Requirements for a Typical Population for Food Aid Programming when Not Using Individual Age- and Sex-specific Requirements

	Energy (kcal per day)	Protein (g per day)
All ages and sexes	2,100	52.5

Table 6.3. Adults, Adolescents, and Children: Adjustments for HIV Status

	HIV Positive Phase	Energy	Protein
Adults and Adolescents	Asymptomatic	10 percent increase	No change
	Symptomatic	20 to 30 percent increase	No change
Children	Asymptomatic	10 percent increase	No change
	Symptomatic with no weight loss	20 to 30 percent increase	No change
	Symptomatic with weight loss	50 to 100 percent increase	No change

Table 6.4. The Energy Requirement of a 25 Year Old HIV-infected Asymptomatic Pregnant Woman with Moderate Activity Level

Energy requirement	+	HIV status*	+	Pregnancy	=	TOTAL
2,140	+	214	+	285	=	2,639 kcal

*The addition for the woman's HIV infection was estimated to be 10 percent of 2,140 kcal or 214 kcal.

Her daily protein requirements would be 56 g per day (i.e., 49 g base plus 7 g for pregnancy).

An HIV-infected asymptomatic 12 year old moderately active boy should get 2,681 kcal per day (i.e., 2,437 + 244) or 10 percent for HIV infection and 59 g of protein.

Table 6.5. Illustrative Calculation of Daily Household Requirements

	Energy (Kcal/day)	Protein (g/day)
Adults:		
1. Male (33 years)	2,866	55
2. Female lactating (28 years)	(2140+500)	(49+20) 69
3. Male HIV-positive symptomatic (40 years)	(2866+ 860*)	55
Children:		
4. Male (one year)	894	14
5. Female (four years)	1,500	26
6. Female (seven years)	1,880	34
7. Male (nine years)	1,880	34
8. Female (13 years)	2,063	59
9. Male (15 years)	2,795	70
Total household daily requirements:	20,244	416

*HIV infection results in a need for 20 to 30 percent more energy during the symptomatic phase. In this case, 30 percent (i.e., 860 kcal) is used.

⁸ Latham, Michael C. Human Nutrition in the Developing World (Food and Nutrition Series No. 29). Rome, Italy: Food and Agriculture Organization of the United Nations (FAO), 1997.

⁹ Minimum energy requirements are based on moderate activity levels. For light activity levels reduce requirements for adolescent and adult males by approximately 25 percent and for females by 8 percent. For heavy activity levels increase requirements for adolescent and adult males by approximately 33 percent and for females by 20 percent.

¹⁰ Energy requirements are usually quoted in kilocalories (kcal). The SI unit of energy is the joule. The relationship between the two units is 1 kcal = 4.18 kilojoules. Thus, the estimated daily per capita energy requirement of 2100 kcal = 8,778 kilojoules.

¹¹ Protein values are adjusted for digestibility factor of 85 percent, representing a diet containing mostly cereals, starchy roots, and pulses, and little complete protein as found in animal products.

Selecting Ration Size and Composition

Decisions about both the ration size and the composition of the foods included in a food basket should be made based on objectives such as addressing nutritional needs and serving as an incentive to participate in a program.

Before determining ration size, a brief assessment should be conducted to determine the community definition of a household. The definition will vary, particularly in heavily HIV-prevalent areas where household composition changes as relatives and friends care for children and others.

The selection of foods for inclusion in a food aid program should be influenced by four considerations as to whether it: 1) is nutritionally appropriate; 2) is culturally acceptable; 3) can be properly processed, stored, and prepared; and 4) complements rather than replaces local food production. Other factors, such as which commodities are

available, sometimes restrict choice. Table 6.6 shows the nutritional value of foods available through the U.S. Title II Food Program. A more complete list of commodities and their composition can be found in Fact Sheets in Part 1 of the Commodity Reference Guide, available online at the USAID website: www.usaid.gov/our_work/humanitarian_assistance/ffp/crg/.

Nutritional Value. Does the food to be included meet the nutritional needs of adults and children? Is it well-tolerated and easily digestible by a child or adult who is sick with AIDS? For many young children and infants, there are limits in the volume and bulk that can be digested. For a person sick with AIDS, poor absorption of foods is common. For young children and HIV-infected persons, foods that are high in protein and micronutrient content, such as fortified CSB, are more beneficial and easily digestible—see Chapter 3 on managing symptoms for more information.

Table 6.6. Selection of Foods Provided through the U.S. Title II Food Program

Food	Energy (kcal/ 100 g)	Protein (per 100 g)	Iron (mg/100 g)	Vitamin A* (IU/100 g)
Cereals				
Bulgur	342	12.3	2.9	2,205
Cornmeal	366	8.5	2.9	2,205
Rice	365	7.1	0.8	0
Sorghum	339	11.3	3.0	2,205
Soy-fortified sorghum grits	337	17.3	2.9	2,205
Wheat flour	333	11.7	4.4	2,205
Pulses				
Lentils	338	28.1	9.02	39
Peas	341	24.6	4.40	149
Fortified blended foods				
CSB	374.3	17.1	17.49	2,612
Wheat soy blend	354.5	21.5	17.85	2,323
Fats				
Vegetable oil	884	0.0	.02	6,000

*Note that vitamin A composition is often presented as micrograms of retinol equivalents (i.e., micrograms RE) IU conversions: 1,000 IU = 333 micrograms RE

Cultural Acceptability. A community or household may have food preferences or taboos, particularly during times of pregnancy, lactation, or illness. It is important to select foods that promote practices that enhance nutritional status and discourage potential harmful practices. As noted, this is an important component of the assessment phase. Program planners should make suggestions of available food choices to community members and get their input before determining the ration.

Availability of Processing, Storage and Preparation Techniques. The availability of milling facilities and fuel should be considered when selecting food aid commodities. In areas where fuel shortages are common, selecting foods that require less preparation and cooking time may be advisable. Flours and pre-mixes do not require milling. It is also important to consider the shelf-life and type of storage facility and packaging, particularly in tropical climates where pests, heat, and humidity can result in food losses.

Compatibility with Local Production. Donated food should not impede local production or reduce the demand for local foods. Finding commodities that can complement local foods or replace them during seasonal shortages is an important consideration when selecting the commodity for inclusion in a food basket.

Calculating a Ration. Two approaches are taken in this guide. The first uses precise knowledge of the age and sex composition of the recipients and the second uses average energy and protein requirements.

An example for calculating the ration size based on energy and protein for the household including the person a PLWHA who is symptomatic is presented in Table 6.7. The overall ration size is based on the estimated nutritional needs for all household members for energy and protein and taking into account the food already available for household consumption.

The ration consists of three commodities common in Title II programs: a micronutrient-fortified cereal (e.g., CSB), combined with a

good protein source (e.g., beans, lentils), and a widely acceptable high-energy source (e.g., refined vegetable oil). It is common to have the cereal and bean or lentil combination or weight ratio of three-to-one or two-to-one. In the example in Table 6.7., the ratio of weight of CSB to lentils is one-to-one. Other combinations are possible and the program manager is encouraged to go through the calculation and adapt it to other scenarios using a spreadsheet-type tool.

In the example in Table 6.7., the monthly ration was determined based on total family daily needs. The calculations captured the additional needs of the HIV-infected family member as well as a condition that approximately 25 to 30 percent of energy needs should come from oil. Note that the ration provided approximately half of the family needs for energy and protein.

Whole grain cereals, such as wheat and corn, are not fortified. All processed food cereals under Title II programs, however, with the exception of rice, are fortified with B vitamins (e.g., thiamin, riboflavin, folic acid, niacin), vitamin A, calcium, and iron. Blended cereals (e.g., CSB, wheat soy blend) are further fortified with zinc, B12, pantothenic acid, iodine, magnesium, vitamin C, vitamin D, and vitamin E.

The micronutrient content of blended cereals is estimated. Because some of these vitamins are lost during storage and cooking, they do not accurately reflect the level of nutrient available to the body after consumption. For example, up to 40 percent of vitamin A can be lost from fortified cereals that are exposed for several months to heat, light, and air. Minerals are not subject to deterioration by environmental factors; however, their bioavailability in cereal can be greatly reduced by absorption inhibitors present in food aid commodities and other foods commonly consumed, such as tea and coffee.

All refined vegetable oil provided through Title II is fortified with vitamin A, a nutrient essential for the protection of the health of any population, but particularly young children. One tablespoon or about 14 g of fortified vegetable oil potentially satisfies over 70

Table 6.7. Illustrative Calculation of a Food Basket for a Household

Calculation for household food ration requirements: (Based on 9 people already consuming 10,000 kcal and 100 grams of protein per day)

A) HOUSEHOLD REQUIREMENT		Energy	Protein
Adults:		Kcal/day	g/day
Male HIV-		2,866	55
Female HIV- lactating	(2,140 + 500)	2,640 (49+20)	69
Male HIV-positive	(2,866 + 860)	3,726	55
Children (age in years):			
Male (1)		894	14
Female (4)		1,500	26
Female (7)		1,880	34
Male (9)		1,880	34
Female (13)		2,063	59
Male (15)		2,795	70
Total household daily requirements:		20,244	416
B) DEFICIT: To calculate subtract family intake from requirement			
(Daily requirement - Estimated current intake) =		Deficit	
Energy	20,244 kcal - 10,000 kcal	=	10,244
Protein	416 g - 100 g	=	316

C) CONSTRUCTING A FOOD BASKET

Select three commodities for the food basket. Choose a high energy source (e.g., vegetable oil), a milled cereal fortified with micronutrients (e.g., CSB), and a high protein source (e.g., lentils) as in Table 6.4.. Base the ration on at least 25 to 30 percent of the energy coming from fats and oils: $0.30 \times 10,973 = 3,392$ kcal from vegetable oil.

c1. Calculate household daily ration size

Oil: Need 3,073 kcal from vegetable oil in ration or 348 g, based on 1 g oil = 8.84 kcal; then 348 g = 3,076 kcal
 Cereals/Pulses: Need to supply remainder energy, based on total energy deficit (i.e., energy from oil)
 Total deficit is 10,244; oil supply of 3,076; cereal/pulses supply of 7,168 kcal
 Remaining energy supplied by equal amounts of CSB (i.e., 1 kg) and lentils (i.e., 1 kg)
 Where 1 kg of CSB = 3,743 kcal; 1 kg of lentils = 3,380 kcal
 Total energy provided by 1 kg each of CSB and lentils = 7,123 kcal

c2. Calculate monthly ration size

- 1) Oil: 348 g x 30 days = 10.44 kg or 11.35 liters (since 920 g = 1 liter, round up to 11.5 liters)
- 2) CSB: 1 kg x 30 days = 30 kg
- 3) Lentils: 1 kg x 30 days = 30 kg

c3. Confirm that proposed ration meets energy requirements

Oil: 11.5 L per month = 10.58 kg per month = 353 g per day x 8.84 kcal/g provides 3,121 kcal per day
 CSB: 1 kg per day provides 3,743 kcal per day
 Lentils: 1 kg per day provides 3,380 kcal per day
 CSB, oil, and lentils provide 10,244 kcal per day

percent of a five to 10 year old child's daily requirement and about 50 percent of an adult's requirement of vitamin A. The calculation for the family ration in Table 6.7. was not based on meeting the requirements for key micronutrients such as vitamin A or iron. But the CSB, lentil, and oil ration for the family of nine provides 43,070 IU per day of vitamin A, excluding the contribution from other foods in the family diet. This is in excess of three times the requirement for this size of family but losses due to storage and cooking would be expected, especially in the CSB, which provided over 60 percent of the vitamin A in the ration.

In situations where a ration has to be estimated for a population and not done based on individual requirements, as was done in Table 6.7., an estimate of the average minimum requirement for energy can be used. Average daily energy needs for a population is estimated to be 2,100 kcal per person per day, irrespective of age, sex, and physical activity. In high HIV-prevalent populations, some agencies increase the requirement by 100 kcal per person per day or more. In Table 6.8., a ration is estimated for a population of 1,000 men, women, and children, 204 of who are HIV-positive. In the example, 25 percent of adults are HIV-positive and asymptomatic, 5 percent of adults are HIV-positive and symptomatic, 10 percent of children are HIV-positive and asymptomatic, and 5 percent of children are HIV-positive and symptomatic. In this example, individuals over 15 years old are considered to be adults.

The process for determining a ration for the community involves estimating the energy and protein requirements for everyone and then adding the extra commodities needed to meet the additional energy requirements due to HIV infection. The calculation in Table 6.8. suggests an additional 78,120 kcal per day is needed for the 204 symptomatic and asymptomatic adults and children. The increase in energy amounts to an average increase of 383 kcal per HIV-positive person per day. In the example used, half of the diet was provided from their own resources and, as a result of the infection, food needs for the 204 HIV-positive individuals increased per person per month for vegetable oil was 0.4 L, CSB was 2.2 kg, and nothing for lentils. Increasing the energy requirements for the HIV-positive resulted in an increase in

protein being provided with CSB and lentils. This option is preferred as it enables increased food provisioning that is more reflective of the overall diet and avoids overloading with oil.

Calculations of a ration based on specific nutrients can be done with the information provided in the Commodity Reference Guide based on the nutrient composition of the commodities in Part 1 and the nutrient needs in Part 2. Due to the inhibiting and enhancing effects of different food components on micronutrient utilization, any calculation on specific micronutrients should be carried out by someone familiar with micronutrient malnutrition. Given the difficulty of planning diets based on specific micronutrients, it is recommended that ration calculations be based on energy and protein needs instead.

The WFP, in partnership with UNHCR, has developed a spreadsheet-based program called NutVal¹² to plan rations based on commonly available commodities, including those available through the Title II program. The calculator includes a range of nutrient composition for 147 foods and applies minimum nutrient requirement values to estimate the energy, protein, vitamin A, and other nutrients provided by the ration. The calculation yields the percentage of requirements provided by the ration and the percentage of energy provided by fat or protein.

NutVal is a very useful as a simple-to-use spreadsheet application for the calculation, planning, and monitoring of the nutritional value of food aid rations and has four parts. The database and calculation sheets help to plan and calculate the nutrient content of a food ration. The selected ration can then be viewed as a graph. The fourth part helps in collecting and analyzing data from on-site distribution monitoring, also called food basket monitoring. There are also "Help" pages to provide additional information. For more information on NutVal, contact the Nutrition Section of WFP at nutrition@wfp.org.

For complete specifications, go to the Fact Sheets in Part 1 of the Commodity Reference Guide at www.usaid.gov/our_work/humanitarian_assistance/ffp/crg/ or the FANTA website at www.fantaproject.org.

¹² For more information on NutVal, contact the Nutrition Section of the World Food Programme: nutrition@wfp.org.

Table 6.8. Calculating a Ration for a Community Program Using Average Energy Requirements

Total Population:	1,000
Percent below 15 years:	65 percent
Percent below 5 years:	20 percent
Percent adults HIV-positive asymptomatic	25 percent
Percent adults HIV-positive symptomatic:	5 percent
Percent children HIV-positive asymptomatic:	10 percent
Percent children HIV-positive symptomatic with weight loss:	5 percent

Calculation for food ration requirements, based on the assumption that people are already consuming half of their energy requirements from other sources:

A) MINIMUM REQUIREMENT	Energy (kcal per day)	Protein (g per day)
1. Base requirement (1,000 people: energy = 2,100 kcal and protein = 52.5 g)	2,100,000	52,500
2. HIV-positive adult asymptomatic (88 people: 10 percent increase)		18,480
3. HIV-positive adult symptomatic (18 people: 30 percent increase)		11,340
4. HIV-positive child asymptomatic (65 people: 10 percent increase)		13,650
5. HIV-positive child symptomatic with weight loss (33 people: 50 percent increase)		34,650
Total community daily requirements:	2,178,120	52,500

In this case, HIV/AIDS represents an overall increase in energy in the community's total ration of 3.7 percent (i.e., 78,120 kcal per day or 383 kcal per HIV-positive person per day) over minimum requirements.

B) DEFICIT:

To calculate community deficit, subtract minimum requirements from locally available sources (e.g., 50 percent of 2,100,000). All additional energy needs for HIV-positive need to be provided by food ration.

Deficit in energy from local sources is 1,050,000 kcal per day, and protein is 26,250 g per day.

C) CONSTRUCTING A FOOD BASKET

The food basket will be based on meeting 50 percent or minimum requirements of all beneficiaries (i.e., 1,000 people), plus additional rations based on recommendations for HIV-positive individuals, assuming half of the food needs will be met from local sources. Select three commodities for the food basket. In this example, choose an energy dense source (e.g., vegetable oil), a blended cereal fortified with micronutrients (e.g., CSB), and a high protein source (e.g., lentils), as in Table 6.6. Base the ration on at least 25 to 30 percent of the energy coming from fats and oils (e.g., $0.30 \times 1,050,000 \text{ kcal} = 315,000 \text{ kcal}$ from vegetable oil).

c1. Calculate Community daily ration size for General Population

Oil: Need 315,000 kcal from vegetable oil in ration = 38.7 L

Based on 1 g oil = 8.84 kcal; then 35,634 g = 315,000 kcal

Note that 920 g of oil = 1 L or 35,634 g = 38.7 L

Cereals/Pulses: needed to supply remainder energy, based on total energy deficit (i.e., energy from oil and a weight ratio of CSB to lentils of two-to-one, due to greater energy needs of the HIV-positive

Total energy deficit of 1,050,000 - energy from oil of 315,000 kcal = 735,000 kcal

Remaining energy supplied by amounts of CSB and lentils in two-to-one ratio by weight

Where 1 kg of CSB = 3,743 kcal; 1 kg of lentils = 3,380 kcal

CSB: Need 490,000 kcal from CSB in ration = 130.9 kg

Lentils: Need 245,000 kcal from lentils in ration = 72.5 kg

c.2 Check proposed ration meets protein requirements

Since CSB and lentils are the major source of protein and the deficit is 26,250 g per day

CSB: Protein per kg = 171 g or Ration = 22,384 g per day

Lentils: Protein per kg = 281 g or Ration = 20,373 g per day

CSB and lentils provide protein of 42,757 g per day in excess of requirements by 16,678 g per day.

Protein provided by the ration for the community exceeds minimum requirement by 11.7 kg per day.

Increasing the oil or using cereals will reduce the protein level in the ration but at the expense of micronutrients. The decision is to increase the CSB amounts and accept higher protein intakes for the HIV-positive beneficiaries.

c.3. Calculate basic monthly ration size for the general population of 1,000 people

Vegetable Oil: 38.7 L per day x 30 days = 1,161 L

CSB: 130.9 kg per day x 30 days = 3,927 kg

Lentils: 72.5 kg per day x 30 days = 2,175 kg

General Ration (rounded per person per month):

Vegetable Oil = 1.2 L

CSB = 4 kg

Lentils = 2.2 kg

c.4. Calculate additional daily ration for HIV-positive population

Additional energy needs for the HIV-positive requires an increase in energy of 78,120 kcal per day for the 204 symptomatic and asymptomatic adults and children—see above. No additional protein needs are recommended. To maintain approximately 30 percent of the dietary energy to be from oil, an increase of oil and CSB is recommended.

Oil: need 23,436 kcal from vegetable oil in ration = 2.9 L, based on 1 g oil = 8.84 kcal; then 2,651 g = 23,436 kcal

Where 920 g oil = 1 L or 2,651 g = 2.9 L

Cereals/Pulses: needed to supply remainder energy, based on total energy deficit - energy from oil

Total energy deficit of 78,120 - energy from oil of 23,436 kcal = 54,684 kcal

Remaining energy supplied by CSB, where 1 kg of CSB = 3,743 kcal

CSB: need 54,684 kcal from CSB in ration = 14.6 kg

Calculate additional monthly ration size for HIV-positive

Oil: 2.9 x 30 days = 87 L

CSB: 14.6 kg x 30 days = 438 kg

Linking Communities with Other Services

Providing food can play an important role in providing nutritional support to HIV-infected individuals, including management of drug related side effects of ARV therapies; assisting HIV-affected households to cope with a member who is living with AIDS; providing extra food to overburdened households caring for children orphaned by the disease; and assisting households that have suffered the recent loss of a member to allocate resources to cover other expenses associated with an illness or loss. If food aid is provided, it should be part of an overall intervention strategy that builds the capacity of AIDS-affected households and communities to sustain them over the long term.

Programs that use food to provide nutritional support to households are most efficient when combined or linked to other services such as:

- Prevention of HIV transmission, including the prevention of MTCT during pregnancy, delivery, and infant care;
- Treatment of HIV infection with HAART;
- Nutrition education and counseling to ensure proper utilization, preparation, and storage of foods;
- Growth promotion, breastfeeding, and basic child health services to promote the health of young children;
- Health services to manage and treat infections, especially diarrhea, TB, and malaria, which can worsen malnutrition;
- Reproductive health services, particularly pre- and post-natal care to assist pregnant and lactating women;
- Psychosocial support for PLWHAs and family members to cope with the illness and plan for the future; and
- Other types of economic and social support, including microfinance, agricultural training, vocational training, and school feeding programs, and programs that help HIV-affected households maintain their income, savings, and overall livelihood security.

The actual increases in consumption required by individual HIV-positive beneficiaries will depend on their age, sex, and symptoms—see Table 6.1. The above calculation uses average minimum requirements for a population for planning purposes.

Institution-based Feeding Programs

Institutions, such as orphanages, community groups, hospitals, hospices, and health clinics provide on-site and take-home rations for specific groups, including HIV/AIDS-affected people. These programs are usually targeted to people who are living with AIDS who come for medical treatment and care, children who have lost a parent to HIV/AIDS, or street children.

Designing a complete diet for participants fed at institutions requires careful consideration of how to meet nutritional needs and ensure that food is appealing, culturally acceptable, and easy to prepare, serve and consume and that resources are available to ensure needs can be met over time. The role of food aid should be to complement locally available foods, especially fruits and vegetables. Earlier suggestions for estimating a food basket can be used, but consideration must be given to additional foods and flavorings such as spices, salt, sugar, fruits, and vegetables, which are not usually part of a Title II ration.

Institutional and Home-based Care for Severely Malnourished Individuals

In some cases, people suffering from AIDS or children orphaned by the death of a parent may become severely malnourished and need therapeutic foods and medical care to reduce the risk of death or excessive morbidity. Severe acute malnutrition occurs once AIDS has developed, but these children are often underweight and stunted even before AIDS symptoms are evident. More significant, however, is that the indirect impact of HIV on nutrition by the underlying poverty, which also results in acute malnutrition events.

HIV-positive children do respond to treatment for severe acute malnutrition using special foods such as F100 therapeutic milk and

special pastes such as Plumpynut® produced by Nutriset. The nature of the HIV results in bouts of infection and weight loss and is therefore difficult to treat. The approach to using specialized foods for HIV positive people should combine both supplementary feeding approaches with therapeutic feeding.

In therapeutic feeding, a person receives both medical and nutritional care until he/she gains sufficient weight. The timeframe for rehabilitating a severely malnourished child without HIV infection is generally four to six weeks and can be longer. For HIV-infected adults and children, however, weight gain may not be sufficient or relapse, and programs will need to assess with households whether nutritional care or more intensive medical treatment is needed.

In addition to center-based therapeutic care, home-based or Community Therapeutic Care (CTC) can be used to deal with rehabilitation of severely malnourished adults and children. Often, critical to home based or CTC is the availability of ready-to-use therapeutic food (RUTF) such as PlumpyNut®. RUTF can be imported or locally produced and includes vitamins and minerals, and consists of locally produced foods like peanut, butter, oil, full cream milk, and sugar. RUTF pastes have been successfully used for treating outpatients suffering from uncomplicated severe malnutrition and moderate uncomplicated malnutrition in resources limited settings. RUTF is a high-energy, nutrient-dense food that meets strict formulations and all safety requirements and is administered by trained providers, including caregivers. For more information, consult guidelines from UNICEF, WHO, international NGOs, and national authorities. For CTC information, go to www.fantaproject.org/ctc/ctc.shtml.

Priority Nutrition and Food-based Actions

The goals and objectives of nutrition and food interventions for PLWHAs vary according to the disease stage of the individual, and whether or not they are receiving ART and other treatments for secondary infections. Goals and objectives will also vary according to the group being targeted for interventions.

Interventions for which an adequate evidence base currently exists and which should be immediately included in program are listed below. Other interventions, including food aid and food security programs, are likely to be effective in certain situations and may be supported on a pilot basis while further evidence is gathered.

Types of Food and Nutrition Supplements

Nutrition and food-based interventions often include the term ‘supplement’, which refers to any food or nutritional product that is provided to supplement or add to the daily diet. Three types of supplements should be considered:

1. **Food to manage HIV-related symptoms and secondary infections; maintain weight and treat mild weight loss; manage the nutrition-related side effects of ART; and address nutritional needs in food insecure areas.** For PLWHAs, foods that are enriched, easy to prepare and digest, and palatable during illness are preferred. These foods can include commodities provided through USAID Title II and WFP or commodities produced and/or purchased locally. Programmed food is intended to supplement the food that an individual or household has available, except in emergency situations. Some examples of food commodities currently being used in HIV/AIDS programs include: CSB, vitamin A-fortified vegetable oil, and lentils.
2. **Nutrition supplements for specific HIV-positive groups at risk of malnutrition.** This includes multi-vitamin supplements for HIV-positive children, special fortified foods for non-breastfed children six months and older, and nutritional supplements for pregnant and lactating women, according to WHO or national protocols. Such supplements may include iron-folic acid pills for pregnant women and to treat iron deficiency anemia, and multiple micronutrient (MM) supplements. The optimal MM formulation for these groups is unknown.

3. **Therapeutic foods for rehabilitation of moderate and severe malnutrition in HIV-positive adults and children.**

This includes nutrient-dense foods that can be used for clinic-based stabilization and home- or community-based care, WHO or national nutrition rehabilitation protocols. The foods and protocols used to treat severe and moderate malnutrition in the general population may be used for HIV-positive patients, although some adaptations may be required for adults and those experiencing severe symptoms. Some examples of therapeutic foods include: BP100, F100 therapeutic milk, Plumpynut® (a peanut-based paste), and locally produced nutrient-dense foods.

PLWHAs targeted for HIV/AIDS programming generally come from populations with high pre-existing rates of malnutrition. This needs to be taken into account when designing nutrition and food interventions, but the nutritional requirements for PLWHAs are not significantly different than those for the general population. There are increased daily energy needs (10-30 percent) to maintain or recover weight and there is a heightened need to have palatable and easy-to-digest foods for those suffering from anorexia, oral sores, diarrhea, and other symptoms that affect ability to eat. Nutrient dense foods or food-spreads are an excellent way to insure that nutritional needs are being met in people with reduced appetite or ability to eat or absorb nutrients. A number of locally produced food products that are now being marketed as specialized foods for PLWHAs. Some caution is advised when considering the use of these foods in HIV/AIDS programs, as they have not yet been reviewed for effectiveness and cost.

Table 6.9. Examples of Food and Nutrition Activities in HIV/AIDS Programs

Activity	Objective	Related Emergency Plan Goal	Beneficiary entry criteria	Entry Points	Resources Required
Anthropometric baseline assessment and follow-up monitoring	Identify moderately and severely malnourished PLWHAs	Care and support, treatment	Screening for all PLWHAs participating in care programs	pMTCT, voluntary counseling and testing (VCT), ART, home-based and palliative care	Training of health workers in nutritional assessment and equipment for anthropometric screening
Therapeutic feeding (inpatient facilities or support to community-based therapeutic feeding programs)	Nutritional rehabilitation of severely malnourished children (including OVCs) and adults living with HIV/AIDS according to standard WHO nutritional protocols for treatment of severe malnutrition	Care and support, treatment	Children: Weight/height < 3 SD or < 70 percent median Adults: Weight loss greater than 10 percent of body weight; or mid-upper-arm circumference (MUAC) < 160 mm irrespective of clinical signs; or MUAC 161-185 mm plus WHO Stage 2 or 3 criteria	pMTCT, VCT, ART, home-based and palliative care	Training and ongoing nutritional/ Logistics, Technical Assistance for program supervision, therapeutic foods (e.g. F100, F75 therapeutic milk, Plumpynut®)
Medical services in therapeutic feeding centers/ programs	HIV+ Children: Vitamin A, measles immunization, presumptive treatment with antibiotics, treatment of malaria, and anemia and anti-helminthes, where appropriate HIV+ Adults: presumptive treatment with antibiotics, treatment of malaria and anemia and anti-helminthes, where appropriate	Care and support, treatment	Children: Weight/height < 70 percent percent median, Adults: BMI < 16.0 Kg/M ² for non pregnant women:	pMTCT, VCT, ART, home-based and palliative care	Training and technical assistance for program supervision, drugs and medical supplies
Supplementary feeding (in outpatient facilities)	Nutritional rehabilitation of moderately malnourished children (including OVC) and adults living with HIV/AIDS according to standard WHO nutritional and medical protocols	Care and support, treatment	Children: Weight/height < 2 SD or 70-80 percent percent median, Adults: Weight loss greater than 10 percent of body weight; or MUAC 161-185 mm; Pregnant and lactating women Nutritional deterioration or failure to gain weight despite ART and/or treatment of infections in any of the above groups	pMTCT,VCT, ART, home-based and palliative care	Training and ongoing nutritional technical assistance for program supervision, Supplement-ary foods (e.g. CSB, oil, other locally produced foods)

Activity	Objective	Related Emergency Plan Goal	Beneficiary entry criteria	Entry Points	Resources Required
Supplementary feeding (in outpatient facilities)	To provide incentive for regular follow-up attendance for those PLWHAs not yet qualifying for ART	Treatment	CD4 count 200-500 /mm ³	ART	Training and ongoing nutritional technical assistance for program supervision, supplementary foods (e.g. CSB, oil, other locally produced foods)
Nutritional education and counseling	To provide advice on: 1) Maintaining weight among PLWHAs, both those on and not on ART, by increasing energy intake 2) Safe infant feeding (e.g., early and exclusive breastfeeding or replacement feeding options) to prevent transmission/non-HIV related illness/death 3) Safe food/water handling/use to prevent diarrhea 4) Manage HIV-related illnesses, with a focus on dietary management of symptoms (e.g. anorexia, diarrhea, nausea) to promote adherence and improvement of diets during recuperation from acute infections, to recover lost weight	Care and support, treatment	PLWHAs	VCT, pMTCT, ART, home-based and palliative care	Training and nutritional technical assistance, development of national guidelines and nutritional commodities, including replacement feeding if appropriate
'Preventative' care package	Improve participation and symptom management	Care and support	Participants receiving insecticide-treated bednets (ITNs), safe water systems and co-trimoxazole (this is not screening criteria)	Home-based and palliative care	Training and TA and nutritional commodities (e.g. CSB, oil other locally produced foods)

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Websites**Academy of Educational Development (AED)**

www.aed.org

Commodities Reference Guide

www.usaid.gov/our_work/humanitarian_assistance/ffp/crg/

Community Therapeutic Care

www.fantaproject.org/ctc/ctc.shtml

Food and Nutrition Technical Assistance Project (FANTA)

www.fantaproject.org

Food and Agriculture Organization of the United Nations (FAO): HIV/AIDS and Food Security

www.fao.org/hivaids/

International Food Policy Research Institute (IFPRI)

www.ifpri.org

Institute of Medicine of the national academies (IOM)

www.iom.oedu

Joint United Nations Program on HIV/AIDS (UNAIDS)

www.unaids.org

Support for Analysis and Research in Africa Project (SARA)

<http://sara.aed.org>

United Nations Children's Fund (UNICEF): HIV/AIDS Program

www.unicef.org/aids/index.html

United Nations High Commission on Refugees

www.unhcr.org

United Nations University (UNU)

www.unu.edu

United Nations World Food Programme (WFP)

www.wfp.org

U.S. Agency for International Development (USAID)

www.usaid.gov

U.S. Agency for International Development (USAID): Displaced Children and Orphans Fund

www.usaid.gov/our_work/humanitarian_assistance/the_funds/dcof/index.html

World Health Organization (WHO): HIV/AIDS Program

www.who.int/hiv/en/

Glossary of Terms

ACQUIRED IMMUNE DEFICIENCY SYNDROME (AIDS): The most severe manifestation of infection with the Human Immunodeficiency Virus (HIV). The Centers for Disease Control and Prevention (CDC) lists numerous opportunistic infections and cancers that, in the presence of HIV infection, constitute an AIDS diagnosis. In 1993, CDC expanded the criteria for an AIDS diagnosis in adults and adolescents to include CD4+ T cell count at or below 200 cells per microliter in the presence of HIV infection. In persons (age 5 and older) with normally functioning immune systems, CD4+ T cell counts usually range from 500–1,500 cells per microliter. Persons living with AIDS often have infections of the lungs, brain, eyes, and other organs, and frequently suffer debilitating weight loss, diarrhea, and a type of cancer called Kaposi's Sarcoma.

ACUTE HIV INFECTION: The period of rapid viral replication immediately following exposure to HIV. An estimated 80 to 90 percent of individuals with primary HIV infection develop an acute syndrome characterized by flu-like symptoms of fever, malaise, lymphadenopathy, pharyngitis, headache, myalgia, and sometimes rash. Following primary infection, seroconversion and a broad HIV-1 specific immune response occur, usually within an average of 3 weeks after transmission of HIV. It was previously thought that HIV was relatively dormant during this

phase. However, it is now known that during the time of primary infection, high levels of plasma HIV RNA can be documented.

ADHERENCE: Compliance with a drug regimen, as in taking medications correctly and on time. It encompasses the patient's active participation in his or her own healthcare, seeking medical advice, keeping appointments, following recommendations concerning lifestyle, as well as following medical regimens.

AFFECTED COMMUNITY: Persons living with HIV and AIDS and other related individuals, including their families, friends, and advocates whose lives are directly influenced by HIV infection and its physical, psychological, and sociological ramifications.

AIDS: See Acquired Immune Deficiency Syndrome.

AIDS-RELATED CANCERS: Several cancers are more common or more aggressive in persons living with HIV. These malignancies include certain types of immune system cancers known as lymphomas, Kaposi's Sarcoma, and anogenital cancers that primarily affect the anus and the cervix. HIV, or the immune suppression it induces, appears to play a role in the development of these cancers.

AIDS WASTING SYNDROME: The involuntary weight loss of 10 percent of baseline body weight plus either chronic diarrhea (two loose stools per day for more than 30 days) or chronic weakness and documented fever (for 30 days or more, intermittent or constant) in the absence of a concurrent illness or condition other than HIV infection that would explain the findings.

ANEMIA: A lower than normal number of red blood cells.

ANOREXIA: The lack or loss of appetite that leads to significant decline in weight.

ANTHROPOMETRY: The study of human body measurements, especially on a comparative basis.

ANTIBODY: A protein that is manufactured by lymphocytes (a type of white blood cell) to neutralize an antigen or foreign protein. Bacteria, viruses, and other microorganisms commonly contain many antigens.

ANTIRETROVIRAL DRUGS (ARV): Substances used to kill or inhibit the multiplication of retroviruses such as HIV.

ANTIVIRAL: A substance or process that destroys a virus or suppresses its replication (i.e., reproduction).

ARV: See Antiretroviral Drugs.

ART: Antiretroviral therapy.

ASYMPTOMATIC: Without symptoms. Usually used in the HIV/AIDS literature to describe a person who has a positive reaction to one of several tests for HIV antibodies but who shows no clinical symptoms of the disease.

BIOAVAILABILITY: The extent to which an oral medication is absorbed in the digestive tract and reaches the bloodstream, thereby permitting access to the site of action.

B LYMPHOCYTES (B CELLS): One of the two major classes of lymphocytes, B lymphocytes are blood cells of the immune

system, derived from the bone marrow and spleen; they are involved in the production of antibodies. During infections, these cells are transformed into plasma cells that produce large quantities of antibody directed at specific pathogens. When antibodies bind to foreign proteins, such as those that occur naturally on the surfaces of bacteria, they mark the foreign cells for consumption by other cells of the immune system. This transformation occurs through interactions with various types of T cells and other components of the immune system. In persons living with AIDS, the functional ability of both the B and the T lymphocytes is damaged, with the T lymphocytes being the principal site of infection by HIV.

BODY FLUIDS: Any fluid in the human body, such as blood, urine, saliva (spit), sputum, tears, semen, mother's milk, or vaginal secretions. Only blood, semen, mother's milk, and vaginal secretions have been linked directly to the transmission of HIV.

BODY MASS INDEX (BMI): A measure of body fat based on height and weight that applies to both adult men and women.

BONE MARROW: Soft tissue located in the cavities of the bones where blood cells such as erythrocytes, leukocytes, and platelets are formed.

BONE MARROW SUPPRESSION: A side effect of many anticancer and antiviral drugs, including AZT. Leads to a decrease in white blood cells, red blood cells, and platelets. Such reductions in turn result in anemia, bacterial infections, and spontaneous or excess bleeding.

BREAST MILK SUBSTITUTE: Any food being marketed or otherwise represented as a partial or total replacement for breast-milk, whether or not suitable for that purpose.

CANDIDA: Yeast-like fungi commonly found in the normal flora of the mouth, skin, intestinal tract, and vagina, which can become clinically infectious in immune-compromised persons.

CANDIDIASIS: An infection with a yeast-like fungus of the *Candida* family, generally *Candida albicans*. Candidiasis of the esophagus, trachea, bronchi, or lungs is an indicator disease for AIDS. Oral or recurrent vaginal candida infection is an early sign of immune system deterioration.

CD4 (T4) or CD4+ CELLS: A type of T cell involved in protecting against viral, fungal, and protozoal infections. These cells normally orchestrate the immune response, signaling other cells in the immune system to perform their special functions. Also known as T helper cells. HIV's preferred targets are cells that have a docking molecule called "cluster designation 4" (CD4) on their surfaces. Cells with this molecule are known as CD4-positive (or CD4+) cells. Destruction of CD4+ lymphocytes is the major cause of the immune deficiency observed in AIDS, and decreasing CD4+ lymphocyte levels appear to be the best indicator for developing opportunistic infections. Although CD4 counts fall, the total T cell level remains fairly constant through the course of HIV disease, due to a concomitant increase in the CD8+ cells. The ratio of CD4+ to CD8+ cells is therefore an important measure of disease progression.

COINFECTION: The infection of HIV/AIDS simultaneously with another disease, usually hepatitis.

COMBINATION THERAPY: Two or more drugs or treatments used together to achieve optimum results against HIV infection and/or AIDS. Combination drug therapy has proven more effective in decreasing viral load than monotherapy (single-drug therapy). An example of combination therapy would be the use of two nucleoside analog drugs plus either a protease inhibitor or a non-nucleoside reverse transcription inhibitor.

COMMUNITY THERAPEUTIC CARE (CTC): Treatment of the majority of the severely acutely malnourished at home, focused on outreach and community mobilization to promote participation and behavioral change.

CORN-SOY BLEND (CSB): A naturally wholesome blended food containing 69.5 percent cornmeal, 21.8 percent soy flour, a premix of 3.0 percent minerals and vitamin antioxidant, and 5.5 percent soy oil. It is highly nutritious and precooked for ease in use and handling.

CRYPTOSPORIDIOSIS: A diarrheal disease caused by the protozoa *Cryptosporidium* which grows in the intestines. Symptoms include abdominal cramps and severe chronic diarrhea. It is considered an AIDS defining opportunistic infection in persons with HIV infection. Cryptosporidiosis usually occurs late in the course of HIV disease as immunological deterioration progresses.

DEMOGRAPHIC HEALTH SURVEY (DHS): Assists developing countries to collect, analyze, and use data to improve national programs addressing family planning, maternal and child health, child survival, HIV/AIDS, and reproductive health.

DIABETES MELLITUS (DM): A disorder of carbohydrate metabolism characterized by elevated blood glucose (blood sugar) levels and glucose in the urine resulting from inadequate production or use of insulin. Insulin is the hormone that allows glucose to leave the bloodstream and enter body cells, where it is used for energy generation or stored for future use. Diabetes mellitus can also lead to long-term complications that include the development of neuropathy (swelling and wasting of the nerves), retinopathy (nonswelling eye disorder), nephropathy (swelling or breakdown disorder of the kidneys), generalized degenerative changes in large and small blood vessels, and increased susceptibility to infections.

DIARRHEA: Uncontrolled, loose, and frequent bowel movements caused by diet, infection, medication, and irritation or inflammation of the intestine. Severe or prolonged diarrhea can lead to weight loss and malnutrition. The excessive loss of fluid that may occur with AIDS-related diarrhea can be life threatening. There are many

possible causes of diarrhea in persons who have AIDS. The most common infectious organisms causing AIDS-related diarrhea include cytomegalovirus (CMV), the parasites *Cryptosporidium*, *Microsporidia*, and *Giardia lamblia*, and the bacteria *Mycobacterium avium* and *Mycobacterium intracellulare*. Other bacteria and parasites that cause diarrheal symptoms in otherwise healthy people may cause more severe, prolonged, or recurrent diarrhea in persons with HIV or AIDS.

DRUG-DRUG INTERACTION: A modification of the effect of a drug when administered with another drug. The effect may be an increase or a decrease in the action of either substance, or it may be an adverse effect that is not normally associated with either drug.

DYSPNEA: Difficult or labored breathing.

ERYTHEMA: Redness or inflammation of the skin or mucous membranes.

FEVER: A rise of body temperature above the normal (98 degrees Fahrenheit).

FISTULA: An abnormal passage leading from an abscess or hollow organ to the body surface or from one hollow organ to another and permitting passage of fluids or secretions.

FOOD-DRUG INTERACTION: When food affects the ingredients in a medication, preventing the medicine from working the way it should. Some nutrients can affect the way certain drugs metabolize by binding with drug ingredients, thus reducing their absorption or speeding their elimination. Taking medications at the same time as eating may interfere with the stomach and intestines' absorption of medications.

FOOD SECURITY: When all people at all times have both physical and economic access to sufficient food to meet their dietary needs for a productive and healthy life. To be food secure, households and individuals need to have available food, access to food and the ability to fully utilize it once it is consumed.

FORTIFIED FOODS: The addition of nutrients to foods for the purpose of ensuring the nutritional equivalence of substitute foods.

GIARDIASIS: A common protozoal infection of the small intestine, spread via contaminated food and water and direct person-to-person contact.

HAART: See Highly Active Antiretroviral Therapy.

HEPATITIS: An inflammation of the liver that may be caused by several agents, including viruses and toxins. Hepatitis is characterized by jaundice, enlarged liver, fever, fatigue and abnormal liver function tests.

HIGHLY ACTIVE ANTIRETROVIRAL THERAPY (HAART): The name given to treatment regimens recommended by leading HIV experts to aggressively suppress viral replication and progress of HIV disease. The usual HAART regimen combines three or more different drugs, such as two nucleoside reverse transcriptase inhibitors (NRTIs) and a protease inhibitor, two NRTIs and a non-nucleoside reverse transcriptase inhibitor (NNRTI), or other combinations. These treatment regimens have been shown to reduce the amount of virus so that it becomes undetectable in a patient's blood.

HIV: See Human Immunodeficiency Virus.

HIV DISEASE: During the initial infection with HIV, when the virus comes in contact with the mucosal surface and finds susceptible T cells, the first site at which there is truly massive production of the virus is lymphoid tissue. This leads to a burst of massive viremia, with wide dissemination of the virus to lymphoid organs. The resulting immune response to suppress the virus is only partially successful and some virus escape. Eventually, this results in high viral turnover that leads to destruction of the immune system. HIV disease is, therefore, characterized by a gradual deterioration of immune functions. During the course of infection, crucial immune cells, called CD4+ T cells, are disabled and killed, and their numbers progressively decline.

HIV VIRAL LOAD: See Viral Load Test.

HOOKWORM: A parasitic blood-sucking roundworm that has hooked mouth parts to fasten to the intestinal wall.

HUMAN IMMUNODEFICIENCY VIRUS: The retrovirus isolated and recognized as the etiologic (i.e., causing or contributing to the cause of a disease) agent of AIDS. HIV is classified as a lentivirus in a subgroup of retroviruses. The genetic material of a retrovirus such as HIV is the RNA itself. HIV inserts its own RNA into the host cell's DNA, preventing the host cell from carrying out its natural functions and turning it into an HIV factory.

IMMUNE DEFICIENCY: A breakdown or inability of certain parts of the immune system to function, thus making a person susceptible to certain diseases that they would not ordinarily develop.

IMMUNE SYSTEM: The body's complicated natural defense against disruption caused by invading foreign agents (e.g., microbes, viruses). There are two aspects of the immune system's response to disease: innate and acquired. The innate part of the response is mobilized very quickly in response to infection and does not depend on recognizing specific proteins or antigens foreign to an individual's normal tissue. It includes complements, macrophages, dendritic cells, and granulocytes. The acquired, or learned, immune response arises when dendritic cells and macrophages present pieces of antigen to lymphocytes, which are genetically programmed to recognize very specific amino acid sequences. The ultimate result is the creation of cloned populations of antibody-producing B cells and cytotoxic T lymphocytes primed to respond to a unique pathogen.

INCLUSION/EXCLUSION CRITERIA: The medical or social standards determining whether a person may or may not be allowed to enter a clinical trial. For example, some trials may not allow persons with chronic liver disease or with certain drug allergies; others may exclude men or women, or only include persons with a lowered T cell count.

INFECTION: The state or condition in which the body (or part of the body) is invaded by an infectious agent (e.g., a bacterium, fungus, or virus), which multiplies and produces an injurious effect (active infection). As related to HIV: Infection typically begins when HIV encounters a CD4+ cell. The HIV surface protein gp120 binds tightly to the CD4 molecule on the cell's surface. The membranes of the virus and the cell fuse, a process governed by gp41, another surface protein. The viral core, containing HIV's RNA, proteins, and enzymes, is released into the cell.

INTERACTION: See Drug-Drug Interaction.

INTRAUTERINE GROWTH RESTRICTION (IUGR): A fetus whose estimated weight is below the tenth percentile for its gestational age and whose abdominal circumference is below the 2.5th percentile.

LESION: A general term to describe an area of altered tissue (e.g., the infected patch or sore in a skin disease). Nipple lesions can increase the chances of HIV transmission from infected mother to child during breastfeeding.

LIPID: Any of a group of fats and fatlike compounds, including sterols, fatty acids, and many other substances.

LIPODYSTROPHY: A disturbance in the way the body produces, uses, and distributes fat. Lipodystrophy is also referred to as buffalo hump, protease paunch, or Crixivan potbelly. In HIV disease, lipodystrophy has come to refer to a group of symptoms that seem to be related to the use of protease inhibitor and NRTI drugs. How protease inhibitors and NRTIs may cause or trigger lipodystrophy is not yet known. Lipodystrophy symptoms involve the loss of the thin layer of fat under the skin, making veins seem to protrude; wasting of the face and limbs; and the accumulation of fat on the abdomen (both under the skin and within the abdominal cavity) or between the shoulder blades. Women may also experience narrowing of the hips and enlargement of the breasts. Hyperlipidemia and insulin resistance are frequently associated with lipodystrophy. Also called lipodystrophy syndrome, pseudo-Cushing's syndrome.

LOW BIRTH WEIGHT (LBW): Infant birth weight of under 2,500 g. A sensitive measure of mother's health and nutrition during pregnancy and before. The lower an infant's birth weight below 2,500 g., the greater the infant's vulnerability to infections and other problems and the greater the risk of sickness and death.

MALABSORPTION SYNDROME: Decreased intestinal absorption resulting in loss of appetite, muscle pain, and weight loss. See AIDS Wasting Syndrome.

MALARIA: An infective disease caused by sporozoan parasites that are transmitted through the bite of an infected Anopheles mosquito; marked by paroxysms of chills and fever.

MASTITIS: An infection of the breast. It usually only occurs in women who are breastfeeding their babies. In the process, unaccustomed to the vigorous pull and tug of the infant's suck, the nipples may become sore, cracked, or slightly abraded. This creates a tiny opening in the breast, through which bacteria can enter. The presence of milk, with high sugar content, gives the bacteria an excellent source of nutrition. Under these conditions, the bacteria are able to multiply, until they are plentiful enough to cause an infection within the breast. Mastitis usually begins more than two to four weeks after delivery of the baby. Mastitis may increase the chances of HIV transmission from infected mother to child during breastfeeding.

METABOLISM: The chemical changes in living cells by which energy is provided for vital processes and activities and new material is assimilated.

MORBIDITY: The condition of being diseased or sick; also the incidence of disease or rate of sickness.

NAUSEA: A stomach distress with distaste for food and an urge to vomit.

NON-NUCLEOSIDE REVERSE TRANSCRIPTASE INHIBITORS (NNRTI): A group of structurally diverse compounds that bind to the catalytic site

of HIV-1's reverse transcriptase. They are quite specific; unlike the nucleoside reverse transcriptase inhibitors, the NNRTIs have no activity against HIV-2. As noncompetitive inhibitors of reverse transcriptase, their antiviral activity is additive or synergistic with most other antiretroviral agents. However drug-drug interactions may dictate dosage adjustments with protease inhibitors.

NUCLEOSIDE REVERSE TRANSCRIPTASE INHIBITOR (NRTI): A nucleoside analog antiretroviral drug whose chemical structure constitutes a modified version of a natural nucleoside. These compounds suppress replication of retroviruses by interfering with the reverse transcriptase enzyme. The nucleoside analogs cause premature termination of the proviral (viral precursor) DNA chain. All NRTIs require phosphorylation in the host's cells prior to their incorporation into the viral DNA.

OPPORTUNISTIC INFECTIONS: Illnesses caused by various organisms, some of which usually do not cause disease in persons with normal immune systems. Persons living with advanced HIV infection suffer opportunistic infections of the lungs, brain, eyes, and other organs. Opportunistic infections common in persons diagnosed with AIDS include *Pneumocystis carinii* pneumonia; Kaposi's Sarcoma; cryptosporidiosis; histoplasmosis; other parasitic, viral, and fungal infections; and some types of cancers.

ORAL REHYDRATION SALTS (ORS): Carbohydrate and electrolytes combination used to treat or prevent dehydration that may occur with severe diarrhea, especially in babies and young children. Although this medicine does not immediately stop the diarrhea, it replaces the water and some important salts (electrolytes), such as sodium and potassium, that are lost from the body during diarrhea, and helps prevent more serious problems.

OSTEOPOROSIS: The loss of bony tissue, resulting in bones that become brittle and liable to fracture. Infection, injury and synovitis (inflammation of the membrane surrounding a joint), as well as prolonged exposure to microgravity, can cause osteoporosis.

PALLIATIVE: A treatment that provides symptomatic relief but not a cure.

PALLIATIVE CARE: Palliative care is an approach to life-threatening chronic illnesses, especially at the end of life. Palliative care combines active and compassionate therapies to comfort and support patients and their families who are living with life-ending illness. Palliative care strives to meet physical needs through pain relief and maintaining quality of life while emphasizing the patient's and family's rights to participate in informed discussion and to make choices. This patient- and family-centered approach uses the skills of interdisciplinary team members to provide a comprehensive continuum of care including spiritual and emotional needs.

PERIPHERAL NEUROPATHY: Condition characterized by sensory loss, pain, muscle weakness, and wasting of muscle in the hands or legs and feet. It may start with burning or tingling sensations or numbness in the toes and fingers. In severe cases, paralysis may result. Peripheral neuropathy may arise from an HIV-related condition or be the side effect of certain drugs, some of the nucleoside analogs in particular.

PLACENTA: The vascular organ that unites the fetus to the maternal uterus and mediates its metabolic exchanges through a more or less intimate association of uterine mucosal with chorionic and usually allantoic tissues. During pregnancy, HIV can be passed from the mother to the fetus through the placenta.

PLUMPYNUT®: An energy-dense peanut paste RUTF produced and distributed by the French company Nutriset.

PNEUMONIA (PNEUMOCYSTIS CARINII PNEUMONIA): An infection of the lungs caused by *Pneumocystis carinii*, which is thought to be a protozoa but may be more closely related to a fungus. *P. carinii* grows rapidly in the lungs of persons with AIDS and is a frequent AIDS-related cause of death. *P. carinii* infection sometimes may occur elsewhere in the body (skin, eye, spleen, liver, or heart).

POLYMERASE CHAIN REACTION (PCR): A laboratory process that selects a DNA segment from a mixture of DNA chains and rapidly replicates it to create a large, readily analyzed sample of a piece of DNA. As related to HIV: a sensitive laboratory technique that can detect and quantify HIV in a person's blood or lymph nodes (also called RT-PCR). It is an FDA-approved test to measure viral load.

PROTEASE: An enzyme that breaks down proteins into their component peptides. HIV's protease enzyme breaks apart long strands of viral protein into the separate proteins making up the viral core. The enzyme acts as new virus particles are budding off a cell membrane. Protease is the first HIV protein whose three-dimensional structure has been characterized.

PROTEASE INHIBITORS (PI): Antiviral drugs that act by inhibiting the virus' protease enzyme, thereby preventing viral replication. Specifically, these drugs block the protease enzyme from breaking apart long strands of viral proteins to make the smaller, active HIV proteins that comprise the virion. If the larger HIV proteins are not broken apart, they cannot assemble themselves into new functional HIV particles.

PLWHA: Person living with HIV/AIDS.

READY-TO-USE THERAPEUTIC FOOD (RUTF): Solid or paste food product designed for the treatment of severe acute malnutrition and nutritionally equivalent to the milk-based liquid therapeutic product, which is widely used for the inpatient management of severe and moderate malnutrition during the rehabilitation phase of treatment for infants and children. RUTF is effective in promoting rapid weight gain in malnourished children.

REPLACEMENT FEEDING: See Breast Milk Substitute.

RESISTANCE: Reduction in a pathogen's sensitivity to a particular drug. Resistance is thought to result usually from a genetic mutation. In HIV, such mutations can change the structure of viral enzymes and proteins so that an antiviral drug can no longer bind

with them as well as it used to. Resistance detected by searching a pathogen's genetic makeup for mutations thought to confer lower susceptibility is called "genotypic resistance." Resistance that is found by successfully growing laboratory cultures of the pathogen in the presence of a drug is called "phenotypic resistance."

RETROVIRUS: A type of virus that, when not infecting a cell, stores its genetic information on a single-stranded RNA molecule instead of the more usual double-stranded DNA. HIV is an example of a retrovirus. After a retrovirus penetrates a cell, it constructs a DNA version of its genes using a special enzyme called reverse transcriptase. This DNA then becomes part of the cell's genetic material.

SECONDARY INFECTION: An infection that occurs during or after treatment of a primary infection. It may result from the treatment itself or from alterations in the immune system.

SEROCONVERSION: The development of antibodies to a particular antigen. When people develop antibodies to HIV, they seroconvert from antibody-negative to antibody-positive. It may take from as little as 1 week to several months or more after infection with HIV for antibodies to the virus to develop. After antibodies to HIV appear in the blood, a person should test positive on antibody tests.

SEXUALLY TRANSMITTED DISEASE (STD): Also called venereal disease (VD) (an older public health term) or sexually transmitted infections (STIs). Sexually transmitted diseases are infections spread by the transfer of organisms from person to person during sexual contact. In addition to the "traditional" STDs (syphilis and gonorrhea), the spectrum of STDs now includes HIV infection, which causes AIDS; Chlamydia trachomatis infections; human papilloma virus (HPV) infection; genital herpes; chancroid; genital mycoplasmas; hepatitis B; trichomoniasis; enteric infections; and ectoparasitic diseases (i.e., diseases caused by organisms that live on the outside of the host's body). The complexity and scope of

STDs have increased dramatically since the 1980s; more than 20 micro-organisms and syndromes are now recognized as belonging in this category.

THREE-DRUG THERAPY: A combination of the drugs efavirenz, lamivudine, and zidovudine (AZT).

TRANSMISSION: In the context of HIV disease: HIV is spread most commonly by sexual contact with an infected partner. The virus can enter the body through the mucosal lining of the vagina, vulva, penis, rectum, or, rarely, the mouth during sex. The likelihood of transmission is increased by factors that may damage these linings, especially other sexually transmitted diseases that cause ulcers or inflammation. HIV also is spread through contact with infected blood, most often by the sharing of drug needles or syringes contaminated with minute quantities of blood containing the virus. Children can contract HIV from their infected mothers during either pregnancy or birth, or postnatally, through breast-feeding. In developed countries, HIV is now rarely transmitted by transfusion of blood or blood products because of screening measures.

TUBERCULOSIS (TB): A bacterial infection caused by *Mycobacterium tuberculosis*. TB bacteria are spread by airborne droplets expelled from the lungs when a person with active TB coughs, sneezes, or speaks. Exposure to these droplets can lead to infection in the air sacs of the lungs. The immune defenses of healthy people usually prevent TB infection from spreading beyond a very small area of the lungs. If the body's immune system is impaired because of HIV infection, aging, malnutrition, or other factors, the TB bacterium may begin to spread more widely in the lungs or to other tissues. TB is seen with increasing frequency among HIV-infected persons. Most cases of TB occur in the lungs (pulmonary TB). However, the disease may also occur in the larynx, lymph nodes, brain, kidneys, or bones (extrapulmonary TB). Extrapulmonary TB infections are more common among persons living with HIV.

VIRAL BURDEN: The amount of HIV in the circulating blood. Monitoring a person's viral burden is important because of the apparent correlation between the amount of virus in the blood and the severity of the disease: sicker patients generally have more virus than those with less advanced disease. A new, sensitive, rapid test—called the viral load assay for HIV-1 infection—can be used to monitor the HIV viral burden. This procedure may help clinicians to decide when to give anti-HIV therapy or to switch drugs. It may also help investigators determine more quickly if experimental HIV therapies are effective.

VIRAL LOAD TEST: In relation to HIV: Test that measures the quantity of HIV RNA in the blood. Results are expressed as the number of copies per milliliter of blood plasma. Research indicates that viral load is a better predictor of the risk of HIV disease progression than the CD4 count. The lower the viral load, the longer the time to AIDS diagnosis and the longer the survival time. Viral load testing for HIV infection is being used to determine when to initiate and/or change therapy.

VIRAL REPLICATION: There are generally six steps that take place in viral replication. Adsorption (attachment to the host cell), penetration, uncoating, genome replication (viral synthesis), maturation, and release.

WASTING SYNDROME: See AIDS Wasting Syndrome.

YEAST INFECTION: See Candidiasis.