Nutrition and HIV/AIDS

A Training Manual for Nurses and Midwives

August 2008

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To request copies of this manual, contact:

East, Central and Southern African Health Community (ECSA)
157 Olorien, Njiro Road
P.O. Box 1009
Arusha, United Republic of Tanzania
Tel: +255-27-2508363, 2504105/6
Fax +255-27-2504124, 2508292
Email: nutrition@ecsa.or.tz
Website: www.ecsa.or.tz

Or download the manual from www.crhcs.org.tz or www.fantaproject.org.

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East, Central and Southern African Health Community

FOOD AND NUTRITION TECHNICAL ASSISTANCE

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Africa's Health in 2010

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This training manual is the product of a partnership among numerous institutions and individuals. The authors (in alphabetical order) are Tony Castleman (FANTA/AED), Craig Jaggers (FANTA/AED*), Dorcas Lwanga (Africa's Health in 2010/AED), Stephanie Martin (LINKAGES/AED*), Sandra Remancus (FANTA/AED), Eleonore Seumo (AED), and Mofota Shomari (ECSA-CH).

Technical input was provided by (in alphabetical order) Inam Chitsike (WHO), Boitshepo Giyose (ECSA-CH*), Fred Grant (FANTA/AED), Sarah Kibuka (ECSA-CH*), Sabas Kimboka (Tanzania Food and Nutrition Commission), Joyce Kinabo (Sokoine University), Olive Munjanja (ECSA-CH*), Robert Mwadime (FANTA/AED), and Savitha Subramanian (FANTA/AED*).

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* Formerly with the project

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Abbreviations and Acronyms

ACC	Administrative Committee on Coordination
AFASS	Acceptable, feasible, affordable, sustainable, and safe
AIDS	Acquired immune deficiency syndrome
ANC	Antenatal care
ART	Antiretroviral therapy
ARV	Antiretroviral drug
BMI	Body mass index
BMR	Basal metabolic rate
CDC	Centers for Disease Control and Prevention
ECSA-HC	East, Central and Southern African Health Community
EIA	Enzyme immune assay
ELISA	Enzyme linked immunosorbent assay
FANTA	Food and Nutrition Technical Assistance Project
FAO	Food and Agriculture Organization of the United Nations
HAART	Highly active antiretroviral therapy
HIV	Human immunodeficiency virus
IATT	Interagency Task Force
IDD	Iodine deficiency disorder
IMR	Infant mortality rate
LBW	Low birth weight
MUAC	Mid-upper arm circumference
MTCT	Mother-to-child transmission of HIV
NRTI	Nucleoside reverse transcriptase inhibitor
NNRTI	Neo-nucleoside reverse transcriptase inhibitor
OI	Opportunistic infection
PCR	Polymerase chain reaction
PEM	Protein energy malnutrition
PLHIV	People living with HIV
PMTCT	Prevention of mother-to-child transmission of HIV
PI	Protease inhibitor
RCQHC	Regional Centre for Quality of Health Care
RDA	Recommended daily allowance
ROI	Reactive oxygen intermediate
STI	Sexually transmitted infection
UNAIDS	Joint United Nations Program on HIV/AIDS
UNGASS	United Nations General Assembly Special Session
UNICEF	United Nations Children's Fund
UNU	United Nations University
USAID	United States Agency for International Development
VAD	Vitamin A deficiency
VCT	Voluntary counseling and testing

Introduction

Many people living with HIV (PLHIV) in Africa report that food is their most urgent need. Even among populations in the region not affected by HIV, food insecurity and malnutrition are common. HIV worsens the situation through a vicious cycle in which HIV causes or exacerbates malnutrition and food insecurity, and malnutrition and food insecurity limit capacity to cope with the disease and its impacts.

Nutrition interventions can help break this cycle by strengthening immune response, promoting response to treatment, supporting management of symptoms, and improving functioning and quality of life. Nutrition interventions are therefore a critical component of comprehensive HIV care and treatment. USAID/East Africa has worked with the Regional Centre for Quality of Health Care (RCQHC), the East, Central and Southern African Health Community (ECSA-HC), the Food and Nutrition Technical Assistance (FANTA) Project, the LINKAGES Project, and the Africa's Health in 2010 Project to strengthen the capacity of health care providers in sub-Saharan Africa to integrate nutrition interventions into HIV care and treatment services.

As front-line care providers, nurses play a critical role in HIV care and often have regular opportunities to provide counseling and other support to PLHIV. Equipping nurses with nutrition and HIV knowledge and skills enables them to provide effective nutrition care and support, but nursing school curricula in the region include limited information on this subject. This training manual is designed to address that gap by providing materials for nursing school instructors to use to equip nursing students with knowledge of nutrition and HIV and skills to provide nutrition care and support to PLHIV.

The manual is based on *Nutrition and HIV/AIDS: A Training Manual* (2003), developed by RCQHC, FANTA, and LINKAGES with funding from USAID/East Africa and used by medical schools, nutrition departments, ministries of health, and others for pre-service and in-service training of health care providers. This manual updates the 2003 manual with recent evidence and approaches and includes additional sessions and information relevant to nurses, such as nutrition care for people nurses support at various contact points.

Purpose. The purpose of the manual is to support nursing instructors and trainers in training nursing students to provide effective nutrition care and support to PLHIV. To achieve this purpose, the manual includes a range of training materials with extensive information on nutrition and HIV topics.

Audience. The primary users of the manual will be nursing school instructors, although others, including in-service trainers of nurses and other health care providers, may also use the manual as a reference and training guide. Users of the manual are expected to have experience training adults, including using participatory training techniques; basic knowledge of nutrition, HIV, food security, and maternal and child health; and familiarity with the health care systems where nurses work.

Use. The manual is designed to be incorporated into existing pre-service nurse training curricula, but it can also be used for in-service training of nurses or other health care providers. Each session contains lecture notes with detailed information about the session's topic; a presentation that can be used as a PowerPoint, as overhead slides, or as handouts; exercises, case studies, and/or role plays for students; handouts for students; and references and suggested reading materials.

Depending on time availability and relevance, instructors can use all of the sessions or select individual sessions that are most relevant. Sessions can be incorporated into a larger curriculum throughout a course or taught together in sequence.

Organization. The twelve sessions are organized into three parts. Part I includes three introductory sessions with basic information about HIV and nutrition and the links between the two. Part II aims to build the technical knowledge of nurses in nutrition management of symptoms, nutrition implications of HIV therapy, infant feeding and prevention of mother-to-child transmission, and food security constraints to nutrition care and support. Part III provides guidance on nutrition care for different clients living with HIV. Because nurses see different types of patients at different contact points, these sessions are organized based on a life cycle approach, with separate information on caring for adults, pregnant and lactating women, infants and young children, children 2–9 years old, and adolescents living with HIV.

Part I. Background Information

SESSION 1. THE BASICS OF HIV and AIDS

Purpose (slide 2)

This session provides nursing and midwifery students with basic information about HIV and AIDS—the causes, transmission routes, stages of progression, clinical management and associated challenges.

Learning objectives (slide 3)

By the end of the session, students will be able to:

- Discuss the scale of HIV and AIDS globally and in their countries.
- Outline the cause, transmission, and disease progression of HIV.
- List factors that affect the risk of transmission of HIV and increase vulnerability to HIV infection.
- Outline the stages of HIV and the diseases and complications at each stage.
- Discuss strategies for caring for and supporting people living with HIV and the challenges faced in managing HIV.

NB. This topic should be updated regularly as the epidemic changes and new findings emerge.

Prerequisite knowledge

- Basic science (biology and physiology)

Estimated time: 100 minutes

Session guide (slide 4)

Content	Methodology	Activities	Estimated time (minutes)
Magnitude, prevalence, and trends of HIV in Africa	Participatory lecture	Ask students to brainstorm the meaning of HIV and AIDS and summarize trends in the region.	10
Definitions of HIV and AIDS	Participatory lecture	Explain the meaning of HIV and AIDS.	5
Modes of HIV transmission and related factors	Participatory lecture	Summarize the modes of HIV transmission.	10
Factors affecting HIV transmission	Participatory lecture	Discuss factors that affect susceptibility to HIV transmission.	10
Phases of HIV infection	Participatory lecture	Summarize the phases of infection.	10
Disease recognition and testing	Participatory lecture	List and describe common testing methods.	5
Treatment of HIV and AIDS	Participatory lecture	Present information on antiretroviral therapy (ART) and treatment of opportunistic infections (OIs in the region.	10
Impact of HIV on demographic patterns, food security, health, and education in Africa	Participatory lecture	Briefly summarize the impact of HIV.	10
Comprehensive package of HIV programs	Participatory lecture	Summarize the components of HIV and AIDS programs.	15
Challenges of managing HIV and AIDS	Participatory lecture	Summarize the challenges in addressing HIV and AIDS in the region.	10
Discussion points	Group discussion	Facilitate large group discussion.	15
Conclusions			5
Review			5
Total time			120

Required materials

- Flipchart stand and paper
- Writing pens
- Board and chalk or markers
- LCD or overhead projector
- PowerPoint 1

Materials provided

- PowerPoint 1

Preparation

- Review PowerPoint 1 and Lecture Notes 1.
- Be familiar with the prevalence and epidemiology of HIV and AIDS (if possible, disaggregating the data by geographic area and by sex), and HIV activities in the country.
- Review Discussion Points 1 to identify questions to help students master the concepts.

Suggested reading

Family Health International. 2001. HIV/AIDS Prevention and Care in Resource-Constrained Settings: A Handbook for the Design and Management of Programs. Research Triangle Park, North Carolina, USA.

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Royce, R. A., A. Sena, W. Cates, and M. Cohen.1997. Sexual Transmission of HIV. *New England Journal of Medicine* 336(15):1072–78.

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Introduction

The global human immunodeficiency virus (HIV) pandemic killed approximately 2 million people in 2007, and an estimated 2.7 million people acquired HIV during this period. This brings the number of people living with HIV (PLHIV) around the world to approximately 33 million. The number increases each year and is expected to grow unless proven interventions are scaled up effectively and innovative approaches are applied.

Basic knowledge of HIV and its prevention has increased among young people in recent years. However, knowledge is still disturbingly low in many countries, especially among young women, suggesting that more intensive, focused education and behavior change efforts are needed.

What are HIV and AIDS? (slides 5 and 6)

HIV is the virus that causes AIDS.

- **H**uman (the virus infects human beings)
- **I**mmunodeficiency (the effect of the virus results in deficiency or failure of the body's immune system)
- **V**irus (the organism is a virus)

AIDS stands for acquired immunodeficiency syndrome and is the last stage of HIV infection.

- **A**cquired (the condition must be acquired by the person and is not a disease transmitted by the genes)
- **I**mmune (the disease affects the body's immune system, which is used to fight off germs such as bacteria and viruses)
- **D**eficiency (the disease keeps the immune system from functioning properly, generating a deficiency in the immune system)
- **S**yndrome (a person with HIV may experience a wide range of diseases and OIs when the immune system is deficient)

Definitions and scope (slide 6)

HIV was first identified in 1981, and the scale of the epidemic has increased steadily. By the end of 2007, between 30 and 36 million people were estimated to be living with HIV (UNAIDS 2008). This makes HIV one of the largest epidemics of the 20th century. The epidemic varies in scale and impact among continents, regions, and countries.

HIV and AIDS in Africa (slides 7–10)

Africa is the continent by far most affected by HIV and AIDS. Despite having just over 10 percent of the world's population, sub-Saharan Africa has 22 million of the 33 million PLHIV globally, and in 2007 had 1.5 million of the approximate 2 million deaths globally resulting from HIV and AIDS (UNAIDS 2008). At this rate, every minute two or three people die from AIDS in sub-Saharan Africa.

Approximately half of all HIV infections in the world are found among women. Moreover, evidence shows that women account for 59 percent of infections among adults in sub-Saharan Africa. Young women 15–24 years old bear the greatest burden of HIV: 3.2 percent are infected with HIV compared with 1.1 percent of men in the same age group (UNAIDS 2007; UNAIDS 2008).

The burden of HIV also has a profound impact on children. Approximately 2.5 million children under 15 years old are HIV infected, and 330,000 children died from AIDS in 2007. A growing number of children are orphaned by the death of a parent from AIDS. In sub-Saharan Africa approximately 11.6 million children have lost one or both parents to AIDS (UNAIDS 2007; UNAIDS 2008).

The disease (slide 11)

HIV, which causes AIDS, belongs to a class of viruses that attack and weaken the immune system. Over a long time, the virus reduces the body's ability to fend off diseases. In a healthy person, white blood cells replicate and are dispersed throughout the blood, producing antibodies and destroying harmful micro organisms. HIV alters these cells and reduces their ability to fight infection.

When HIV enters the body, it attaches itself to the white blood cells with the help of a surface protein called CD4. This protein plays an important role in determining HIV disease progression. HIV alters components of the cell, causing the destruction of these CD4 proteins. The virus reduces the white blood cells' ability to fight infection and replicates itself so that it can infect new cells. The immune system tries to fight the virus like any other infection, but over time, the repeated change in white blood cells and increasing quantities of HIV circulating in the body gradually weaken the immune system. The infected person becomes vulnerable to a variety of life-threatening illnesses and is said to have AIDS, which is characterized by signs and symptoms of severe immune deficiency.

HIV transmission (slide 12)

HIV can be transmitted from an infected person to another person through blood (including menstrual blood), semen, vaginal secretions, and breastmilk. Blood contains the highest concentration of the virus, followed closely by semen, followed by vaginal fluids. It is not enough to come into contact with HIV to become infected. HIV can enter the body only through an open cut or sore or contact with the mucous membranes in the genitals, anus, rectum, mouth, and eyes. HIV is NOT transmitted through the following:

- *Insect bites.* HIV is not transmitted by mosquitoes, flies, ticks, fleas, bees, or wasps. Blood-sucking insects do not transmit HIV, because the virus dies almost instantly in the stomachs of the insects. HIV can only survive in *human* cells.

- *Contact with saliva, tears, sweat, feces, and urine.* Although HIV may be present in sweat, tears, vomit, feces, and urine, there have been no reported cases of transmission from contact with these substances.

HIV is transmitted through three main routes: sexual, parenteral, and vertical. The risk of transmission varies by mode of transmission and context.

Sexual transmission

According to WHO, male to female sexual intercourse accounts for most HIV infections. However, sexual transmission of HIV may also occur from male to male and female to female. While the percentage of global HIV infections through sexual transmission is not clear, studies suggest this is the primary route of transmission (Schmid et al 2004).

It is difficult to assess the exact risk of transmitting HIV through sexual intercourse because many factors influence sexual transmission. The probability of male-to-female transmission of HIV-1 during unprotected sex ranges from 0.0005 to 0.003 during non-acute infection, but a study by Pilcher et al (2004) found that the higher viral load during acute infection among men between 20 and 54 days after infection increases the probability of male-to-female sexual transmission eight- tenfold. In general, the probability of transmission increases during anal intercourse and menstruation and when a person has a sexually transmitted infection (STI) or (if male) is uncircumcised (UNAIDS 2004).

Parenteral transmission

Parenteral transmission occurs when a person is exposed to HIV through means other than contact with mucous membranes, such as piercing the skin with contaminated objects. This form of transmission may occur through blood transfusion (the estimated risk of infection from a single unit of HIV-infected whole blood is over 90 percent) and the sharing of needles among infected intravenous or injecting drug users. Health workers have become infected with HIV through needle pricks. Risk of transmission by a needle that has been used on an HIV-infected patient is 0.3 percent (Schmid et al 2004).

Parenteral transmission is an important concept to understand because it can be reduced greatly through appropriate clinical precautions and guidelines. Unsafe medical practices such as improperly disposing of syringes or using them more than once, not testing all blood for transfusions, and inadequately containing blood-borne pathogens increase the chance of transmitting HIV from an infected person. Medical clinics and health staff should implement guidelines and take precautions to protect both health workers and patients from HIV infection.

Vertical transmission

Vertical (perinatal) transmission occurs when a mother passes HIV to her infant in utero, during labor and delivery, and/or through breastfeeding. In sub-Saharan Africa the risk of this means of transmission ranges between 10 percent and 30 percent. Sessions 6 and 10 provide further information about vertical/perinatal HIV transmission

Factors facilitating HIV transmission

Vulnerability to HIV and AIDS seems to depend on several factors. Physical factors such as the type of HIV, the health of the host, hereditary resistance, and stage of infection play a role in HIV transmission. Society and culture also influence susceptibility to HIV significantly. All these factors must be taken into consideration for prevention and treatment of HIV.

Physical factors (slide 13)

Nine physical factors have been identified as affecting HIV transmission.

1. Viral factors

Evidence suggests that the properties of HIV influence transmission. The two known types of HIV are HIV-1 and HIV-2. Both are transmitted by sexual contact, through blood, and vertically from mother to child. Both cause the same clinical AIDS.

HIV-1, the most common type worldwide, is divided into several groups and sub-types, which may differ by geography. The most common sub-types in Africa are A, C, O, and E. While differences in the efficacy of transmission between the various groups and sub-types of HIV-1 have been identified, the implications of these differences for medical practice are not yet documented (Duer et al 2000; Kunanusont et al 1995; Soto Ramirez et al 1996). HIV-2 is mainly found in West Africa. Evidence suggests that this type is less transmissible, especially vertically, and is associated with a lower viral load and a slower rate of clinical disease progression.

In addition to viral properties, evidence suggests that greater concentration of HIV in the blood is correlated with increased transmission by all routes (Busch et al 1996; Gray et al 2001; Pao et al 2005; Quinn et al 1993; St Louis et al 1993).

2. Host factors

A person's physical condition, including the presence of an STI, may affect the likelihood of HIV transmission. As mentioned before, viral entry into the white blood cells causes HIV infection. When a person has an illness, inflammation, or immune activation, the normal production of white blood cells may change, increasing the number of susceptible target cells or the receptivity of those cells to HIV. The presence of an STI or reproductive tract infection is strongly associated with susceptibility to HIV. Chlamydia, gonorrhea, and trichomoniasis infections are associated with a 60 percent relative increase in HIV prevalence in men and 40 percent in women (Royce et al 1997). Cytomegalovirus infection, gonorrhea, and seminal urethritis are also associated with increased detection of HIV in semen (Ibid). Studies have shown that treating urethritis diminishes the detection of HIV in the urethra and the excretion of HIV in semen (Cohen et al 1997).

Circumcised men have a significantly lower risk of HIV infection. Randomized clinical trials in Kenya, South Africa, and Uganda have indicated that circumcision reduces the risk of infection among men by 50 to 75 percent (Auvert et al 2005; Bailey et al 2007; Gray et al 2007).

Other STIs may cause microscopic erosions that give HIV direct access to the bloodstream. Ulcerative genital tract diseases are associated with a much higher susceptibility to HIV than non-ulcerative genital tract infections.

3. Stages of infection

The likelihood of HIV transmission is very high during the acute and late stages of infection. During more advanced stages of AIDS, HIV concentration in the blood increases, and CD4 count decreases (Royce et al 1997). Studies have shown that the viral level in semen at this stage of AIDS is similar to the elevated levels in the blood, increasing the risk of transmission. In fact, evidence suggests that at peak viral levels, the risk of transmitting HIV through heterosexual sex increases 8 to 10 times (Pilcher 2004). Increased infectivity is also associated with acute or primary infection, the stage between exposure to HIV and appearance of HIV antibodies.

4. Resistance to HIV

The results of recent studies suggest that some people have innate or acquired resistance to HIV infection. Some sex workers in Nairobi, Kenya, have been found to stay uninfected despite repeated unprotected sex with HIV-infected clients. This resistance is attributed to a variant cell type and the production of specific antibodies against HIV (Fowke et al 1996; Hoffman et al 1997; Kau et al 1999).

5. Social and demographic factors (slide 14)

Some population groups may be more vulnerable to HIV infection than others because of social norms that affect sexual practices, including patterns of sexual partnering, contraceptive choices, and the use of substances that lower sexual inhibitions.

6. Views about women

In many cultures women and men are not seen or treated equally. As a result, women often have limited choices in sexual relationships, are subjected to sexual violence, or are pressured to trade sex for food, increasing their vulnerability to infection. A significant problem for women engaged in sexual activities is limited control over using methods to help prevent transmission such as contraceptives, because men often determine the conditions for sex. Traditional perceptions about sexuality and STIs and the lack or late presentation of STI symptoms in women also decrease the likelihood that women will seek treatment when they are infected. This increases women's vulnerability to the impacts of HIV.

7. Youth

Young people are more vulnerable to HIV than adults because of unclear perceptions about what constitutes risky behavior and insufficient knowledge and incorrect information about sex, sexuality, and sexual health. This vulnerability is further complicated by traditional beliefs about what should be discussed and practiced during this stage of life. Such beliefs can limit the availability of correct information and increase susceptibility to infection. Moreover, traditional initiation ceremonies in some cultures may promote early engagement in sex as part of the sexual maturation process.

8. Transience and mobility

Some demographic factors, especially those that increase mobility, may affect the average rate of sex partner change, which in turn may affect HIV transmission rates.

Vulnerable groups include people on the move in emergency situations when their basic security of life is threatened, occupational groups who leave their homes and families for extended periods, and street children. As these people move from place to place, the potential for spreading HIV to new areas increases.

9. Established HIV presence

The length of time HIV has been present in a community may affect the probability of exposure. The number of people with HIV in different geographic areas may affect awareness, which influences both individual behavior and social response. The risk of new HIV cases can be described as a combination of how long people with HIV have been infected, how many sexual partners people have, and the efficiency of transmission (Anderson and May 1991).

Phases of HIV infection (slide 15)

Once infected with HIV, a person rapidly becomes infectious and can transmit the virus to other people within a short time. This person will be infectious for the rest of his or her life, even if he or she does not show signs or symptoms of disease or look sick. Generally HIV disease has four phases: the acute phase, the asymptomatic phase, the symptomatic phase, and the late symptomatic phase (also referred to as full-blown AIDS).

1. **Acute phase** (initial infection)

As soon as HIV enters the body, it replicates quickly. This rapid replication needs energy from the host's body. The virus relies entirely on the host for survival and will deplete the host of whatever it needs to multiply and survive. HIV infection may have a rapid onset, leading to hypermetabolism with catabolism. Although some infected people may not have any symptoms at this stage, the host's energy and nutrient requirements increase significantly, and food intake should increase accordingly. This period varies from 1 to 6 weeks.

Seroconversion

After the first 6 weeks (sometimes up to 12 weeks), levels of the virus decrease, and the body produces antibodies to fight it. This is known as seroconversion. The body needs additional energy and begins to use its fat stores and muscle. Muscle is used to repair the cellular and tissue damage. If the additional energy and nutrients used are not replaced, the host loses weight and can gradually develop undernutrition that weakens the immune system and makes the body vulnerable to OIs

2. **Asymptomatic phase**

This phase is the period of time between initial infection and the onset of signs and symptoms associated with AIDS. The length of the asymptomatic phase varies from person to person and may reach several years, depending on the health and nutritional status of the host. Even though there are no symptoms present during this phase, the asymptomatic phase is marked by hypermetabolism and increased energy needs.

3. **Symptomatic phase**

The onset of OIs, a sign of a weakened immune system, is the beginning of the symptomatic phase of AIDS. The HIV-infected person presents symptoms which may include fever, night sweats, tuberculosis, fungal infection of the mouth, chronic diarrhea, and weight loss. The body's response to infection can cause fever, which leads to increased energy expenditure, and anorexia, which decreases the intake of calories. The demand for additional nutrients combined with a loss of appetite exacerbates the problem of OIs and further weakens the immune system. The infections become more difficult to treat, and the person becomes more susceptible to new infections, speeding up the progression of the disease.

In addition to loss of appetite and added nutritional requirements, the onset of symptoms and OIs may cause malabsorption of nutrients, weight loss, and wasting. The persistence of these conditions leads to early immune failure and eventually to full-blown AIDS.

4. **Late symptomatic phase (full-blown AIDS)**

The late phase is marked by a heightened viral load and decreased CD4 count. People in this stage often experience intense metabolic alteration, weight loss, and wasting. Common infections during this phase include pneumonia, Kaposi's sarcoma, systemic fungal infection, bacterial infection, and cancer.

Disease recognition and testing (slides 16–18)

HIV is recognized primarily by testing for the presence of the antibodies formed to fight the virus. Other tests are available to determine presence of the virus itself, but they are very expensive and less common.

HIV antibody tests

HIV antibody tests include 1) blood tests, 2) urine tests, and 3) oral fluid tests.
The test results may be negative during the first 3 months after infection.

Two tests are recommended. If results are conflicting, a third confirmatory test, which is usually a more accurate type of test, is done. If the initial test is negative, it should be repeated 3 months after the initial testing because seroconversion may not have occurred for a recently infected person.

Pregnant women normally pass on antibodies to their infants. As a result, an infant born to an HIV-infected mother might test positive for HIV antibodies without being infected.

1. **Blood tests**

Enzyme immune assay (EIA) and enzyme linked immunosorbent assay (ELISA) are currently the most common, cost-effective, and accurate methods of testing for HIV infection. Confirmation of HIV requires two consecutive positive tests.

Western blot is considered the gold standard for validation of HIV. Three ELISA tests would be needed to have the accuracy of one Western blot test.

Radioimmunobinding assay is an expensive test that is used when antibody levels are low.

Dot-blot immunobinding assay is an inexpensive, rapid blood test used for screening.

2. **Urine tests**

EIA or Western blot (see above) can be used to test for antibodies in the urine, but urine tests are not as sensitive as blood tests.

3. **Oral fluid (saliva) test**

EIA or Western blot (see above) can be used to test for antibodies in oral fluids.

Tests for HIV

The **polymerase chain reaction (PCR)** test measures HIV genetic information. This test is very useful for detecting infection during the acute stage and among children born to HIV-infected mothers.

WHO guidelines for diagnosis of AIDS among HIV-positive people

WHO specifies the following guidelines for diagnosis of AIDS:

Major signs

-
- Weight loss > 10 percent of body weight
- Fever for longer than 1 month
- Diarrhea for longer than 1 month

Minor signs

- Persistent cough for longer than 1 month
- General itchy skin disease
- Recurring shingles (herpes zoster)
- Thrush in the mouth and throat
- Long-lasting spreading and severe cold sores
- Long-lasting swelling of lymph glands
- Loss of memory
- Loss of intellectual capacity
- Peripheral nerve damage

Treatment of HIV and AIDS (slides 19–21)

At present there is no cure for HIV, but medications and therapies exist to treat OIs and slow progression of the disease. The most effective treatment for HIV is ART, which uses antiretroviral drugs (ARVs) to prevent OIs and slow progression of AIDS. ART has been shown to reduce morbidity and mortality from AIDS and to prevent OIs such as tuberculosis (Tawfik et al 2002).

ART prevents HIV from replicating as fast in the body and destroying the immune system as quickly. The drugs help delay the onset of AIDS and help prevent additional infections, increasing the opportunity for a longer, healthier life. Highly active antiretroviral therapy (HAART) combines multiple ARVs in the treatment regimen to enhance the effectiveness of the drugs.

Although ART has been shown to prevent additional infections and prolong life for PLHIV, several challenges are associated with these drugs. ARVs can be expensive and difficult for patients to afford without financial assistance or government or donor subsidies. Some patients may find it difficult to continue treatment because ARVs must be taken daily for the rest of a patient's life. This becomes more challenging if the patient develops uncomfortable side effects sometimes associated with ART. Unfortunately, failure to comply with drug regimens may make a person worse over time and could lead to drug resistance. Therefore, people who are willing to start and continue ART and people at risk of OIs are prioritized for ARVs (Tawfik et al 2002).

ART may also require additional training of health workers and additional capacity of health systems for the distribution of drugs, laboratory tests, counselling, and patient follow-up.

Prevention and treatment of OIs is an important component of care for PLHIV. As the immune system is weakened, the body is more susceptible to bacterial, fungal, and viral infections. In addition to ART (or even when ART is unavailable) medical services and drugs should be provided to treat individual OI including pneumonia, tuberculosis, encephalitis, and STIs (Benson et al 2004).

Proper nutrition is also needed for treating and caring for PLHIV. PLHIV often have increased nutritional requirements as their bodies try to fight off infection. Various ARV regimens and OIs may change eating habits or nutrient absorption, requiring an enhanced diet to maintain good health.

The impact of HIV

HIV affects mortality, food security, health, and education.

Demographic impact (slides 22–24)

Approximately 33 million people around the world were living with HIV by the end of 2007 (UNAIDS 2008). HIV is now the leading cause of death in sub-Saharan Africa and the fourth-largest global killer (UNDP 2004). In the worst affected countries, HIV has reduced life expectancy by more than 20 years (UNAIDS 2008). In southern Africa the average life expectancy has dropped below 50 years, the same level as in the 1950s (UNAIDS 2008). In countries heavily affected by HIV, the infection is the cause of over one-third of child deaths (UNAIDS 2008). In the seven sub-Saharan African countries hardest hit by HIV, under-five mortality has increased by 36 percent as a result of the disease (WHO 2004)

Impact on food security (slide 25)

HIV is a significant threat to food security. The illness and death of productive household members may reduce access to food. A study in Tanzania found that per capita food

consumption decreased by 15 percent after the death of an adult in the poorest households (FAO 2001).

HIV also causes farmers to reduce agricultural work or even abandon farms. With fewer people, households farm smaller plots of land or resort to less labor-intensive subsistence crops, which often have lower nutritional or market value. Session 7 provides more information about HIV and food security.

Impact on the health sector (slide 26)

Health expenditure per capita in sub-Saharan Africa is generally low, and the demands of HIV further strain already over-stretched health budgets and systems. The impact varies depending on the level of services, the number of people who seek the services, the nature of the demand, and the capacity to deliver care. During early HIV infection, the demand is mostly for primary care and outpatient services. As the infection progresses to AIDS, demand for hospitalization increases. In some cases shortages of beds may lead to admission of HIV patients only at the later stage of the disease.

Besides the increased demand for hospitalization, the increased patient load and the toll the epidemic takes on health workers lead to staff shortages and burnout. The complex nature of some of the OIs associated with HIV demands more time and money to diagnose and investigate cases. The demand for specialized services such as counselling also increases.

Impact on the education sector (slide 27)

A decline in school enrolment is one of the most visible effects of HIV. Research from South Africa showed a 20 percent drop in enrolment in the first year of primary school in parts of KwaZulu Natal Province between 1998 and 2001 (UNAIDS 2002). In the Central African Republic and Swaziland, school enrolment is reported to have fallen by 20–36 percent because of AIDS, with girls the most affected (2002). The following factors contribute to declines in school enrolment:

- Removal of children from school to care for parents and family members
- Inability to afford school fees and other expenses
- AIDS-related infertility and a decline in the birth rate
- Infection of children who do not survive through the years of schooling

Illness or death of teachers reduces the capacity to deliver the basic social mandate of education. Several studies have shown the magnitude of this problem, citing the high prevalence of HIV-infected teachers in sub-Saharan Africa (World Bank 2002). Education budgets are further strained by the need to train new teachers to replace those lost to AIDS, which affect the funds available for materials and infrastructure needed to provide quality education.

Comprehensive package of HIV and AIDS interventions (slides 28–30)

Health professional, community members, and political, social, and cultural leaders should be engaged in developing a comprehensive package of interventions to address HIV. Such a package should include efforts to prevent infection, provide access to ART,

offer adequate care and support, mitigate the impact of HIV, reduce vulnerability to infection, and address cross-cutting issues such as participation and leadership.

Prevention

A strong focus on prevention is essential to reduce the spread and impact of HIV. Special attention has to be given to young people, because over 30 percent of PLHIV are under the age of 24. Efforts must also target vulnerable populations such as pregnant women and children. In addition, strategies should be developed to reach at-risk populations such as intravenous drug users and commercial sex workers. Prevention methods should include health and sex education to provide information and build life skills to reduce vulnerability; promoting the avoidance of multiple sexual partners and abstinence; providing access to female and male condoms; enhancing services for prevention of mother-to-child transmission of HIV (PMTCT); expanding access to circumcision; expanding demand and harm reduction programs for intravenous drug users; and increasing access to voluntary counseling and testing (VCT).

Treatment

Countries should make an Intensive effort to gain access to ARVs for PLHIV. International (e.g., WHO) and national guidelines should be used to provide ART to vulnerable populations with compromised immune systems. Treatment of OIs is also necessary. Patients who cannot afford to pay for medical services should be given other options. Governments should establish continuity of care and access to ARVs to ensure that patients continue treatment and ensure that PLHIV are properly nourished with appropriate foods.

Care and support

Prevention, treatment, and care and support for PLHIV should be linked to reverse the spread of the epidemic. Care and support strategies should clearly indicate the range of services to be provided and the standards to which they will adhere. In addition to the distribution of ARVs, interventions should include access to other health services and psychosocial support, management of symptoms and side effects, palliative care, counseling and care for orphans and vulnerable children (OVC), and promotion of nutritional programming. VCT is a vital component in this process because it is a point of entry for both prevention and care interventions. When done effectively, care and support interventions improve and prolong the lives of PLHIV, help overcome stigma and denial, and lead to better management of illnesses and OIs.

Mitigating the social and economic impact of HIV

HIV increases poverty and vulnerability, which in turn deplete social and individual capacity to respond to the epidemic. Strengthening the livelihoods and improving the food security of HIV-affected people are important ways to mitigate the impact of the epidemic. Special attention should be given to the growing number of OVC. Interventions should aim to give children access to basic education, health, and social services and regular monitoring of care, health, and well-being.

Reducing vulnerability to infection

The HIV epidemic is driven by forces of social and economic vulnerability that inhibit people's capacity to control their risk of infection. A comprehensive package of services should therefore include strategies to reduce vulnerability, particularly for women and girls, and people in conflict and other emergency situations. Such strategies include empowering people to combat poverty, hunger, and disease through education, life skills training, microfinance services, and legislative and policy measures to promote and protect basic human rights.

Cross-cutting issues

Key cross-cutting issues relevant to services addressing HIV include promoting the full participation of PLHIV in designing and implementing services and affirming and strengthening community capacity to respond to the epidemic. Strong leadership is needed from the national level to the community level. Personal commitments from political and civil society leaders are vital to promote national and local understanding and cooperation, reduce denial and stigma associated with HIV, and assure that resources are committed and stakeholders held accountable.

Challenges of managing HIV and AIDS (slide 31)

The global response to HIV/AIDS faces the following major challenges:

1. Political commitment is lacking at multiple levels of government, even in some of the most severely affected countries.

2. Global and national resources do not fund the full package of interventions required to address HIV, including access to ARVs by all who need them.

3. Human resources and health systems in many African countries do not have the capacity to meet the burden imposed by HIV. Governments cannot train and retain medical staff as quickly as needed, and weak health infrastructures cannot keep up with the demand for care.

4. Stigma and discrimination limit the impact of prevention and care interventions.

5. Scale-up of interventions to reach all vulnerable groups is limited by a lack of resources and the need to maintain quality. Many effective programs are still small and have been unable to reach large numbers of beneficiaries.

6. Lack of a vaccine remains a challenge. There is currently no cure for HIV and no effective preventive vaccine. Therefore, the best approach currently is to prevent new infections and treat and care for PLHIV.

Conclusions (slide 32)

HIV stands for human immunodeficiency virus. AIDS, the last stage of HIV infection, stands for acquired immune deficiency syndrome. Africa is the continent most affected by HIV. HIV attacks and weakens the immune system, reducing its ability to fight infection. HIV can be transmitted through blood, semen, vaginal secretions, and

breastmilk and can enter the body only through an open cut or sore or contact with mucous membranes. The three main routes of transmission are sexual, parenteral (i.e., through blood transfusion or contaminated needles), and vertical (mother to child). The risk of transmission varies by mode of transmission and context. Generally HIV has four phases: acute, asymptomatic, symptomatic, and late symptomatic (full-blown AIDS). HIV is recognized mainly by testing antibodies formed to fight the virus. There is no cure for HIV, but ART can prevent OIs and slow progression of AIDS. Various ARVs and OIs may change eating habits or nutrient absorption, requiring an enhanced diet.

HIV affects food security as well as health and education. A comprehensive package of HIV and AIDS interventions should include preventing infection, providing access to ART, offering adequate care and support, mitigating the impact of HIV, reducing vulnerability to infection, and address participation and leadership.

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Discussion points

1. What factors in your country are likely to influence transmission of HIV?

2. What factors in your country are likely to increase vulnerability to HIV infection and the impact of HIV?

3. Which HIV tests are known to be available and currently used in your country?

4. Discuss the main impact of the HIV epidemic on your country.

5. Which elements of a comprehensive HIV and AIDS package are most likely to affect the nutrition of people affected by or infected with HIV?

Session One:
Basics of HIV and AIDS

Purpose

Provide basic information about HIV and AIDS, including causes, transmission, progression, knowledge, and challenges.

2

Learning Objectives

- Know basic facts about the impact, trends, definition, and causes of HIV.
- Understand the factors that affect the risk of transmission and vulnerability to HIV infection
- Discuss strategies to prevent and treat HIV and AIDS and care for people with HIV (PLHIV).
- Describe the challenges of managing HIV and AIDS.

3

Session Outline

- Magnitude, prevalence, and trends of HIV in sub-Saharan Africa
- Definitions of HIV and AIDS
- Modes of HIV transmission and related factors
- Factors affecting HIV transmission
- Phases of HIV infection
- Disease recognition and testing
- Treatment of HIV and AIDS
- Impact of HIV on demographic patterns, food security, health, and education in Africa
- Comprehensive package of HIV programs
- Challenges of managing HIV and AIDS

4

What is HIV?

- Human immunodeficiency virus
- Responsible for causing AIDS

5

What is AIDS?

- Acquired immuno deficiency syndrome
- Characterized by signs and symptoms of severe immune deficiency
  - Weight loss of more than 10% of body weight
  - Diarrhea lasting longer than 1 month
  - Fever lasting longer than 1 month
  - Other signs

Source: WHO

6

Relevance to Public Health

- First recognized in 1981
- One of the largest epidemics of the 20th century
- Approximately 33 million people living with HIV by the end of 2007
- 2.7 million people infected with HIV in 2007

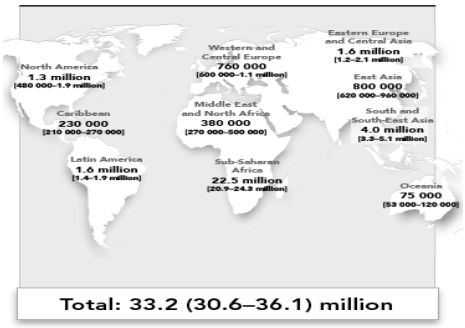
7

Global Summary of HIV, December 2007

- Number of people with HIV
  - Total: 33.2 million
  - Adults: 30.8 million
  - Women: 15.4 million
  - Children under 15: 2.5 million
- New infections in 2007
  - Adults: 2.2. million
  - Children: 370,000
- AIDS deaths in 2007
  - Total: 2.0 million
  - Adults: 1.7 million
  - Children: 330,000

8

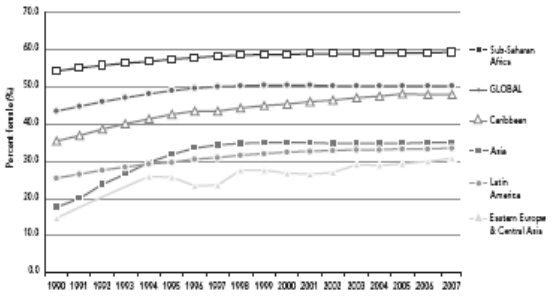
Adults and Children with HIV in 2007



Source: UNAIDS AIDS Epidemic Update 2007

9

Percentage of Adults with HIV Who are Women, 1990−2007



Source: UNAIDS 2008

10

Effects of the Virus

- Attacks white blood cells that fight infection in healthy people
- Changes the composition of white blood cells and enables HIV to replicate itself
- Weakens the immune system
- Increases vulnerability to life-threatening illnesses

11

Main Routes of HIV Transmission

Sexual

- Main mode of transmission
- Accounts for 70−80% of all HIV infections

Parenteral

- Blood transfusions (estimated risk from a single unit of HIV-infected whole blood is > 90%)
- Contaminated needle pricks
- Needle sharing among HIV-infected drug users

Vertical (perinatal)

- In utero, during labor and delivery, and through breastfeeding

12

Physical Factors Affecting Transmission and Vulnerability

Viral
- Strain of HIV
- Viral load

Host
- Presence of sexually transmitted infections
- Stage of infection
- Circumcision
- Hereditary resistance to HIV

13

Social and Demographic Factors in Transmission and Vulnerability

Social
- Views toward women
- Youth perceptions of sex and risky behavior

Demographic
- Mobile and vulnerable populations influencing frequency of sex partner change
- Established presence of HIV in the community

14

Phases of HIV Infection

Acute
- HIV replicates quickly
- Energy requirements increase

Asymptomatic
- No symptoms

Symptomatic
- Onset of opportunistic infections
- Further increase in nutritional requirements

Late symptomatic (full-blown AIDS)
- Heightened viral load
- Intense weight loss and wasting
- Opportunistic infections taking control

15

HIV Recognition and Testing

- May be negative during first 3 months after infection (window period)
- Two tests required plus a third to confirm if results conflict
- Repeated test recommended 3 months after initial test
- False positives very possible in children under 18 months old

16

Types of HIV Tests

Blood tests for antibodies against HIV
- Most common: Enzyme immune assay/enzyme-linked immunosorbent assay (ELISA)
- Gold standard: Western blot (more specific than ELISA and used as a confirmatory test)
- Radio-immunobinding assay (expensive, used as a confirmatory test when antibodies low)
- Dot-blot immunobinding assay (cost-effective rapid screening blood test)
- Polymerase chain reaction (PCR) (measures HIV genetic information)

17

Types of HIV Tests, Cont.

Urine tests
- Test for ant bodies in urine
- Not as sensitive as blood tests
- Enzyme immune assay (EIA)
- Western blot

Oral fluid tests
- Test for ant bodies in oral fluids
- EIA
- Western blot

18

Treatment of HIV and AIDS

- No cure
- Treatment can help slow progression to AIDS, reduce OIs, and minimize malnutrition.
- The most effective treatment is antiretroviral therapy (ART) using antiretroviral drugs (ARVs)

19

ART

- Combination of ARVs
- Proven to limit replication of HIV in the body, delay onset of AIDS, and prevent additional OIs
- Challenges
  - Expensive
  - Must be taken for the rest of the person's life
  - Uncomfortable side effects

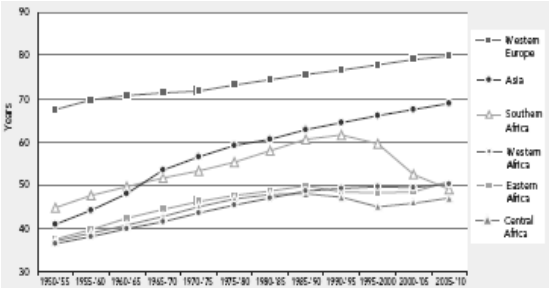
20

Demographic Impact of HIV and AIDS

- In the worst-affected countries, HIV has reduced life expectancy by over 20 years.
- In southern Africa, life expectancy has dropped below 50.
- In the worst affected countries, HIV causes over one-third of child deaths.
- In the seven countries hardest hit by HIV, under-five mortality has increased by 36%.

21

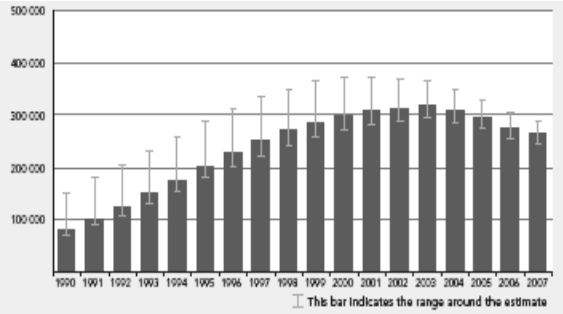
Life Expectancy in Selected Regions, 1950−2010



Source: UNAIDS 2008

22

Child Deaths from AIDS, 1990−2010



Source: UNA DS 2008

23

Impact of HIV on Food Security

- Decreased availability of food
  - Falling production
  - Loss of family labor, land, livestock, and other assets
- Decreased access to food
  - Low income

24

Impact of HIV on the Health Sector

- Straining of already meager health budgets
  - Overall public health spending less than US$10/person (UNAIDS)
- Heavy demands on health system
  - Increased need for medical supervision
  - Longer hospital stays
  - Health workers shortages and burnout

25

Impact of HIV on the Education Sector

- Declining school enrolment
- Illness and death of teachers
- Increased Cost of training new teachers to replace those lost to AIDS

26

Comprehensive Package of HIV and AIDS Programs

- Prevention
  - Health and sex education
  - Expansion of behavior change and harm reduction strategies
  - Increased access to VCT
  - PMTCT
- Treatment
  - Secure access to ARVs for PLHIV
  - Treatment of OIs
  - Proper nutrition

27

Comprehensive Package of HIV and AIDS Programs, Cont.

- Care and support
  - Synergy with prevention interventions
  - Health services
  - Psychosocial support
  - Management of ARV side effects
- Mitigation of social and economic impact
  - Care of OVC
  - Access to basic needs, rights, and general well-being

28

Comprehensive Package of HIV and AIDS Programs, Cont.

- Reduction of vulnerability
  - Services for women, girls, PLHIV, and people in war and conflict
  - Economic empowerment and life skills training
- Cross-cutting issues
  - Participation and acceptance of PLHIV
  - Strong leadership from community to national level

29

Strategies to Prevent and Control Undernutrition

- Improve household food security.
- Improve diversity of diet.
- Improve maternal nutrition and health care.
- Improve child feeding practices.
- Ensure child health care (immunization, medical care, growth monitoring).
- Provide nutrition rehabilitation.

30

Challenges

- Political commitment
- Funding
- Human resources in health system
- Discrimination against PLHIV
- Scale and quality of interventions
- Lack of vaccine

31

Conclusions

- HIV attacks and weakens the immune system, reducing its ability to fight infection.
- Main transmission routes are sexual, parenteral, vertical.
- The four phases of HIV disease are acute, asymptomatic, symptomatic, and full-blown AIDS.
- HIV is recognized mainly by testing antibodies formed to fight the virus.
- ART can prevent OIs and slow progression of AIDS.
- A comprehensive package of HIV and AIDS interventions should include infection prevention, ART, care and support, and mitigation of the impacts of HIV on food security, health, and education.

32

SESSION 2. THE BASICS OF NUTRITION

Purpose (slide 2)

The purpose of this session is to provide students with basic knowledge of nutrition. Concepts include the importance of nutrition for health, food sources of nutrients, the role of nutrients in the body, health disorders associated with inadequate nutrition, and nutrition interventions and strategies to combat undernutrition.

Learning objectives (slide 3)

By the end of the session, students will be able to:

- Explain the importance of good nutrition for health.
- Identify food sources of nutrients.
- Describe the role of nutrients in the body.
- Understand the causes and consequences of undernutrition,
- Describe national and regional strategies to combat undernutrition.

Prerequisite knowledge

- Basic science (biology, anatomy, physiology, and chemistry)

Estimated time: 125 minutes

Session guide (slide 4)

Content	Methodology	Activities	Estimated time (minutes)
Good nutrition and related terms and concepts	Participatory lecture	Discuss terms related to food and nutrition.	5
Essential nutrients: Macronutrients and micronutrients	Participatory lecture and group activity	Describe and define essential nutrients. Discuss which local foods contain specific essential nutrients.	15
Energy requirements for adults, adolescents, and children and infants	Participatory lecture and individual activity	Describe energy requirements and discuss requirements for different age groups. Complete Exercise 1 and discuss answers.	20
Protein requirements for adults, adolescents, and children and infants	Participatory lecture	Describe protein requirements for different age groups.	15
The causes of undernutrition and its impact on society	Participatory lecture	Describe undernutrition in Africa. Discuss students' understanding of undernutrition in their communities.	10
Protein energy malnutrition (PEM) and body mass index (BMI)	Participatory lecture and individual exercise	Describe PEM, its diagnosis, and strategies for prevention and control. Complete Exercise 2 and discuss answers.	15
Anemia, iron deficiency disorders (IDD), and vitamin A deficiency (VAD)	Participatory lecture and individual exercise	Causes, manifestations, and diagnosis of anemia, IDD, and VAD and strategies to control and prevent other nutrition-related conditions	15
Case studies	Exercise and group discussion	Ask students to complete Exercises 3–5 and discuss answers.	15
Conclusions			5
Review			5
Total time			120

Required materials

- Flipchart paper and stand
- Marker pens
- Blackboard and chalk or whiteboard and markers
- Erasers
- Overhead project and transparencies or LCD project and laptop

Materials provided

- PowerPoint 2
- **Handout 2.1. Macronutrient and Micronutrient Food Sources, Functions, and Manifestations of Deficiencies**
- **Handout 2.2. Nutrition Calculations**
- **Handout 2.3. Length/Height for Age and Weight for Age**
- **Handout 2.4. Body Mass Index Reference Table**

Preparation

- Review Lecture Notes and PowerPoint 2.
- Review handouts and identify questions to help students master the concepts.
- Collect samples or pictures of local foods.

Suggested reading

Food and Agriculture Organization of the United Nations (FAO) and World Health Organization (WHO). 1998. Human Vitamin and Mineral Requirements. Report of a Joint FAO/WHO Expert Consultation. Rome: FAO.

FAO, WHO, and United Nations University (UNU). 1985. Energy and Protein Requirements. Report of a Joint FAO/WHO/UNU Expert Consultation. WHO Technical Report Series No. 724. Geneva: WHO.

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Related terms

Balanced diet – The daily provision of a variety of foods which include all the nutrients in the right amounts and combinations required to meet the body's functional needs

Diet – The customary amount and kind of food and drink a person takes in day to day

Carbohydrates – The main sources of energy in the diet, referred to as energy-giving foods

Energy requirement – The amount of energy needed to maintain health and growth and support an individual level of physical activity

Lipids – Fat-soluble compounds high in energy that can be found in solid or liquid form

Macronutrients – Nutrients (carbohydrates, fats, and proteins) needed by the body in relatively large quantities, measured in grams per day

Malnutrition – A condition caused by inadequate or excess intake of nutrients

Meal – Food served or eaten at a given time during the day (e.g., breakfast, lunch, dinner)

Micronutrients – Nutrients (vitamins and minerals) needed by the body in very small quantities, usually less than 1 gram per day

Minerals – Inorganic compounds which must be obtained outside the body, required for chemical and metabolic functions

Nutrients – Substances or components of food which contain carbohydrates, proteins, fats (lipids), vitamins, minerals, and water

Nutrition – The sum of all processes involved in taking in food and the body's assimilation and use of the food

Nutritional status – The health status of the body in relation to a nutrient or group of nutrients

Overnutrition – A condition caused by excess intake of nutrients

Proteins – Macronutrients essential for body growth and building and repairing tissues and muscles

Undernutrition – A condition caused by inadequate intake of nutrients

Vitamins – Organic compounds that performs specific metabolic functions in the body

Introduction (slide 5)

Nutrition is the sum of all processes involved in the intake, assimilation, and utilization of the proper amounts of nutrients to maintain health, well-being, and productivity. Good nutrition relies on a diverse, adequate diet and is essential for the development and maintenance of the body from infancy to old age. Nutritional status can be both the "cause" and the "outcome" of good or poor health.

The terms "nutrition" and "food" are closely related but not interchangeable. Nutrition is a process of events, while food is a product that is eaten or taken into the body. Food is essential because it contains nutrients that the body needs for the following:

- Developing, growing, maintaining, replacing, and repairing cells and tissues
- Resisting and fighting infection and recovering from illness
- Producing energy, warmth, movement, and work
- Carrying out chemical processes such as digestion

Nutrition basics

Nutrients are the substances in food that the body uses to function properly. Nutrients are divided into macronutrients and micronutrients.

Macronutrients are nutrients needed by the body in relatively large quantities (many grams per day and include carbohydrates, fats, and proteins.

Micronutrients are nutrients needed by the body in very small quantities (usually less than 1 gram per day) and include vitamins and minerals.

The body ingests, assimilates, and utilizes the nutrients in food to meet its needs for macronutrients and micronutrients. The body's physical and chemical process of breaking down food and converting it into a useful form of energy is called **metabolism**. The energy produced by metabolism is essential to maintain the body's functions and daily activities. The ability to metabolize food may vary from person to person and may be affected by illness or disease. Balancing the body's ability to metabolize food with an appropriate quantity of nutrients and food types will help ensure good health.

Each person processes and uses nutrients differently. The body responds either positively or negatively when it absorbs a nutrient or group of nutrients. The response affects the body's condition and health status. The body's response to nutrients and the subsequent outcome is called **nutritional status**. The amount and type of food and drink a person eats is called the **diet**. A nutritious or balanced diet includes a variety of foods and the proper nutrients in the correct amounts and combinations to meet the body's functional needs. A healthy and balanced diet should contain food free of harmful substances and in the optimal amounts and mixtures.

Eating a variety of foods is key to good health, especially for people with special needs, such as infants and young children, pregnant and lactating women, and the elderly. Eating a wide assortment of foods increases the likelihood of getting the necessary nutrients. Except for breastmilk, no single food provides all the nutrients the body needs to function properly.

In summary, good nutrition involves eating a variety of safe and appropriate foods in the correct quantities to meet the body's needs for health and well-being.

The essential nutrient groups (slide 6)

To function properly, the body must maintain a proper balance of the following key nutrients:

- Carbohydrates
- Proteins
- Fats
- Vitamins
- Minerals
- Water

As mentioned earlier, these nutrients are divided into macronutrients and micronutrients. People must eat the appropriate amount of all these nutrients to be well nourished. Refer **Handout 2.1. Macronutrient and Micronutrient Food Sources, Functions, and Manifestations of Deficiencies** lists the essential nutrients and their sources, functions, and deficiencies.

Macronutrients

Macronutrients are the main sources of energy in the diet. Their contribution to individual diets may vary.

Carbohydrates (slide 7)

Carbohydrates are called energy-giving foods because they make up a large percentage of the energy in people's diets. In developing countries the basic foods that people eat regularly (staple foods) are usually high in carbohydrates. In fact, carbohydrates account for up to 80 percent of the total energy in diets in developing countries, compared with 45–50 percent in industrialized countries (Lantham 1997). Staple foods often contain other essential nutrients such as protein, vitamins, and minerals, but in smaller amounts. Staple foods are usually produced locally and are readily available, accessible, and affordable.

Rich sources of carbohydrates include cereals (rice, millet, sorghum, wheat, and barley), root crops (cassava, sweet potatoes, yams, and potatoes), and starchy fruits (green bananas and plantains). These foods contain what are known as complex carbohydrates. Complex carbohydrates usually provide more fiber, vitamins, and minerals than simple carbohydrates (FAO 1998). Simple carbohydrates provide energy but are often called "empty calories" because they lack the extra vitamins and minerals found in complex carbohydrates. Simple carbohydrates are quickly digested and absorbed because they lack fiber. They include sugar, honey, and baked goods such as doughnuts and cake.

Carbohydrates cannot meet all the body's energy needs because they do not provide all the essential nutrients. People should eat other kinds of food in combination with staple foods for a nutritious and well-balanced diet.

Lipids (slide 8)

Lipids are found in fats and oils and are a concentrated source of high energy that is slowly absorbed by the body. Lipids provide essential fatty acids that the body does not produce itself and has to get from food. In developing countries lipids represent only 8 percent of the total energy in people's diets, compared with as much as 36 percent in high-income countries (Latham 1997).

Foods that contain lipids generally have a satisfying taste, ensuring that people include them in their diets. These foods include butter, margarine, and lard, which are solid at room temperature, and corn oil, olive oil, cotton oil, linseed oil, and soybean oil, which are liquid at room temperature.

Lipids are categorized as visible and invisible fats. Visible fats are easily recognized and include butter, margarine, vegetable oils, bacon fat, and lard. Their lipid content can be measured accurately. Invisible fats are not seen or measured as easily and are found in milk, nuts, avocados, cheese, egg yolks, and baked goods such as cake.

The body digests and absorbs liquids more slowly than carbohydrates and proteins. Lipids leave people feeling satisfied longer and provide nearly twice as much energy as other macronutrients. Because they are energy dense, lipids are important for people who need to gain weight. Because dietary lipids also help the body transport and absorb fat-soluble vitamins, they may be a good source of vitamins A, D, E, and K. However, eating too many lipids may lead to heart disease, obesity, and related complications. People should therefore eat lipids sparingly.

Proteins (slide 9)

Known as body-building foods, proteins form the main structural components of cells and, apart from water, make up the bulk of tissues and organs. The body needs additional protein from the diet to grow, develop, maintain, and repair tissues and muscles. Proteins are necessary for the following:

- Growth and development
- Maintenance and repair of tissues and replacement of worn-out or damaged tissues
- Production of metabolic and digestive enzymes
- Make up of certain hormones and all cells and tissues

There are two main types of protein: plant protein, which includes legumes (e.g., beans, lentils, soybeans, and chickpeas), groundnuts, and other nuts and 2) animal protein, which includes meat, poultry, fish, insects, milk, cheese, and eggs.

Proteins are made of amino acids, some of which are absolutely essential for humans. Not all proteins have the same quality and nutritional importance. Proteins in some foods do not contain the full range of essential amino acids that the body needs. Foods such as milk and eggs contain high-quality, easily digested proteins with the essential amino acids. Foods such as maize and wheat contain protein with fewer essential amino acids and are less easily digested.

Animal protein is often of high quality and as a result contains more of the amino acids, vitamins, and minerals needed for the body's proper functioning. When people do not eat enough protein, their bodies use protein from their muscle mass, leading to muscle wasting over time.

Micronutrients

Micronutrients are needed in very small amounts but play an important role in the proper functioning of the body. Micronutrients include vitamins and minerals that the body needs to produce various hormones and enzymes to develop and maintain systems including the immune and reproductive systems.

Vitamins (slide 10)

Vitamins are organic compounds that perform specific metabolic functions in the body. The body does not synthesize most vitamins and must get them from food. Unlike carbohydrates, lipids, and proteins, vitamins do not produce energy. However, they are necessary for many of the metabolic processes that produce energy. People who do not eat the proper amounts of vitamins can get vitamin deficiencies that cause illness and disease.

Vitamins are classified into two categories based on the substances they dissolve in. **Fat-soluble vitamins** can be stored by the body when they are not used. These vitamins are essential for good health but not needed every day. Fat-soluble vitamins include A, D, E, and K. These vitamins are necessary for the development and maintenance of certain body tissues, including those in the eyes (vitamin A), bones (vitamin D), and muscles; for the coagulation of blood (vitamin K); for synthesizing certain enzymes, and for absorbing other essential nutrients such as calcium (vitamin D) (Latham 1997).

Water-soluble vitamins pass directly into the bloodstream. The body has limited ability to store these vitamins and must get them daily from food. Water-soluble vitamins include C (ascorbic acid), B_1 (thiamine), B_2 (riboflavin), B_3 (niacin), B_6 (pyroxidine), B_{12} (cobalamin), pantothenic acid, and folic acid.

These vitamins are often classified by their functions. **Energy-releasing vitamins** that enable the body to use macronutrients include B_1 (thiamine), B_2 (riboflavin), B_3 (niacin or nicotinic acid), biotin, and pantothenic acid. **Hematopoietic (red blood cell-synthesizing) vitamins** that help the body make new red blood cells include folacin (folic acid) and B_{12} (cobalamin). **Co-enzyme vitamins** that help the body break down amino acids, produce enzymes, and synthesize new proteins include B_6 (pyroxidine), which helps metabolize protein, and others. **Skin- and bone-building vitamins** that help form collagen, an important component of skin, bone, and connective tissues include C (ascorbic acid).

Minerals (slide 11)

Minerals are inorganic compounds that are not produced by the body but are necessary for health and well-being. Minerals are referred to as essential trace elements because they are needed in very small quantities. While they are chemically different from

vitamins, minerals serve similar purposes. They influence many of the body's biochemical reactions and are used to form cells and tissues.

Important minerals for health include iron, zinc, calcium, and iodine. Iron is an essential component of blood and helps transfer oxygen to various tissues. Zinc is important to enhance and strengthen the immune system, help wounds heal, and facilitate digestion and is an important component of the skeletal system. Calcium is a key component of bone and is needed for a strong skeleton. Other minerals involved in various body reactions are chromium, copper, fluoride, magnesium, manganese, molybdenum, nickel, phosphorus, and selenium.

Water (slide 12)

Water is considered an essential nutrient because it is necessary for body functions including digestion and absorption and certain metabolic processes. Water is also a primary component of the body, representing over 60 percent of a person's weight. Water regularly leaves the body through sweating, excretion, and breathing and therefore must be replaced. Adults should drink at least 2 liters or about 8 cups of water a day. The water should be safe, clean, and boiled if necessary. Tea, soup, milk, juice, and fruit also contain water and can help meet the body's needs. The caffeine in tea and coffee, however, can dehydrate the body and should be drunk in moderation. Tea and coffee also contain substances that bind essential nutrients such as iron, making these nutrients unavailable for the body to use.

To maintain a well-balanced diet, people should eat a variety of foods that contain all the nutrients mentioned above in the right daily amounts and combinations to meet the body's functional needs.

Nutrient requirements of adults and children: Energy (slides 13 and 14)

Energy requirements are the "amount of food energy needed to balance energy expenditure in order to maintain body size, body composition, and a level of necessary and desirable physical activity consistent with long-term good health (FAO, Who, UNU 2004). Essentially, energy requirements are the general guidelines for attaining and maintaining a health life that reflect the body's dietary and expenditure needs. These requirements vary according to age and gender. Infants, children, adolescents, pregnant and lactating women, other adults, and the elderly all have different energy requirements and should eat a well-balanced diet that takes into account their various needs. Energy requirements are also based on the following factors:

- **Basal metabolism**—the minimal energy expenditure needed to maintain the basic body functions needed for life, such as the functioning of vital organs and the nervous system. The basal metabolic rate (BMR) is used to determine basal metabolism over a standard period of time and can represent from 45 to 70 percent of daily energy needs.
- **Metabolic response to food**—the level of energy needed to digest, absorb, and utilize all food eaten.
- **Physical activity**—all daily activities ranging from work to play to rest. These activities may be occupational, associated with work, or discretionary, associated with household and social tasks.

- **Physiological needs**—Young children have added energy needs to support growth and development. Pregnant and lactating women need additional energy to support the growth of the fetus, the placenta, maternal tissues, and milk production (FAO, WHO, UNU 2004).

Estimating energy requirements for adults (slide 15)

Energy requirements and the dietary intake needed to meet these requirements may change from day to day. These definitions are estimates of the appropriate energy for a particular group of people. Energy requirements are measured in calories and are determined by multiplying the BMR by an activity multiplier. The BMR is one of the most important determinants of energy requirements. It is calculated using age, gender, height, and weight. Table 1 shows the BMR for males and females of various ages and weight.

Table 1. Equations for estimating BMR from body weight

Age (years)	Kcal/day
Males	
18–30	15.1 x weight (kg) + 692
30–60	11.5 x weight (kg) + 873
> 60	11.7 x weight (kg) + 588
Females	
18–30	14.7 x weight (kg) + 496
30–60	8.7 x weight (kg) + 829
> 60	10.5 x weight (kg) + 596

Source: FAO, WHO, and UNU. 1985.

Table 2 shows multiples of BMR used to determine the average daily energy requirements of adults based on their physical activity. Activities are classified as light (e.g., the work of an office clerk), moderate (e.g., the work of a subsistence farmer), and heavy (e.g., the work of a laborer). The equation for determining estimated energy requirements based on activity is **kcal/day = BMR x activity factor**.

Table 2. Activity factors

	Light	Moderate	Heavy
Male	1.55	1.78	2.10
Female	1.56	1.64	1.82

As an example, to determine the estimated daily energy required by a healthy 35-year-old man who weighs 70 kg and does heavy activity, we would multiply 2.10 x BMR, or 2.10 x (11.5 x 79 kg + 873). This would give us 3,534 kcal/day.

Exercise 1. Determine the energy requirement of a 23-year-old woman who weighs 53 kg and does farming and household work (moderate activity).

BMR: _____ x _____ kg + _____ = _____ kcal/day

Total kcal/day: BMR of _____ x activity factor of _____ = _____ kcal/day

Answers to the exercises are found in Appendix 1.

To quickly estimate energy requirements, assume that healthy adults who are not obese need 25–35 kcal per kg of body weight (Ireton-Jones and Turner 1991). This estimate should only be used when BMR equations and activity factors are not readily available.

Handout 2.2. Nutrition Calculations can be used to calculate BMR and find the energy and protein requirements of children and adults.

Estimating energy requirements for pregnant and lactating women

The energy needs of women of reproductive age often increase because of the demands of pregnancy, lactation, and even menstruation.

Pregnancy

During pregnancy women need extra energy and nutrients for the growth of the fetus, the placenta, and associated maternal tissues. A pregnant woman who neglects her energy requirements and proper diet may have a higher risk of giving birth to an unhealthy child. Energy demands gradually increase over pregnancy, with the most energy needed during the third trimester. However, a woman can meet her energy needs throughout the 9 months of pregnancy if she gets the added energy in table 3 every day. The body can store extra energy absorbed early in pregnancy and use it when demand increases. Energy levels differ based on activity levels.

Table 3. Added daily energy requirements of pregnant women

Full activity	285 kcal/day
Reduced activity	200 kcal/day

Source: FAO, WHO, and UNU. 1985.

Lactation

Energy and nutrient requirements increase during lactation for milk production and secretion. Meeting these needs is important for the health of the infant, as many nutrients provided by breastmilk come from the mother's diet. Table 4 shows the additional energy needed by lactating women.

Table 4. Added daily energy requirements of lactating women

First 6 months	500 kcal/day
Second 6 months	500 kcal/day

Source: FAO, WHO, and UNU. 1985.

Estimating energy requirement for children and adolescents 1–18 years old (slide 16)

Energy requirements for adolescents, children, and infants > 1 year old are calculated taking into account BMR, physical activity level, and energy needs for growth. Table 5 shows the average daily energy requirements of this group, assuming moderate activity of the average child.

Table 5. Added daily energy requirements of children 1–18 years old

Age (years)	Energy requirements (kcal/day)	
	Girls	Boys
1–2	865	948
2–3	1,047	1,129
3–4	1,156	1,252
4–5	1,241	1,360
5–6	1,330	1,467
6–7	1,428	1,573
7–8	1,554	`1,692
8–9	1,698	1,830
9–10	1,854	1,978
10–11	2,006	2,150
11–12	2,149	2,341
12–13	2,276	2,548
13–14	2,379	2,,770
14–15	2,449	2,990
15–16	2,491	3,178
16–17	2,503	3,332
17–18	2,503	3,410

Source: FAO, WHO, and UNU. 2004.

These levels may be higher or lower depending on the physical activity of a particular child. In general children under 10 years old have lower activity levels and energy requirements than adolescents. During adolescence the tissues in the body change composition and grow rapidly. Adolescents need additional energy to maintain health, promote optimal growth and nutrition, and support physical activity.

Infants (slide 17)

The first 12 months of life are a critical time when the infant is developing and tissues are growing. In fact, during the first 3 months of life, the body uses 35 percent of the energy it needs specifically for growth (FAO, WHO, and UNU 2004). Breastmilk alone contains all the energy and nutrients a child needs for the first 6 months of life. Beyond 6 months the child needs additional food supplements to provide the appropriate level of micronutrients and macronutrients, as shown in table 6.

Table 6. Average daily energy requirements of infants

Age (months)	Energy requirements (kcal/day)	
	Girls	Boys
0–1	464	518
1–2	517	570
2–3	550	596
3–4	537	569
4–5	571	608
5–6	599	639
6–7	604	653
7–8	629	680
8–9	652	702
9–10	676	731
10–11	694	752
11–12	712	775

Source: FAO, WHO, and UNU. 2004.

Infants who are undernourished or born with low birth weight may need additional energy for catch-up growth to reach the normal height and weight of children their age.

Protein requirements (slide 18)

Protein is essential for body growth and maintenance, particularly for children and adolescents. Because protein in the body is constantly depleted and cannot be stored, it must be replenished daily. Requirements may differ from person to person based on health status and physiological condition. Protein requirements for adults are the same for both sexes at all ages and body weights, except for pregnant and lactating women.

Pregnancy substantially increases protein requirements for women to support the growth of the fetus, placenta, and additional maternal tissue. There is some evidence that pregnant women utilize protein less efficiently, thereby increasing the need for dietary sources.

Lactation also increases protein needs, because breastmilk must supply protein to the infant for growth.

Table 7 shows the basic minimum protein required by adults to compensate for protein loss and support growth.

Table 7. Safe protein intake requirements for adults

	Safe protein intake (g/kg of body weight)
Average adult	0.75
Pregnant woman	0.75 + 6 g/day
Lactating woman	
6 months	0.75 + 16 g/day
6–12 months	0.75 + 12 g/day
12+ months	0.75 + 11 g/day

Source: FAO, WHO, and UNU. 1985.

Estimating protein requirements for infants, children, and adolescents

The first year of life is a period of rapid growth. Infants who are breastfed exclusively for the first 6 months of life have their protein requirements met, but it is important to understand the amount of protein needed in their diet. During the first month of life, infants need 2.5 grams of protein per kilogram of body weight. After 4 months and up to 12 months, they need approximately 1.5 grams per kilogram of body weight (FAO, WHO, and UNU 1985).

Protein needs often fluctuate with child growth and development. The most accurate reflection of the protein requirements of an individual child is based on actual body weight. This calculation involves multiplying the safe level of protein intake per age group by weight in kilograms (table 8). Up to age 12, boys and girls need the same level of protein, but the safe protein intake level differs slightly after that point.

Table 8. Safe protein intake requirements for adults

Age (years)	Safe protein intake (g/kg of body weight)	
	Girls and boys combined	
1–2	1.20	
2–3	1.15	
3–5	1.10	
5–7	1.00	
7–10	1.00	
	Girls	Boys
10–12	1.00	1.00
12–14	0.95	1.00
14–16	0.90	0.95
16–18	0.80	0.90

Source: FAO, WHO, and UNU. 1985.

Illness, intense physical activity, and starvation require special protein intake for adults and children because the body needs additional protein to build, repair, or sustain tissues.

Vitamins and minerals are also required in the daily diet. Table 9 shows the recommended daily allowance (RDA) for several vitamins and minerals important for healthy functioning of adults. When intake is inadequate, both children and adults may need a multivitamin. Intake of vitamins and minerals should not exceed 1 RDA.

Table 9. Daily recommended dietary allowances of selected vitamins and minerals for adults 19–50 years old

	Women per day	Men per day
Vitamin A	700 µg	900 µg
Vitamin C	75 mg	90 mg
Vitamin E	15 mg	15 mg
Vitamin B6	1.3 mg	1.3 mg
Vitamin B12	2.4 µg	1.4 µg
Folate	400 µg	400 µg
Zinc	11 mg	11 mg
Iron	18 mg	8 mg
Selenium	55 µg	55 µg

Source: Institute of Medicine, 2005. Dietary Intakes. Available at http://www.iom.edu.

Undernutrition (slides 19–21)

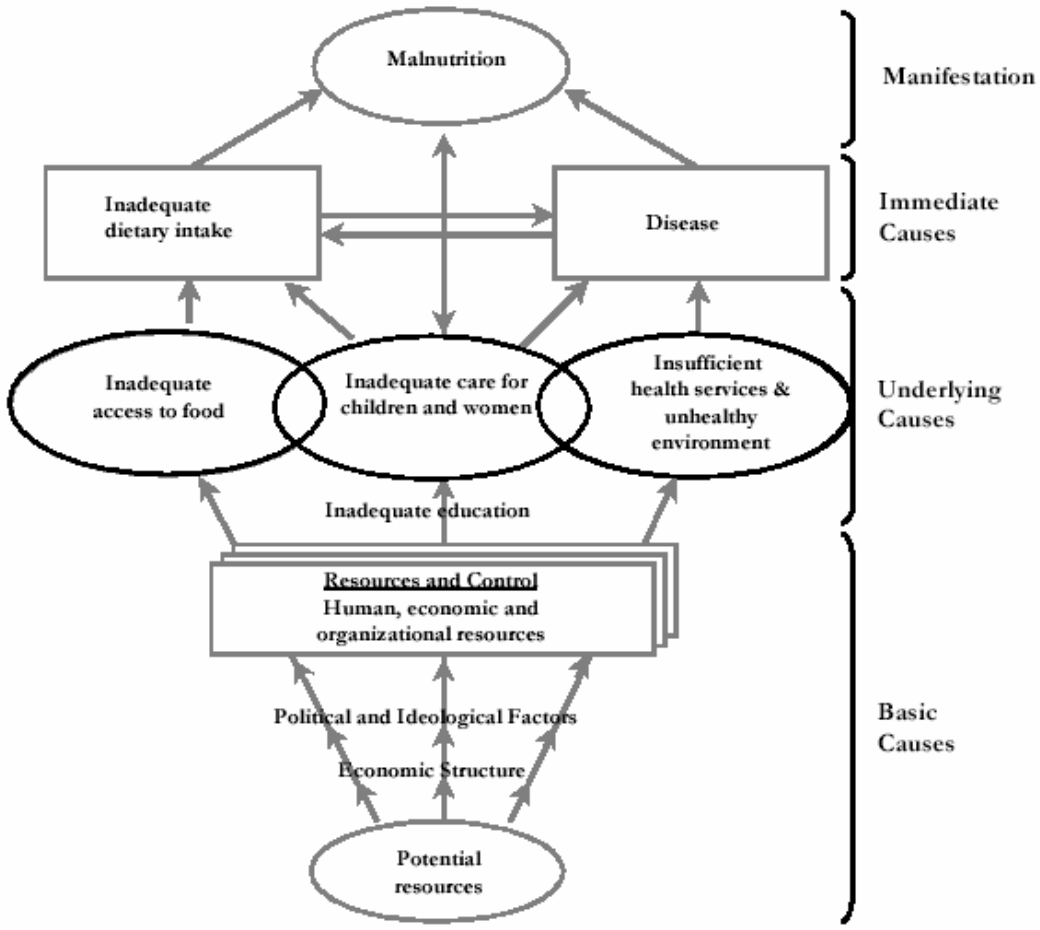
Malnutrition is a condition caused by inadequate or excess intake of nutrients. This session focuses on undernutrition caused by inadequate intake of nutrients. When the body does not receive enough food or receives food that does not provide the appropriate components for healthy living, it becomes weak or overburdened and cannot function properly. Undernutrition is manifested as stunting, underweight, and wasting and/or micronutrient disorders, mainly iron deficiency anemia, iodine deficiency disorders (IDD), and vitamin A deficiency (VAD) (slide 20).

Undernutrition is a serious global problem, causing an estimated 50 percent of all child deaths (WHO 2000). Undernutrition has been widespread in Africa for many years, particularly among young children. Chronic undernutrition is prevalent in sub-Saharan Africa, where alsmot33 percent of all children under 5 are underweight and 38 percent are stunted (low height for age) (UNICEF 2004).

Undernutrition can happened at any point in the life cycle. When it happens early in life, a person can suffer irreversible damage. Nutrition challenges continue throughout the life cycle. Inadequate nutrition usually begins in utero and extends into adolescence and adult life. The cycle of poor nutrition also spans generations. Young children, particularly girls who do not receive adequate nutrition, become stunted women and are more likely to continue the cycle, remaining stunted into adulthood unless the cycle is broken. Pregnancy in the adolescent years increases the risk of low birth weight infants and the difficulty of breaking the cycle. Good nutrition needs support at all stages of the life cycle, including infancy, childhood, adolescence, and adulthood, especially for girls and women. Intensive efforts are needed to prevent and minimize the adverse effects of poor nutrition.

Undernutrition may be improved by improving household access to nutritious foods, improving cultural practices, and improving the individual physiological requirements of food and nutrients. To improve nutritional well-being, coordinated strategies are needed among multiple sectors.

The underlying causes of undernutrition include inadequate access to food and nutrients, improper care of mothers and children, limited access to health services, and unhealthy environments. The UNCEF framework below (slide 21) divides the causes of undernutrition into immediate, underlying, and basic. This framework can guide collection of information on the causes of malnutrition and planning of actions to address undernutrition at the community, district, and national level. Health care staff can use the chart to talk to leaders in various sectors and to communities about the importance of working together to address the multiple causes of undernutrition.



Source: Adapted from UNICEF (1998) *The State of the World's Children 1998*. Oxford University Press, Oxford.

Using anthropometry to determine nutritional status (slide 22)

The following anthropometric measurements are used to measure nutritional status:

- Weight for age (chronic and acute malnutrition)
- Height for age (chronic malnutrition)
- Weight for height (acute malnutrition)

These indexes measure the following nutrition conditions:

1. **Underweight** (weight for age). Children in this category experience body changes resulting from both acute and chronic malnutrition.
2. **Stunting** (height for age). An indicator of chronic malnutrition or past growth failure as a result of inadequate intake of nutrients over a long period or because of long-term illness
3. **Wasting** (weight significantly below the weight expected for the child's height). An acute condition resulting from inadequate dietary intake or infection.

Handout 2.3. Length/Height for Age and Weight for Age is a series of growth reference charts for girls and boys from birth to age 20.

Other anthropometric measurements (slide 23)

Mid-upper arm circumference (MUAC) is a measurement of the upper arm to determine severe or mild-to-moderate malnutrition. MUAC is a quick and easy way to screen people for interventions but is not appropriate to determine the effectiveness of an intervention.

Low birth weight (LBW) is a manifestation of undernutrition in newborns and a reflection of intrauterine growth retardation. WHO (1995) defines LBW as weight under 2.5 kg at birth. Causes of LBW include inadequate maternal food intake during pregnancy, cigarette smoking by the mother, short maternal stature, and maternal infection such as malaria.

Body mass index (BMI) is calculated to determine adult nutritional status. BMI compares weight and height and is measured by dividing weight in kilograms by height in meters squared (BMI = weight ÷ height^2). This calculation measures body mass, ranging from thin to obese. BMI is not useful to assess PEM in pregnant or lactating women, whose weight does not reflect their nutritional status. Table 10 shows how BMI is categorized.

Table 10. Body mass index as an indicator of body type

BMI	Interpretation
< 16.0	Thinness grade 3 (severe malnutrition)
16.00–16.99	Thinness grade 2 (moderate malnutrition)
17.00–18.49	Thinness grade 1 (mild malnutrition)
18.50–24.99	Normal nutritional status
25.00–29.99	Overweight grade 1
30.00–39.99	Overweight grade 2 (obesity)
40.00 or above	Overweight grade 3 (severe obesity)

Source: WHO 1995.

Handout 2.4. Body Mass Index Reference Table is a color-coded chart that can be used to identify underweight, normal weight, overweight, and obesity.

Exercise 2. Using BMI as an indicator, determine the body type of a farmer who weights 57 kg and is 1.82 m tall. What is his BMI?

BMI = _____ kg ÷ (_____ x _____) = _____

Body type _____

Now try calculating your own BMI.

Action may be needed if:

- A person loses 6–7 kg unintentionally within 1 month, even if BMI is not calculated.
- Unintended weight loss continues for longer than 2 months, with BMI < 18.5.

Protein energy malnutrition (slide 24)

PEM can be manifested as marasmus, kwashiorkor, or marasmic kwashiorkor.

- **Marasmus** is a severe form of PEM in which a child experiences intensive growth failure. Marasmus occurs when the underweight child deteriorates further, appearing extremely thin and frail with severe muscle wasting. Marasmic children also may have wrinkled skin, drawn-in faces, and a strong appetite or sense of hunger. In addition to the physical signs, a marasmic child has body weight < 6 percent of the median weight for age (Latham 1997).

- **Kwashiorkor** is another severe form of PEM, usually characterized by the build-up of fluids in various body tissues (edema). Like marasmus, kwashiorkor involves growth failure but often no intense wasting. In addition to edema, which is often recognized by a swollen face or limbs, children with kwashiorkor have dry, flaky skin, changes in hair color, consistent diarrhea, loss of appetite, and lethargy. As a result of liver damage, children may have distended bellies and opportunistic infections (OIs). Weight for age of children with kwashiorkor ranges between 60 and 80 percent of the median.

- **Marasmic kwashiorkor** is the most serious form of PEM, combining the severe wasting of marasmus with edema. This form of PEM is characterized by a combination of the clinical features of marasmus and kwashiorkor. Body weight at this stage is < 60 percent of the median weight for age.

Strategies to prevent and control undernutrition (slide 25)

The following actions can help prevent and control undernutrition:

- **Improve household food security.** Lack of consistent access to an adequate supply of a variety of nutritious foods is an underlying cause of undernutrition.

Households must also promote equitable distribution of food, prioritizing vulnerable groups such as children and pregnant and lactating women.

- **Improve maternal nutrition and health care.** Inadequate nourishment and poor health of mothers often result in poor birth outcomes in addition to compromised health and nutrition status of mothers. Improving maternal nutrition and health care is an important strategy to prevent undernutrition in women and LBW in their infants.

- **Promote appropriate child feeding practices.** Exclusive breastfeeding of infants for the first 6 months of life and adding the appropriate amount of nutritious complementary foods after 6 months can reduce the prevalence of undernutrition. Breastfeeding beyond 6 months should be encouraged in most situations. Session 6 provides detailed information on infant and young child feeding in the context of HIV. Efforts should be made to provide a nutritious diet throughout childhood.

- **Provide nutrition rehabilitation.** A well-functioning health facility or community-based system should be in place to identify undernourished children and adults and adequately treat the condition. These programs should provide nutrition assessment and counseling, micronutrient supplementation, and therapeutic feeding, if appropriate. Effective programs require the following:

  - A surveillance system to identify and refer people
  - Procedures and tools to categorize malnutrition (severity and complications)
  - Guidelines for treatment and recovery (particularly for severe acute malnutrition
  - A reliable inventory of appropriate supplies for clients, especially those who are severely malnourished, e.g., micronutrient supplements, F-100 and F-75 therapeutic milks, and ready-to-use therapeutic food (RUTF)
  - Follow-up visits and interventions to prevent relapse

Micronutrient deficiencies

Micronutrient deficiencies include iron deficiency anemia, iodine deficiency, and vitamin A deficiency.

Nutritional anemia (slide 26)

Anemia is a disorder of the blood resulting from low hemoglobin levels in the body. Hemoglobin is an iron-rich protein that plays a critical role in transporting oxygen throughout the body and, when impaired, can keep key organs from functioning properly. In an anemic person, the necessary oxygen is not circulated and used by the body, often leaving the person easily fatigued or weak, with breathing or heart problems and experiencing dizziness or fainting. A person with severe anemia may also have edema.

The people most affected by anemia are premature infants and children under 5. Children are often anemic because they do not consume enough iron, which is needed to form hemoglobin. Women of childbearing age, especially pregnant and lactating women, are especially vulnerable to anemia because of the extra iron demands for the developing fetus.

Anemia is classified as hemorrhagic, hemolytic, hypoplastic/aplastic, and nutritional. Nutritional anemia is the most common, caused by a deficiency of one or more essential nutrients needed to synthesize red blood cells, such as iron, folic acid, and vitamin B_{12}. These deficiencies cause the following types of nutritional anemia:

- Iron deficiency anemia (the most common type)
- Folic acid deficiency anemia
- Vitamin B_{12} deficiency anemia

Detecting anemia

Anemia is diagnosed by measuring the hemoglobin level in the blood. People with hemoglobin levels glow the expected value for their age group are considered anemic. Measuring hemoglobin requires laboratory tests that are rare at community health centers. Nevertheless, it is important to be able to recognize the cutoffs used to diagnose anemia, shown in table 11.

Table 11. Suggested cutoffs for diagnosing anemia using hemoglobin (Hb)

Population group	Hb level (in g/dl) indicating anemia
Children 6 months–5 years old	< 11.0
Children 6–14 years old	< 12.0
Adult males	< 13.0
Adult females (non-pregnant)	< 12.0
Pregnant women	< 11.0

Source: Latham, M. C. 1997. Human Nutrition in the Developing World. FAO Food and Nutrition Series No. 29. Rome: FAO.

Effects of anemia (slide 27)

The main effects of anemia are listed below.

- Reduced work capacity leading to low productivity
- Reduced mental capacity that negatively affects school performance in children
- Reduced immune competence leading to high incidence of disease
- Poor pregnancy outcomes (low birth weight, spontaneous abortion, premature delivery)
- Maternal death during pregnancy (heavy blood loss during delivery puts mothers at risk)

Strategies to prevent and control anemia (slide 28)

The following interventions can help prevent and control anemia:

- Promote consumption of iron- and vitamin-rich foods.
- Prevent and treat anemia-related diseases such as malaria.
- Prevent and treat parasites such as hookworm to prevent anemia in children.
- Provide iron and folic acid supplementation for at-risk groups such as children, pregnant women, and people with sickle cell disease.
- Fortify food with iron and folic acid.

Iron deficiency disorders (slide 29)

Iodine deficiency disorder (IDD) result from inadequate intake or absorption of the mineral iodine. The body needs only a small amount of iodine, only a teaspoon over an entire lifetime, but the lack of even trace amounts of this mineral can have a negative impact on health. People can usually get iodine by eating a variety of foods, but the level of iodine in certain foods can vary depending on the amount of this mineral in the soil, which edible plants absorb as they grow. The absence of iodine in food because of its limited availability in soil is a major cause of iodine deficiency. Highland and mountainous regions tend to have soil with limited iodine. IDD may also result from eating foods that decrease the rate of iodine absorption, such as cassava, turnips, and certain cabbages and kales.

Manifestations of iodine deficiency (slide 30)

The severity and clinical manifestations of IDD often depend on the age when a person is deficient in iodine. The following conditions are the most common:

- **Goiter.** This is an enlarged thyroid gland, the most obvious sign of iodine deficiency. When a person does not get enough iodine, the thyroid gland cannot produce certain enzymes needed for metabolism and growth and becomes overactive, causing swelling around the neck. Goiter may be distinguishable only on close observation or may be so large that the person cannot move the neck. Goiter may begin to develop in adolescence as a result of iodine deficiency in childhood and can also occur as a result of iron deficiency in adulthood.

- **Hypothyroidism.** This condition occurs when iodine deficiency makes the thyroid less productive, causing dry skin, weight gain, puffiness in the face, slow pulse, and lethargy. Hypothyroidism is most common in adults.

- **Hyperthyroidism (Grave's disease).** This condition results from an overactive thyroid because of iron deficiency or other causes and is characterized by a rapid pulse, considerable weight loss, and nervousness, mainly in adults. Hyperthyroidism can be caused by both iodine deficiency and a sudden increase in iodine by iodine-deficient populations.

- **Cretinism.** This condition in infants and children results from inadequate iodine in the mother during pregnancy. Children with cretinism may have severe mental retardation, physical development problems, spastic movements, abnormal physical features, deafness, and mutism (Latham 1997).

Table 12 shows the recommended daily allowance (RDA) for iodine.

Table 12. Recommended daily allowance (RDA) for iodine for males and females

Age	RDA for iodine (µg/day)	
	Male	**Female**
0–6 months	110	110
7–12 months	130	130
1–3 years	90	90
4–8 years	90	90
9–13 years	120	120
14 years +	150	150
Pregnant women	N/A	220
Lactating women	N/A	290

Source: Institute of Medicine, 2005. Dietary Intakes. Available at http://www.iom.edu.

Strategies to prevent and control iodine deficiency (slide 31)

When iodine is not sufficient in local vegetables, fruits, and grains, food fortification is an effective strategy to reduce IDD. Iodine can be added to basic food products that people use regularly, such as salt, milk, bread, flour, and sugar, to reach a wide group of people. Foods are fortified with iodine, referred to as iodization, during processing. Because iodization is difficult on a small scale, governments should promote and enforce food fortification at the national level for the greatest effectiveness. Other strategies include providing iodine drops and injections, but these interventions are costly and have limited impact across a broad population (FAO 1996).

Vitamin A deficiency (slide 32)

Vitamin A plays an important role in the body's growth, proper functioning of the immune system, reproduction, maintenance of certain body tissues, and especially vision. Vitamin A deficiency (VAD) commonly leads to eye disorders such as blindness and may make children more susceptible to measles and other infections.

VAD may result from low intake of vitamin A-rich foods; inactivation of the vitamin as a result of food processing, preservation, or preparation practices; limited intake of fat and oil, which help absorb vitamin A; gut conditions that affect absorption, such as worms and chronic diarrhea; and poor breastfeeding practices.

Manifestations of VAD (slide 33)

Vitamin A deficiency has the greatest impact on children under 5 and is the leading cause of blindness in this population (Latham 1997). Eye damage is the most common sign of VAD. A person suffering from VAD may first experience night blindness, then visible evidence of eye damage such as Bitot's spots, xerosis, ulcers, and scarring of the cornea. Eventually, without treatment, the cornea collapses and total blindness ensues.

The most obvious sign of VAD is xerophthalmia (the collective term for eye conditions), but less specific manifestations include increased morbidity and mortality, slowed growth and development, higher risk of anemia, and impaired reproductive health (FAO and WHO 1998).

Strategies to prevent and control VAD (slide 34)

The following interventions can help prevent and control vitamin A deficiency:

- Promote consumption of vitamin A-rich foods (fruits, vegetables, dairy products, liver).
- Provide vitamin A supplements to women and children.
- Provide low-dose vitamin A supplements to all pregnant women and children.
- Provide a single dose of 200,000 IU of vitamin A to mothers within 6–8 weeks after delivery.
- Improve child feeding practices.
- Promote feeding colostrum and increasing/prolonging breastfeeding.
- Improve complementary feeding and access to appropriate complementary foods.
- Treat diseases associated with VAD (measles, respiratory tract infections, diarrhea) early.
- Fortify foods with vitamin A.

Table 13 lists the universal preventive vitamin A dosages for children.

Table 13. Universal preventive vitamin A supplementation of children

Age group	Dosage and timing
< 6 months (non-breastfed only)	50,000 IU orally, once
6–< 12 months	100,000 IU orally, once
12 months +	200,000 IU orally, every 4–6 months

Source: USAID. 2006.

National nutrition policies (slide 35)

Many countries have national policies, strategies, and guidelines on nutrition, which are generally based on international guidelines and country-specific issues and context. They help ensure that nutrition actions and services are technically sound and give consistent messages. The content of nutrition training and services should be consistent with national policies and guidelines.

Case studies (slides 36–38)

The case studies below are exercises to give students a practical understanding of the concepts in this session. Answers are found in Appendix 2.

Exercise 3. Food has been in short supply in your area. A mother brings her 3 year-old daughter to the clinic. She is worried because the child has a poor appetite, skin conditions that won't go away, and excessive diarrhea. Her hair has gotten lighter. You notice swelling around the child's ankles. What might she suffer from? What is the appropriate course of action?

Exercise 4. A 28-year-old pregnant woman attending the antenatal clinic complains of shortness of breath, dizziness, a fast heart rate, and extreme fatigue. When asked about the foods she has been eating, she says she's had little access to meat and fish since her pregnancy. What nutrition deficiency might she be suffering from? What action would you recommend?

Exercise 5. You and another nurse are community health workers making rounds to households to assess the general health of children under five. You notice that most children seem small or thin for their age and decide to assess weight for age and height for age using a hanging scale and height board. In the first household, a 24-month-old boy weighs 13 kg and is 80 cm tall. Using the growth charts in the Appendix, assess this

Conclusions (slide 39)

As discussed, good nutrition is essential for health and well-being. Every day the body needs the appropriate amount of each of the essential nutrients, including carbohydrates, proteins, lipids, vitamins, minerals, and water. These nutrients provide the body with energy and may be obtained through a balanced diet consisting of a variety of foods. Children and pregnant women often have increased energy needs.

Maintaining a proper diet is an important component in preventing overnutrition or undernutrition. A person who does not receive a sufficient amount of the essential nutrients or receives an excess of food may be at risk of developing nutrition-related illnesses such as protein energy malnutrition, obesity, and various vitamin deficiency-related illnesses. Strategies to prevent nutrition-related illnesses include promoting an adequate diet using locally available foods, fortifying commonly used food products, providing vitamin and mineral supplementations, and improving food security.

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Handout 2.1. Macronutrient and Micronutrient Food Sources, Functions, and Manifestations of Deficiencies

Nutrient	Food sources	Function	Deficiency, signs, and symptoms
Macronutrients			
Carbohydrates	Cereals: Maize, millet, wheat, and barley Tubers: Sorghum, cassava, potatoes, sweet potatoes, yams Bread, rice, green bananas, plantains, and fruits	Energy production Source of fiber essential for digestion and prevention of some diseases	Protein-energy malnutrition (marasmus, kwashiorkor) Constipation from inadequate fiber intake
Protein	Animal protein: Beef, game, pork, lamb, goat, fish, poultry, edible insects, milk and milk products, eggs Plant protein: Beans, lentils, dried peas, soybeans, chickpeas, groundnuts, peanuts, other nuts	Building and repairing cells Fighting infection Component of enzymes and hormones Producing energy	Protein-energy malnutrition (marasmus, kwashiorkor) Poor wound healing Impaired immune function Easily plucked hair
Fats	Animal fats: Meat, poultry (with skin), lard Vegetable oils: Margarine, butter, whole milk, cream, avocados, groundnuts, and other nuts	Provide energy and fatty acids Help digestion Source of fat-soluble vitamins A, D, E, and K	Marasmus (wasting) Dry and scaly skin Poor wound healing
Micronutrients (vitamins)			
Vitamin A	Liver, eggs, butter, breastmilk, full-cream milk (when fortified), cheese Pigmented vegetables: Carrots, pumpkin, yellow maize, yellow sweet potatoes Pigmented fruits: Paw paws, mangos, etc. Green leafy vegetables cassava leaves, sweet potato leaves, turnips, red palm oil	Vision Maintenance of epithelial tissue Mucous secretion Growth of bones and teeth Reproduction Immunity	Eye problems (blindness, Bitot's spots) Dry and scaly skin and dry hair Vulnerability to infection Male sterility

Nutrient	Food sources	Function	Deficiency, signs, and symptoms
Vitamin D	Produced by the action of the sun on the skin Wheat germ, fish, liver, egg yolks, organ meats, cheese, milk (breastmilk; milk may need to be fortified with vitamin D), butter, margarine, mayonnaise	Facilitates calcium and phosphorus absorption, utilization, and maintenance (hence formation of bones and teeth)	Rickets (children) Osteomalacia (adults)
Vitamin E	Vegetable oils Whole grain cereals	Antioxidant Reproductive functions Contribution to hemoglobin synthesis	Leg cramps Muscle weakness Nerve problems Hearing problems
Vitamin K	Synthesized by plants (vitamin K_1, or phylloquinone) Synthesized by bacteria in the intestines (vitamin K_2, of menaquinone)	Blood coagulation (helps synthesize prothrombin, necessary for blood clotting)	Long time to stop bleeding
Vitamin B_1 (thiamine)	Whole grain cereals such as roasted and cooked maize, pulses Green vegetables such as green peas and fruits, meat, milk, fish, oil seed, yeast	Energy production Appetite promotion Support of the central nervous system	Beriberi (enlargement of nerves, weight loss due to loss of appetite, edema, disturbances in heart function) Lack of energy Lesions in nervous tissues
Vitamin B_6 (riboflavin)	Animal products: Milk, meat, liver, fish, eggs, cheese Vegetable products: Green leafy vegetables Cereal grains and pulses, yeast	Use in metabolism of carbohydrates, fats, and proteins to release energy Helps synthesize corticosteroids and produce red blood cells	Cracked mouth corners and lips Sore and burning lips, mouth, and tongue Rough skin
Vitamin B_3 (niacin)	Meat (especially liver, pork), poultry Groundnuts, beans, peas, other pulses Cereal grains (not readily available in maize and sorghum, but maize can be treated with alkalis such as limewater to make the niacin more available)	Energy production Healthy skin Carbohydrate, fat, and protein metabolism	Pellagra (darkening of the skin exposed to the sun, scaly skin, diarrhea) Dementia (memory loss) Red and sore tongue I some cases

Nutrient	Food sources	Function	Deficiency, signs, and symptoms
	Yeast Any protein-rich food helps form niacin.		
Vitamin B_6 (pyroxidine)	Animal sources: Meat, liver, pork, fish, milk Vegetable and fruit sources: Spinach, turnips, broccoli, bananas, oranges, watermelon Yeast	Protein and fat metabolism Conversion of glycogen in the liver and muscle tissue to glucose (hence energy production and maintenance of blood glucose level) involved in reactions necessary to form hemoglobin	Dermatitis Microcrytic anemia Glossitis (inflammation of the tongue) Chelosis (dry scaling of the lips and mouth corners) Convulsions Medical conditions and drugs such as Chloramphenicol and Isoniazid affect B_6 metabolism and can lead to deficiency
Vitamin B_{12} (cobalamin)	Meat, fish, poultry, cheese, eggs, milk, liver NB. Cobalamin is synthesized by bacteria in plants (e.g., in the nodules of some legumes) and animals.	Involved in synthesis of red and white blood cells Maintenance of nerves and digestive tissues Carbohydrate metabolism	Macrocytic anemia Stomatitis (sores on mouth corners) Glossitis Nerve problems Unsteady gait Delusions Decreased white blood cell count
Vitamin C (ascorbic acid)	Fruits: Citrus fruits (oranges, grapefruit, lemons, tangerines, limes), berries, paw paws, mangos, melons, guavas, tomatoes, bananas Green vegetables : Spinach, cabbage, broccoli, green peppers Cauliflowers, potatoes (with skin), plantains, young maize, sprouted cereals and pulses Animal foods: Liver, milk NB. Substantial vitamin C can be lost during food processing, preservation, and preparation.	Helps the body use calcium and other nutrients to build bones and the walls of blood vessels Helps form collagen, which is important for connective tissues Increases absorption of iron from foods Increases resistance to infection Antioxidant Protein metabolism	Scurvy (bleeding gums, dry skin, dry mouth, impaired wound healing) Gingivitis (bleeding, sore, and inflamed gums) Stomatitis (sores on the corners of the mouth) Anemia

Nutrient	Food sources	Function	Deficiency, signs, and symptoms
Folic acid	Animal foods: Liver, eggs, poultry, meat Green leafy vegetables: Spinach, kale, legumes Oranges, whole grain cereals, nuts	Involved in synthesis of red blood cells Maintenance of the nervous system Metabolism of amino acids	Macrocytic anemia Glossitis Stomatitis Diarrhea Neural tube defects
Micronutrients (minerals)			
Iron	Red meat, liver, fish, poultry, shellfish Eggs, legumes, vegetables, fruits NB. Phytates in cereals and vegetables and tannins in tea and coffee decrease iron absorption. Iron in food boiled in water is leached and lost if the water is discarded.	Oxygen transportation Needed by enzymes Absorption of vitamin C Energy production	Macrocytic anemia Fatigue Pallor Glossitis Irritability Dizziness Decreased mental alertness
Iodine	Seafood,, seaweed, iodized salt NB. Iodine content depends on the soil, animal feed, etc.	Development and proper functioning of the brain and nervous system Important for normal growth and development, protein synthesis, energy metabolism, and reproduction	Goiter (swelling on the neck) Hypothyroidism Cretinism Impaired brain function Dwarfism (gross stunting)
Zinc	Animal sources; Meat, liver, fish, poultry, eggs, milk, yoghurt, seafood including shellfish and oysters Plant sources: Cabbage, carrots, spinach, beets, green peas, legumes, whole grain cereals, peanuts, barley	Protects the immune system Needed for digestion Enzyme formation Wound healing Vitamin A metabolism Normal development of male organs Antioxidant Component of insulin	Slow growth Loss of smell and taste Loss of appetite Diarrhea Poor wound healing Skin problems
Calcium	Milk, yoghurt, cheese, green leafy vegetables such as broccoli, legumes, peas, fish with bones that are eaten	Strong bones and teeth Normal functioning of the heart Helps in blood clotting Helps maintain normal blood pressure	Delayed blood clotting Weak, breakable bones (osteoporosis) Osteomalcia Teeth problems Low resistance to infection Stunting

Nutrient	Food sources	Function	Deficiency, signs, and symptoms
Copper	Nuts, shellfish, liver, kidneys, raisins, legumes NB. Copper content of foods is reduced by milling, grinding, and cooking in water and is affected by environmental factors such as type of fertilizer	Copper-containing enzymes play a role in energy metabolism and fatty acid metabolism. Influences iron absorption and mobilization	Mental deterioration Hypothermia Hair depigmentation Microcrytic anemia (indistinguishable from iron deficiency anemia) affecting infants and people with severe protein energy malnutrition
Selenium	Brown rice, nuts, whole grains Mushrooms, UNBOILED asparagus, onions, garlic, egg yolks, milk, meat, seafood	Prevents oxidation and breakdown of fat and other body cells Antioxidant Helps in treatment of children with kwashiorkor	Weakness Pancreatitis (blockage of the pancreatic ducts) Impaired growth Impaired hearing Faster HIV disease progression and reduced survival Impaired immune system
Magnesium	Legumes, avocados, green leafy vegetables (okra, broccoli), cucumber skin, nuts, seeds, whole grain cereals Seafood, dairy products, meat, poultry	Muscle and nerve function Synthesis of proteins and fats Strong bones and teeth	Muscle spasms Cramps Tremors Seizures Coma NB. Excessive loss of magnesium resulting from diarrhea and severe PEM leads to weakness, mental changes, and occasionally convulsions.
Fluoride	Fish and seaweed Bone meal, meat, and dairy products Grains, vegetables, and nuts	Protection of bone and dental tissues Protection against tooth decay (caries) Wound healing	Dental caries
Phosphorus	Milk and milk products Legumes	All energy-producing reactions Calcium metabolism	Weakness Cardiac failure Glucose intolerance Decreased red blood cell function

Nutrient	Food sources	Function	Deficiency, signs, and symptoms
Sodium	Table salt, canned soups	Primary regulator of fluid in the body Maintenance of blood pressure	Dehydration
Potassium	Bananas, avocados, oranges, mangoes, papayas Legumes, spinach, cabbage, carrots, tomatoes, potatoes, yams Milk, meat, chicken, pork, fish	Nervous system functioning Muscle contraction Maintenance of blood pressure	Muscle weakness Tetany Cardiac problems Hypotension (low blood pressure)

Handout 2.2 Nutrition Calculations

Basal metabolic rate (BMR) and activity factors

Equations for estimating BMR from body weight

Age (years)	kcal/day
Males	
18–30	15.1 x weight (kg) + 692
30–60	11.5 x weight (kg) + 873
> 60	11.7 x weight (kg) + 588
Females	
18–30	14.7 x weight (kg) + 496
30–60	8.7 x weight (kg) + 829
> 60	10.5 x weight (kg) + 596

Activity

	Light	Moderate	Heavy
Male	1.55	1.78	2.10
Female	1.56	1.64	1.82

Additional energy requirements for pregnant and lactating women

Additional daily energy requirements for pregnant women

Full activity	285 kcal/day
Reduced activity	200 kcal/day

Additional daily energy requirements for lactating women

First 6 months	500 kcal/day
Second 6 months	500 kcal/day

Energy requirements of children > 12 months old

Average daily energy requirements for children 1−18 years old

Age (years)	Energy requirement (kcal/day)	
	Girls	Boys
1–2	865	948
2–3	1,047	1,129
3–4	1,156	1,252
4–5	1,241	1,360
5–6	1,330	1,467
6–7	1,428	1,573
7–8	1,554	1,692
8–9	1,698	1,830
9–10	1,854	1,978
10–11	2,006	2,150
11–12	2,149	2,341
12–13	2,276	2,548
13–14	2,379	2,770
14–15	2,449	2,990
15–16	2,491	3,178
16–17	2,503	3,322
17–18	2,503	3,410

Additional energy requirements for infants

Average daily energy requirements for infants

Age (months)	Energy requirement (kcal/day)	
	Girls	**Boys**
0–1	464	518
1–2	517	570
2–3	550	596
3–4	537	569
4–5	571	608
5–6	599	639
6–7	604	653
7–8	629	680
8–9	652	702
9–10	676	731
10–11	694	752
11–12	712	775

Average daily energy requirements for children 1–18 years old

Age (years)	Energy requirement (kcal/day)	
	Girls	**Boys**
1–2	865	948
2–3	1,047	1129
3–4	1,156	1,252
4–5	1,241	1,360
5–6	1,330	1,467
6–7	1,428	1,573
7–8	1,554	1,692
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10–11	2,006	2,150
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12–13	2,276	2,548
13–14	2,379	2,770
14–15	2,449	2,990
15–16	2,491	3,178
16–17	2,503	3,322
17–18	2,503	3,410

Protein requirements for adults and children

Safe adult protein intake requirements

	Safe protein intake level (g/kg)
Average adult	**0.75**
Pregnant woman	**0.75 + 6 grams/day**
Lactating woman:	
At 6 months	0.75 + 16 grams/day
At 6−12 months	0.75 + 12 grams/day
At 12 + months	0.75 + 11 grams/day

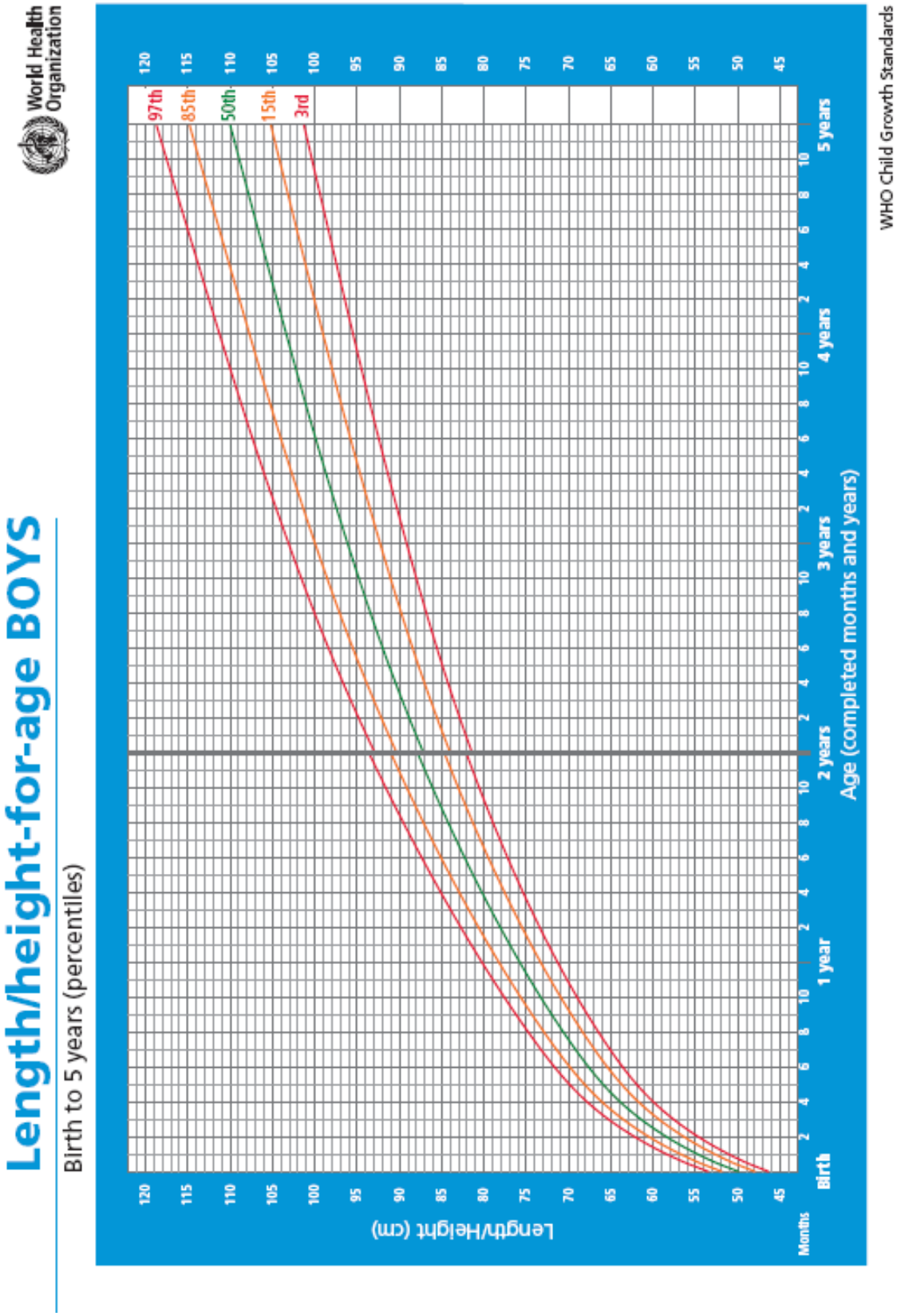
Safe child protein intake requirements by age

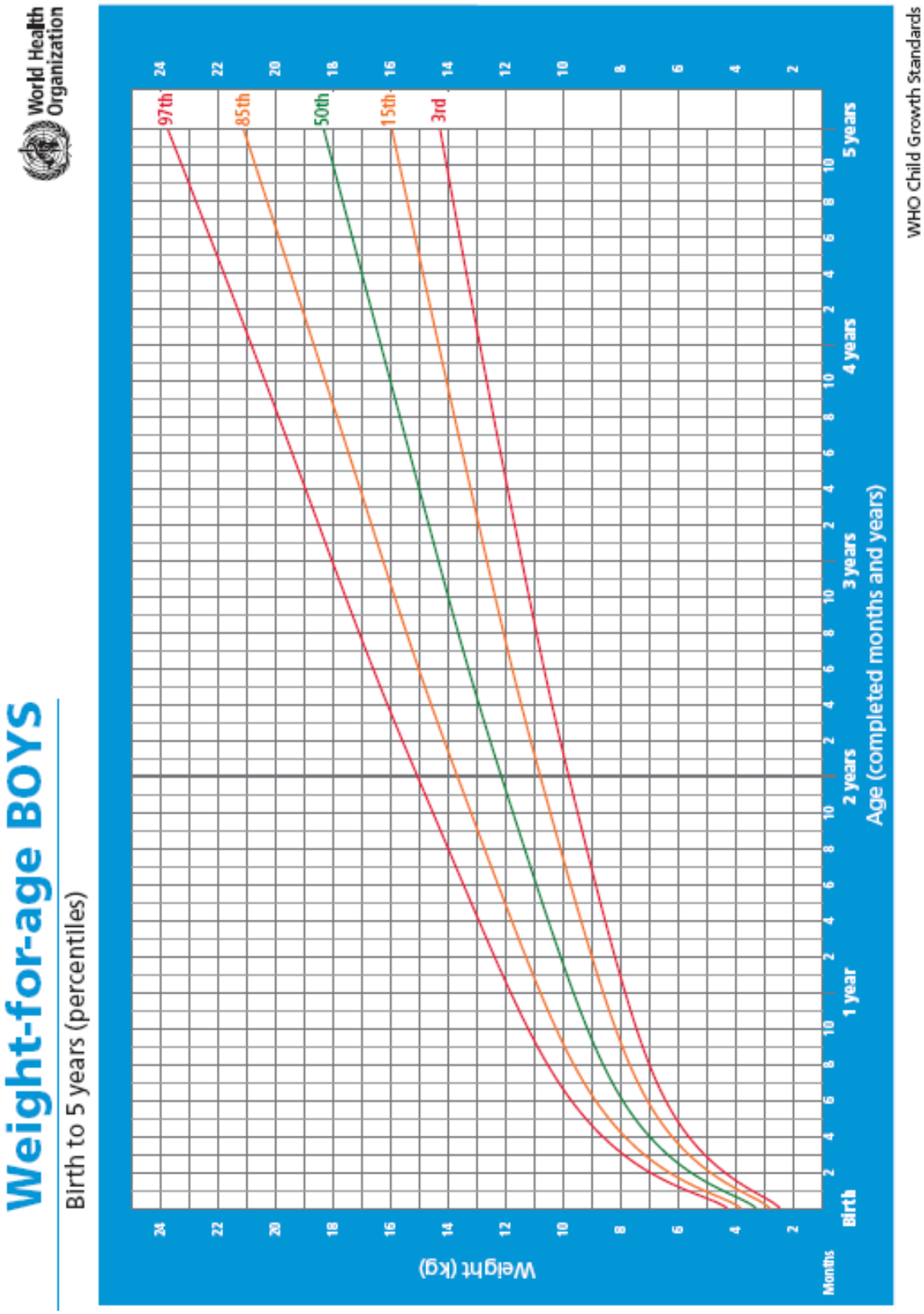
Age (years)	Safe protein intake level (g/kg)	
	Girls and boys combined	
1–2	1.20	
2–3	1.15	
3–5	1.10	
5–7	1.00	
7–10	1.00	
	Girls	Boys
10–12	1.00	1.00
12–14	0.95	1.00
14–16	0.90	0.95
16–18	0.80	0.90

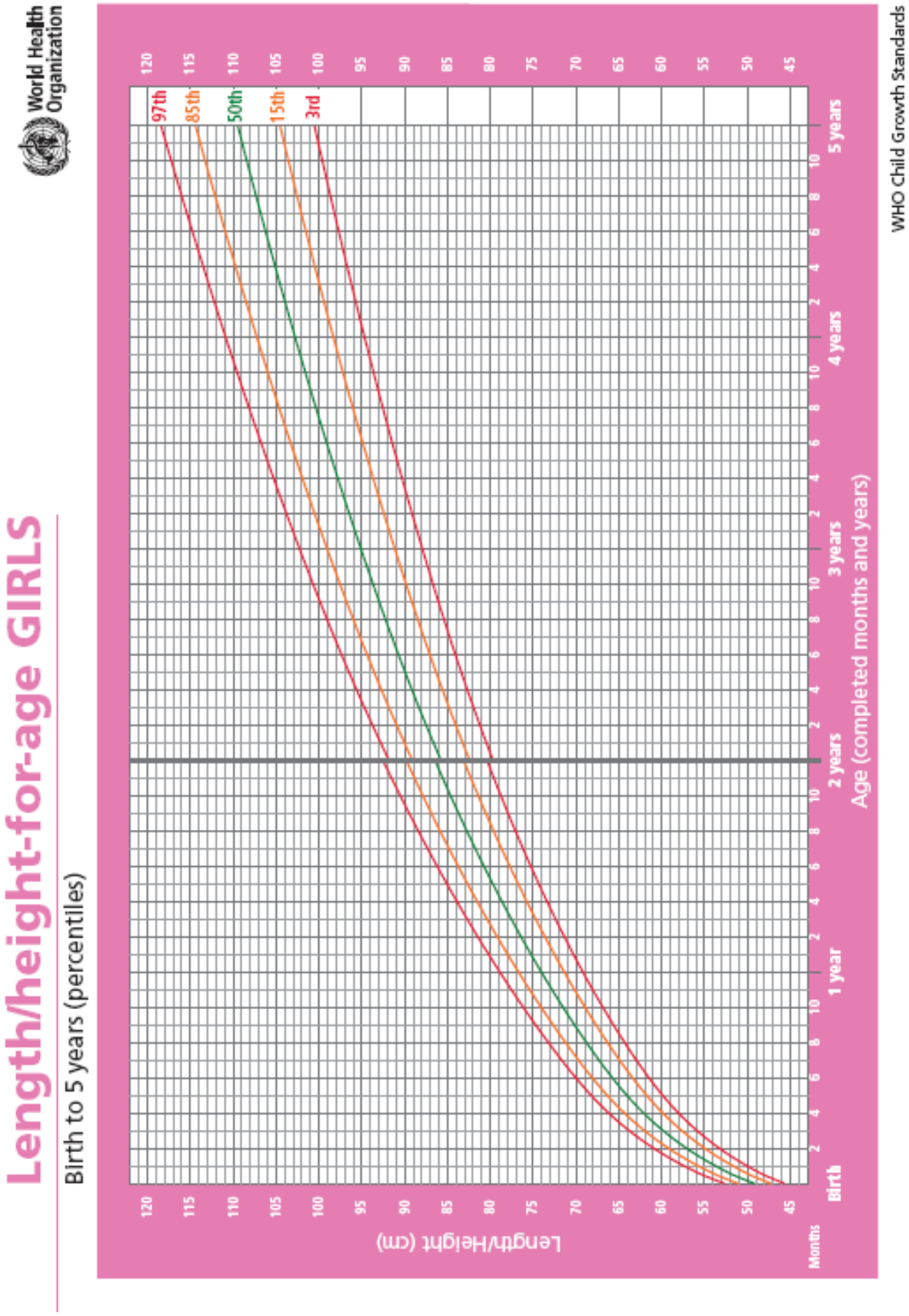
Equation for calculating body mass index (BMI)

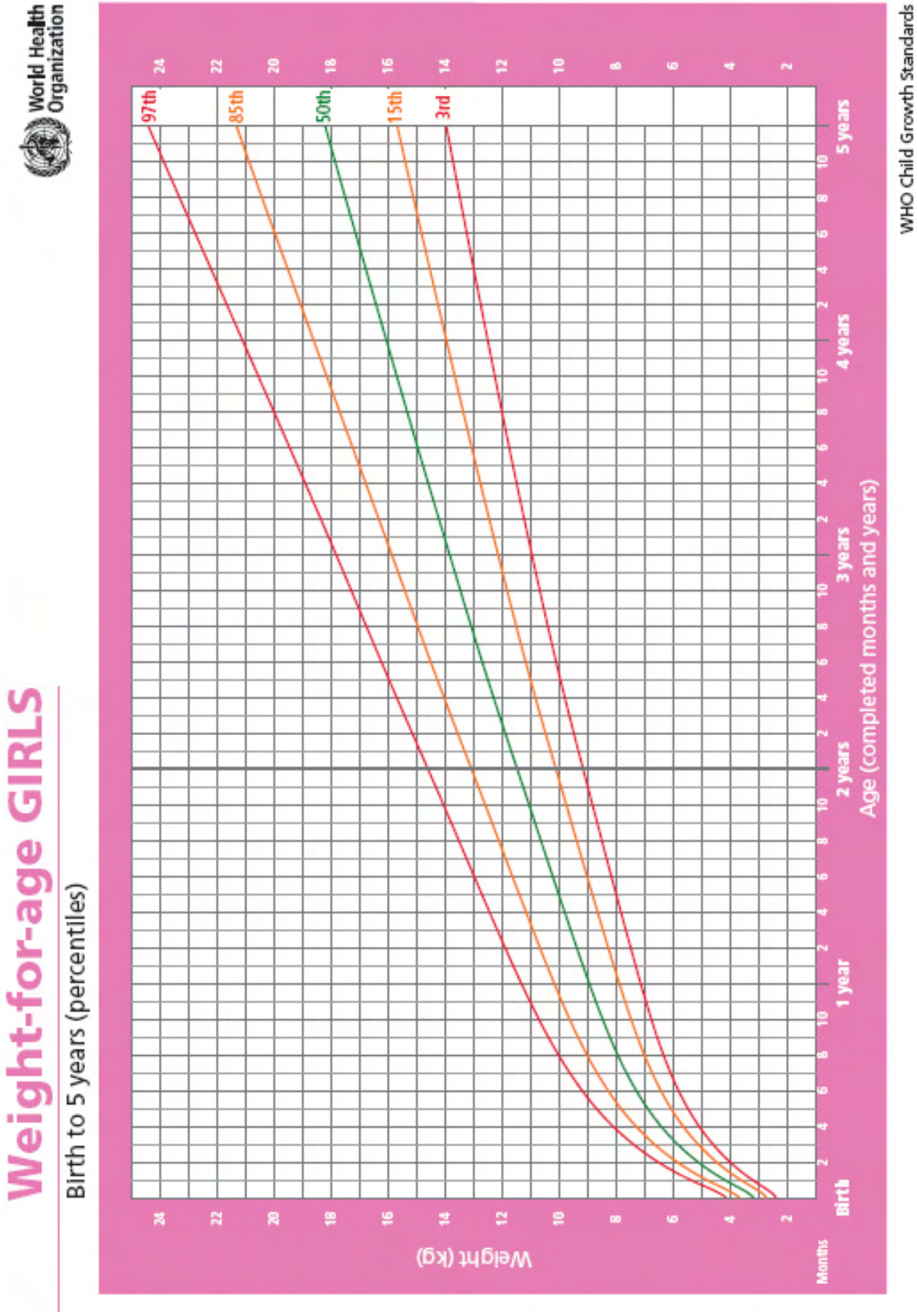
$$\text{BMI} = \frac{\text{Weight (kg)}}{\text{Height (m)}^2}$$

Handout 2.3. Length/Height for Age and Weight for Age




World Health Organization
Weight-for-age BOYS
Birth to 5 years (percentiles)
97th
85th
50th
15th
3rd
Weight (kg)
Months
Birth
1 year
2 years
3 years
4 years
5 years
Age (completed months and years)
WHO Child Growth Standards


World Health Organization
Length/height-for-age GIRLS
Birth to 5 years (percentiles)
97th
85th
50th
15th
3rd
Length/Height (cm)
Months
Birth
1 year
2 years
3 years
4 years
5 years
Age (completed months and years)
WHO Child Growth Standards


World Health Organization
Weight-for-age GIRLS
Birth to 5 years (percentiles)
97th
85th
50th
15th
3rd
Weight (kg)
24
22
20
18
16
14
12
10
8
6
4
2
Months
Birth
1 year
2 years
3 years
4 years
5 years
Age (completed months and years)
WHO Child Growth Standards

2 to 20 years: Boys
Stature-for-age and Weight-for-age percentiles

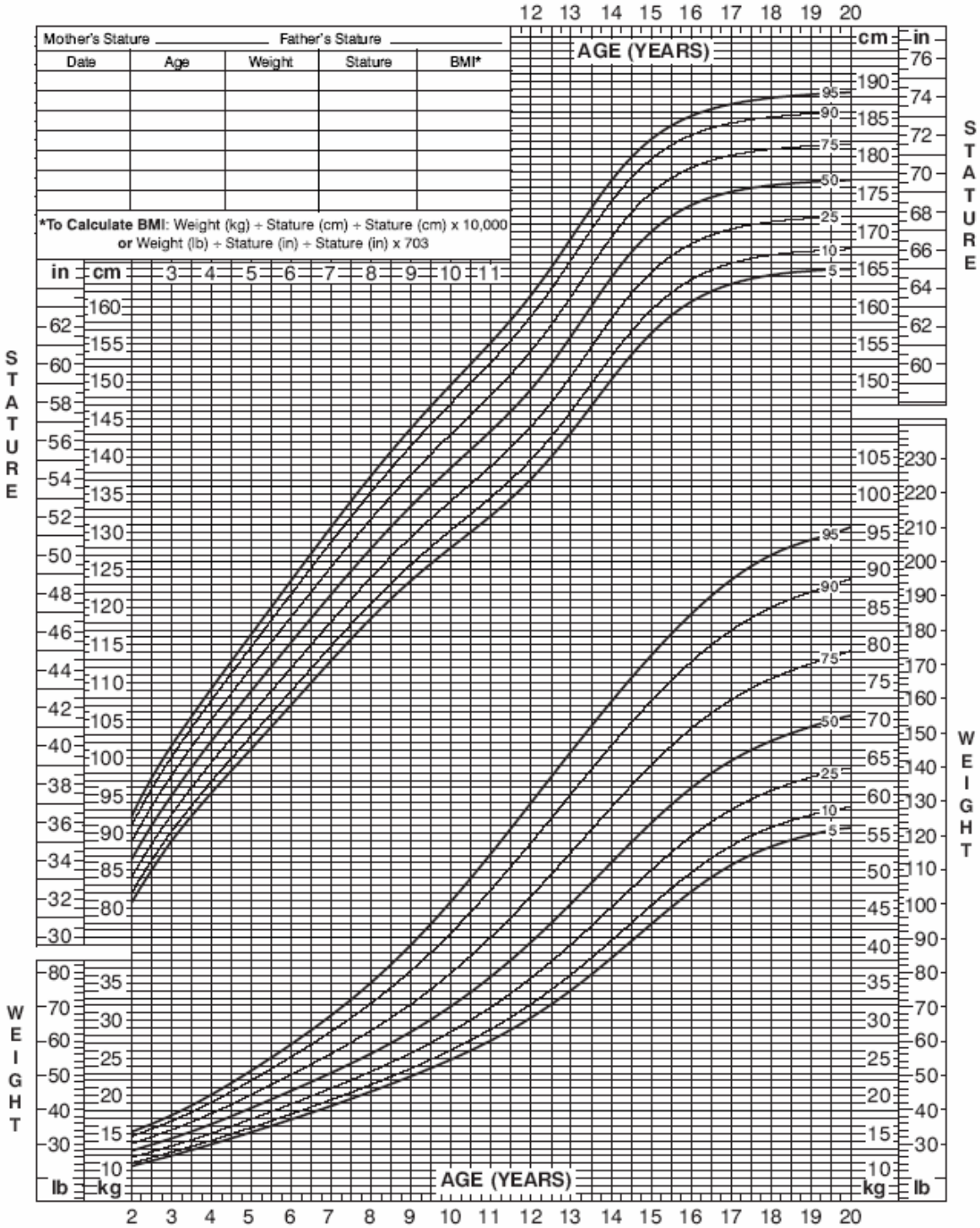
NAME _____

RECORD # _____

Mother's Stature _____ Father's Stature _____

Date	Age	Weight	Stature	BMI*

***To Calculate BMI**: Weight (kg) ÷ Stature (cm) ÷ Stature (cm) x 10,000
or Weight (lb) ÷ Stature (in) ÷ Stature (in) x 703



Published May 30, 2000 (modified 11/21/00).
SOURCE: Developed by the National Center for Health Statistics in collaboration with the National Center for Chronic Disease Prevention and Health Promotion (2000).
http://www.cdc.gov/growthcharts

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2 to 20 years: Girls
Stature-for-age and Weight-for-age percentiles

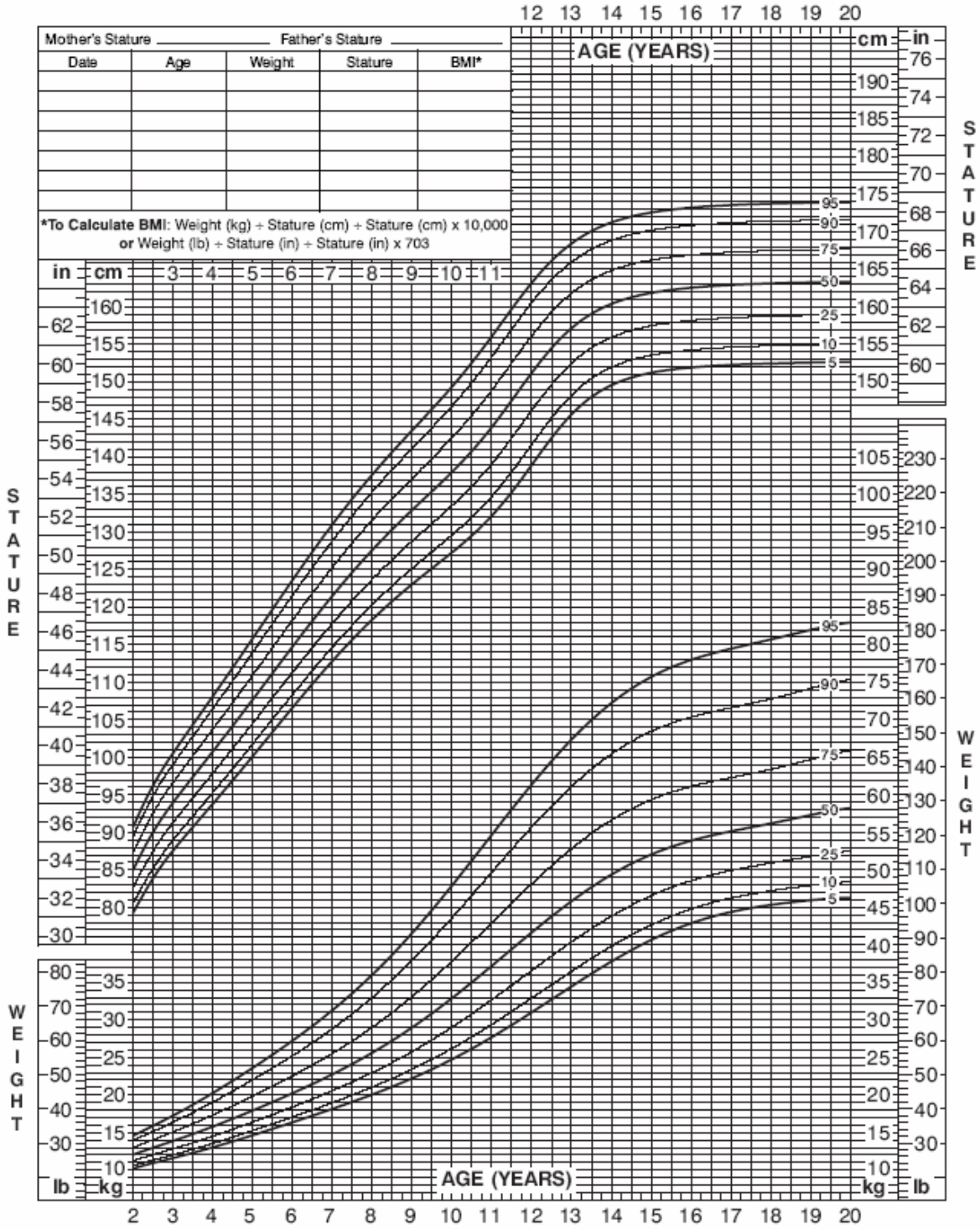
NAME _____

RECORD # _____

Mother's Stature _____ Father's Stature _____

Date	Age	Weight	Stature	BMI*

*To Calculate BMI: Weight (kg) ÷ Stature (cm) ÷ Stature (cm) x 10,000
or Weight (lb) ÷ Stature (in) ÷ Stature (in) x 703



Published May 30, 2000 (modified 11/21/00).
SOURCE: Developed by the National Center for Health Statistics in collaboration with the National Center for Chronic Disease Prevention and Health Promotion (2000).
http://www.cdc.gov/growthcharts

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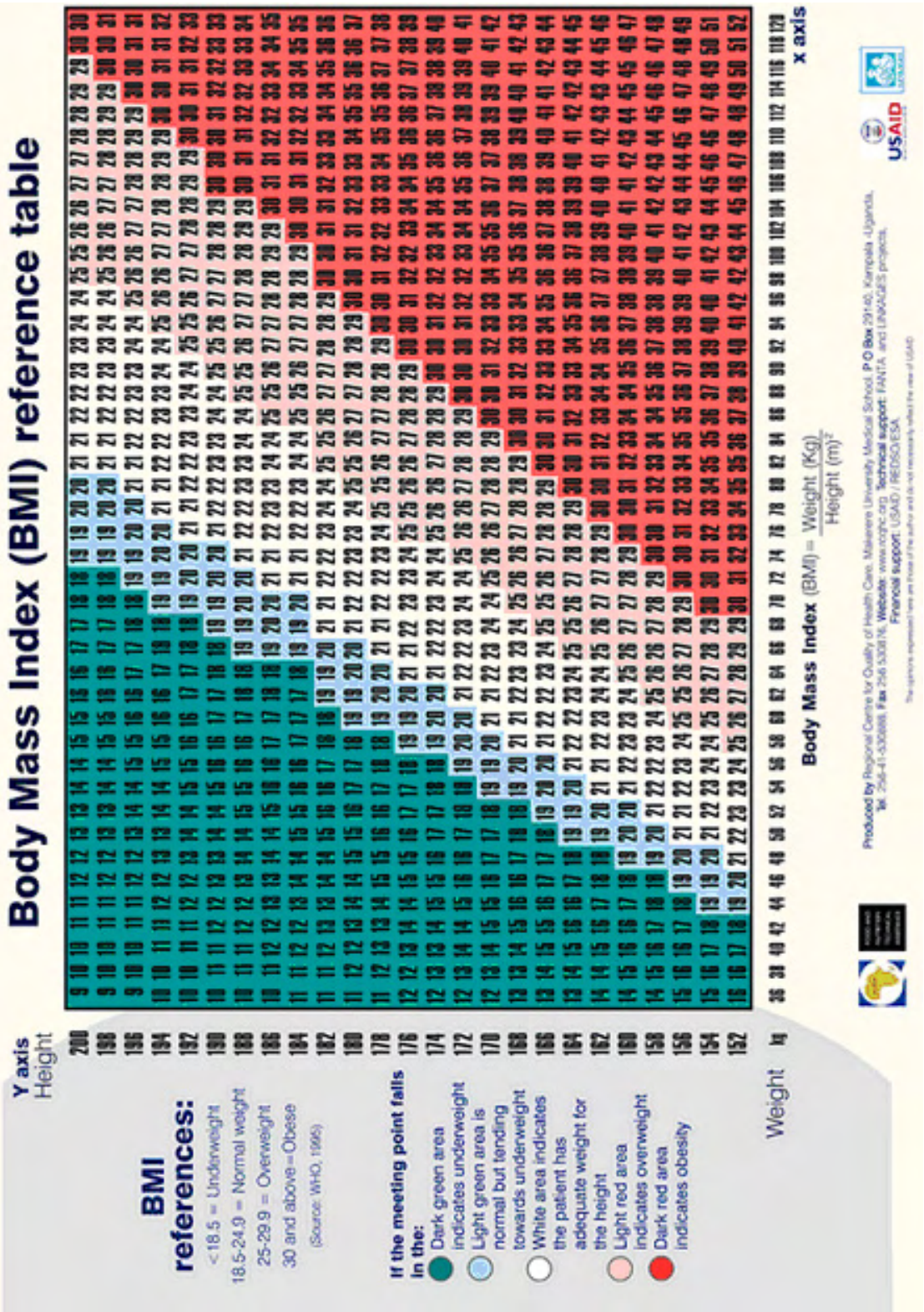
Handout 2.4. Body Mass Index Reference Table



Appendix 1. Answers to Exercises

Exercise 1

BMR = 1,275 kcal/day (14.7 x 23 kg + 496)
Total kcal/day = 2,091 (1,275 x 1.64)

Exercise 2

BMI = 17.2 (57 kg ÷ 1.822)
Body type = Thinness grade 1 (mild undernutrition)

Exercise 3

Protein energy malnutrition manifested as kwashiorkor. The child should be admitted to a treatment center or hospital immediately for rehydration and special food formulas to help her recover. Once she is admitted from the recovery facility, health staff should follow up with the child and engage community leaders in ensuring that households have adequate access to food energy sources.

Exercise 4

Anemia. Because of the potential risk to the fetus and the possibility of complications with childbirth, the mother should be given iron supplementation and encouraged to eat more fresh fruits and vegetables and animal products high in iron.

Exercise 5

According to the growth charts, the child is below the 5th percentile for height, suggesting that he may be stunted and suffering from chronic undernutrition. However, he is at the 50th percentile for weight, suggesting he is of average weight for age.

Session Two:
Basics of Nutrition

Purpose

Provide basic nutrition information, including food sources of nutrients, roles of nutrients in the body, and disorders associated with inadequate nutrition.

2

Learning Objectives

- Understand the importance of good nutrition.
- Identify food sources of nutrients.
- Describe the roles of nutrients in the body.
- Understand the causes and consequences of undernutrition.
- Describe strategies to combat undernutrition.

3

Session Outline

- Good nutrition
- Essential nutrients and food sources
- Role of nutrients in the body
- Nutrient requirements
- Measuring nutritional status
- Causes and consequences of undernutrition
- Strategies to combat undernutrition
- National nutrition guidelines, policies, and strategies

4

Good Nutrition

- Consuming food and nutrients and using them to function healthily
- Both cause and result of good or poor health
- Not the same as “food” and “nutrients”
- Food = products eaten or taken into the body that contain nutrients for
  - Development, growth, and maintenance of tissues and cells
  - Resisting and fighting infection
  - Producing energy, warmth, and movement
  - Carrying out the body’s chemical functions

5

Essential Nutrients

- Macronutrients
  - Carbohydrates
  - Fats (lipids)
  - Proteins
- Micronutrients
  - Vitamins
  - Minerals
- Water

6

Macronutrients: Carbohydrates

- Energy-giving foods composed of sugars
- Common staple eaten regularly, accounting for up to 80% of the diet in developing countries
- Quickly absorbed by the body
- Sources
  - Cereals (e.g., millet, sorghum, maize, rice)
  - Root crops (e.g., cassava, potatoes)
  - Starchy fruits (e.g., bananas)

7

Macronutrients: Fats and Oils (Lipids)

- Energy-giving foods
- Not produced by the body
- Absorbed more slowly than carbohydrates
- Account for small part of diet in developing countries
- Fats (solids): Butter, ghee, lard, margarine
- Oils (liquids): Corn oil, soybean oil, peanut oil

8

Macronutrients: Proteins

- Body-building foods
- Form main structural components of cells
- Help produce and maintain tissues and muscles
- Sources
  - Plants (e.g., beans, nuts, chickpeas)
  - Animals (meat, poultry, fish, dairy products, insects)

9

Micronutrients: Vitamins

- Organic compounds mostly from outside the body
- Do not provide energy
- Fat soluble: Dissolve in lipids, can be stored, not needed daily (e.g., vitamins A, D, E, K)
- Water soluble: Dissolve in water, absorbed into bloodstream immediately, needed daily
- Sources
  - Fruits
  - Dark leafy vegetables
  - Animal foods

10

Micronutrients: Minerals

- Inorganic compounds not synthesized by the body
- Needed in very small quantities but possibly essential
- Important for biochemical processes and formation of cells and tissues
- Sources
  - Plants
  - Animal products

11

Water

- Main component of the body (60 percent of body mass)
- Needed for digestion, absorption, and other body functions
- Regularly lost through sweating, excretion, and breathing
- Approximately 1,000 ml (4−8 cups) needed each day

12

Essential Nutrient Food Products

- What local foods are rich in these essential nutrients?
  - Proteins
  - Carbohydrates
  - Fats and oils
  - Vitamins (water soluble and fat soluble)
  - Minerals (including iodine and iron)

13

Energy Requirements

- Amounts needed to maintain health, growth, and appropriate physical activity
- Vary according to age, gender, and activity
- Met through an age-appropriate balanced diet
- Based on
  - Basal metabolism: Energy needed for basic body functions
  - Metabolic response to food: Energy needed to digest, absorb, and utilize food
  - Physical activity: Work, rest, and play
  - Physiology: Pregnancy, lactation, and maturation increase energy needs

14

Energy Requirements of Adults > 19 Years Old

- Basal metabolic rate (BMR) = Number of kilocalories (kcal) needed each day
- Energy needs = BMR x activity factor
- Additional energy needed by pregnant and lactating women

15

Energy Requirements of Children and Adolescents < 18

- Calculated based on age, physical activity, and energy needs for growth
- Increase after age 10 to support changing body composition and growth
- Kcals required per day (FAO, WHO, UNU 2004)
  - Boys 1−18 years old: 948−3,410
  - Girls 1−18 years old: 865−2,503

16

Energy Requirements of Infants 0−12 Months Old

- Mainly for growth
- Vary by age and gender
- All energy and nutrient needs met by breastmilk for the first 6 months of life

17

Protein Requirements

- Needed daily to replenish continuous depletion
- May vary by age, health status, physiological status, and occupation
  - Higher for pregnant and lactating women
  - Fluctuate in children based on weight, age, and gender

18

Undernutrition

- The manifestation of inadequate nutrition
- Common in sub-Saharan Africa
  - 1/3 of all children < 5 years old underweight
  - 38% of children with low height for age
- Many causes
  - Inadequate access to food/nutrients
  - Improper care of mothers and children
  - Limited health services
  - Unhealthy environment

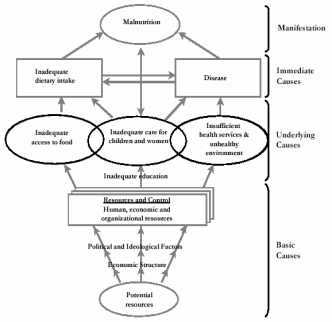
19

Conditions Associated with Under- and Overnutrition

- Vitamin deficiency disorders
  - Scurvy (deficiency of vitamin C)
  - Rickets (deficiency of vitamin D)
  - Mental, adrenal disorders (deficiency of B vitamins)
- Mineral deficiency
  - Osteoporosis (deficiency of calcium)
- Diet-related non-communicable diseases
  - Diabetes
  - Coronary heart disease
  - Obesity
  - High blood pressure

20

Causes of Undernutrition



Source: Adapted from UNICEF (1998) *The State of the World's Children 1998*. Oxford University Press, Oxford.

21

Nutritional Status Determined by Anthropometry

- Underweight: Low weight for age compared to reference standard, a composite measure of stunting and wasting
- Stunting: Low height for age compared to reference standard, an indicator of chronic or past growth failure
- Wasting: Low weight for height, an indicator of short-term nutritional stress

22

Other Anthropometric Measurements

- MUAC (mid-upper arm circumference)
- BMI (body mass index): Compares height and weight

$$BMI = \text{Weight (kg)} \div \text{height (m)}^2$$

23

Manifestations of Protein-Energy Malnutrition (PEM)

- Marasmus: Severe growth failure
  - Weight < 60% weight for age
  - Frailty, thinness, wrinkled skin, drawn-in face, poss ble extreme hunger
- Kwashiorkor: Severe PEM
  - Weight 60−80% weight for age
  - Swelling (edema), dry flaky skin, changes in skin and hair, appetite loss, lethargy
- Marasmic kwashiorkor: Most serious form of PEM, combining both conditions above
  - Weight < 60% weight for age

24

Strategies to Prevent and Control Undernutrition

- Improve household food security.
- Improve diversity of diet.
- Improve maternal nutrition and health care.
- Improve child feeding practices.
- Ensure child health care (immunization, medical care, growth monitoring).
- Provide nutrition rehabilitation.

25

Nutritional Anemia

- Most common type of anemia
- Caused by malaria, hookworm, and inadequate iron and vitamin intake resulting in low hemoglobin levels
- Affects mainly children < 5 years old and pregnant women
- Detected by measuring blood hemoglobin levels

26

Effects of Anemia

- Adults
  - Reduced work capacity
  - Reduced mental capacity
  - Reduced immune competence
  - Poor pregnancy outcomes
  - Increased risk of maternal death
- Infants and children
  - Reduced cognitive development
  - Reduced immune competence
  - Reduced work capacity

27

Strategies to Prevent and Control Anemia

- Promote iron, folic acid, and B12-rich foods.
- Treat and prevent anemia-related diseases (malaria and worms).
- Provide iron and folic acid supplements to infants and pregnant and lactating women.
- Fortify foods.
- Promote vitamin C-rich foods with meals.
- Discourage drinking coffee or tea with meals.

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Iodine Deficiency Disorders (IDD)

- Caused by inadequate intake of iodine
- Only 1 tsp. needed over entire lifetime
- Iodine in food sources varies by geography.
  - Less in highlands and mountain regions
  - Leached from soil and carried to lowlands

29

Manifestations of IDD

- Goiter: Enlarged neck region from overactive thyroid gland
- Hypothyroidism: Dry skin, weight gain, puffy face, lethargy from underactive thyroid
- Hyperthyroidism: Rapid pulse and weight loss from overactive thyroid
- Cretinism: Mental retardation, physical development problems, spasticity from IDD in mother during pregnancy

30

Strategies to Control IDD

- Iodize salt, dairy products, and bread where where iodine is deficient in local foods.
- Provide iodine drops.
- Inject people with iodized oil (expensive).

31

Causes of Vitamin A Deficiency (VAD)

- Low consumption of vitamin A-rich foods.
- Dietary deficiency due to food processing
- Limited consumption of fats and oils
- Poor breastfeeding (no colostrum, insufficient breastfeeding)
- Diseases affecting absorption (e.g., worms, chronic diarrhea)

32

Manifestations of VAD

- Xerophthalmia (eye conditions)
  - Blindness (VAD is the leading cause of blindness in children < 5 years old)
  - Bitot's spots
  - Damage to the cornea
- Slowed growth and development
- Reduced reproductive health
- Increased risk of anemia

33

Strategies to Control VAD

- Promote vitamin A-rich foods (fruits, vegetables, red palm oil).
- Give infants and women low-dose iron supplements according to WHO protocols.
- Improve food security.
- Feed children properly.
- Prevent disease and treat disease early.
- Fortify foods.

34

National Nutrition Strategies, Policies, and Guidelines

- General nutrition
- Infant feeding
- Nutrition and HIV
- Food security

35

Case Study 1

- Food has been in short supply in your area. A mother brings her 3 year-old daughter to the clinic. She is worried because the child has a poor appetite, skin conditions that won't go away, and excessive diarrhea. Her hair has gotten lighter. You notice swelling around the child's ankles. What might she suffer from? What is the appropriate course of action?

36

Case Study 2

- A 28-year-old pregnant woman attending the antenatal clinic complains of shortness of breath, dizziness, a fast heart rate, and extreme fatigue. When asked about the foods she has been eating, she says she's had little access to meat and fish since her pregnancy. What nutrition deficiency might she be suffering from? What action would you recommend?

37

Case Study 3

- You and another nurse are community health workers making rounds to households to assess the general health of children under five. You notice that most children seem small or thin for their age and decide to assess weight for age and height for age using a hanging scale and height board. In the first household, a 24-month-old boy weighs 13 kg and is 80 cm tall. Using the growth charts in the Appendix, assess this child.

38

Conclusions

- Good nutrition is essential for health and well-being.
- Daily well-balanced diets should include foods containing essential nutrients and meeting energy requirements.
- Inadequate nutrition can lead to PEM and vitamin and mineral deficiencies (anemia, VAD, IDD).
- Nutrition interventions include improved household food security, food fortification, vitamin and mineral supplementation (for women and children), and improved child feeding.

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SESSION 3. LINKS BETWEEN NUTRITION AND HIV

Purpose (slide 2)

- The purpose of this session is to provide students with information about the relationship between nutrition and HIV.

Learning objectives (slide 3)

By the end of the session, students will be able to:

- Explain the relationship between nutrition and infection.
- Describe how nutrition affects HIV.
- Describe how HIV affects nutrition.

Prerequisite knowledge

- Basics of nutrition (Session 1)
- Basics of HIV and AIDS (Session 2)

Estimated time: 60 minutes

Session guide (slide 4)

Content	Methodology	Activities	Estimated time (minutes)
Nutrition and infection	Participatory presentation	Explain the relationship between nutrition and infection.	5
Relationship between nutrition and HIV	Large group activity	Present and discuss the cycle of poor nutrition and infection.	10
Effects of poor nutrition on HIV and AIDS	Participatory presentation	Pass out cards with the effects of nutrition on HIV and the effects of HIV on nutrition. Ask students to place their cards under the appropriate heading. Discuss in plenary.	20
Effects of HIV and AIDS on nutrition	Participatory presentation	Introduce the relationship between nutrition and HIV.	10
Conclusions			5
Review			5
Total time			60

Required materials

- Flipchart stand and paper
- Writing pens
- Blackboard and chalk or whiteboard and markers
- LCD or overhead projector
- PowerPoint 3
- 2 poster-size pieces of paper or card
- 11 index cards

Materials provided

- PowerPoint 3

Preparation

1. Review Lecture Notes and PowerPoint 3 to identify questions to help students master the concepts.
2. Be familiar with the relationships between nutrition and infection and nutrition and HIV.
3. Prepare the cards for Exercise 1 as follows. Mark one poster-sized piece of paper or card "Effects of Poor Nutrition on HIV" and the other, "Effects of HIV on Nutrition." On each of the index cards, write one of the following:

    - Lowered immune system functioning
    - Slower healing
    - Faster disease progression
    - Increased nutrient needs
    - Nutrient malabsorption
    - Adverse drug effects
    - Anorexia
    - Nausea
    - Recurrent infections
    - Abnormal metabolic response
    - Frequent diarrhea

Suggested reading

Food and Nutrition Technical Assistance (FANTA) Project. 2004. HIV/AIDS: A Guide for Nutritional Care and Support, 2nd edition. Washington, DC: Academy for Educational Development (AED).

Piwoz, E. G. 2004. Nutrition and HIV/AIDS: Evidence, Gaps, and Priority Actions. Washington, DC: SARA Project, AED.

Piwoz, E. G., and E. A. Preble. 2000. HIV/AIDS and Nutrition: A Review of the Literature and Recommendations for Nutritional Care and Support in Sub-Saharan Africa. Washington, DC: SARA Project, AED.

World Health Organization (WHO). 2003. Nutrient Requirements for People Living with HIV/AIDS: Report of a Technical Consultation. Geneva.

Related terms

Antioxidant vitamin – A type of vitamin found in fruits and vegetables that may help fight infection

Immunocompetent – Having normal capacity to develop an immune response to infection-causing antigens

Immunosuppressed – Having a suppressed immune response to infection-causing antigens, including deliberate suppression of the response in order to control autoimmune diseases

Opportunistic infection – An infection that takes advantage of a weak immune system. Opportunistic infections common in people with HIV vary from tuberculosis and persistent diarrhea to pneumonia and Kaposi's sarcoma.

Oxidative stress – A disturbance in the equilibrium of pro-oxidant/antioxidant systems of intact cells. Oxidative stress in HIV may be caused by both overproduction of reactive oxygen intermediates (ROI) and a simultaneous deficiency of antioxidant defenses.

Wasting – In children, weight for height more than two standard deviations below the median reference level; in adults, involuntary weight loss of at least 10 percent of body weight

Introduction

The relationship between nutrition and HIV is a vicious cycle, similar to the relationship between nutrition and other infections. HIV compromises nutritional status, and poor nutrition further weakens the immune system, increasing susceptibility to opportunistic infections (OIs) (CRHCS and SARA Project 2001).

Nutrition and infection (slide 5)

Before looking at the relationship between nutrition and HIV, it is important to understand the relationship between nutrition and infection in general. Poor nutrition increases the body's vulnerability to infections, and infections aggravate poor nutrition. Inadequate dietary intake leads to poor nutrition and lowers immune system functioning. Poor nutrition reduces the body's ability to fight infections and therefore helps increase the incidence, severity, and length of infections. Symptoms that accompany infections such as loss of appetite, diarrhea, and fever lead to reduced food intake, poor nutrient absorption, nutrient loss, and altered metabolism. All of these contribute to weight loss and growth faltering, which further weaken the immune system.

An adequate nutrient-dense diet, proper hygiene, food safety, and nutrition management of symptoms are critical interventions to break the cycle of infection and poor nutrition.

HIV and nutrition (slide 6)

HIV infection progressively destroys the immune system, leading to recurrent OIs, debilitation, and death. OIs are infections that take advantage of a weak immune system. Poor nutritional status is one of the major complications of HIV and a significant factor in full-blown AIDS. In resource-limited settings, many people who become infected with HIV may already be undernourished. Their weakened immune systems further increase their vulnerability to infection.

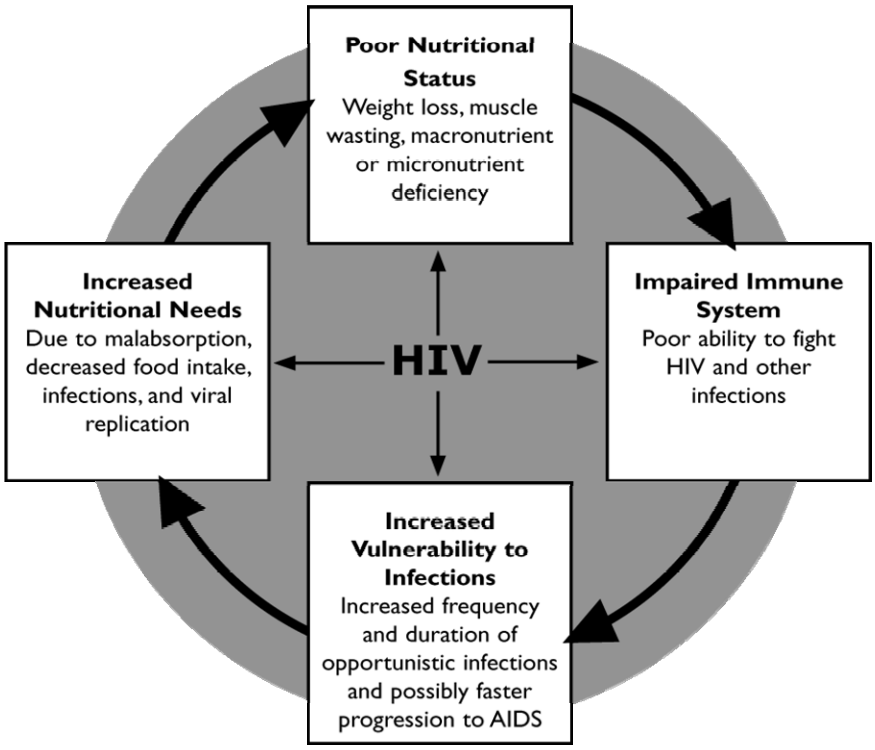
Poor nutrition and HIV: A vicious cycle (slide 7)

The relationship between HIV and nutrition is multifaceted and multidirectional. HIV can cause or worsen undernutrition by causing reduced food intake, increased energy requirements, and poor nutrient absorption. Undernutrition in turns further weakens the immune system, increasing vulnerability to infection and worsening the disease's impact. This cycle can result in the following:

- Weight loss, the most common and often most disturbing symptom of HIV, reported in most people with AIDS (RCQHC and FANTA Project 2003b)
- Loss of muscle tissue and fat
- Vitamin and mineral deficiencies
- Increased nutritional needs because of infections, metabolic changes, viral replication, and poor nutrient absorption
- Weakness and reduced productivity
- Reduced immune function
- Increased susceptibility to OIs

Figure 1 illustrates this relationship (slide 8)

Figure 1. Malnutrition and HIV: A vicious cycle

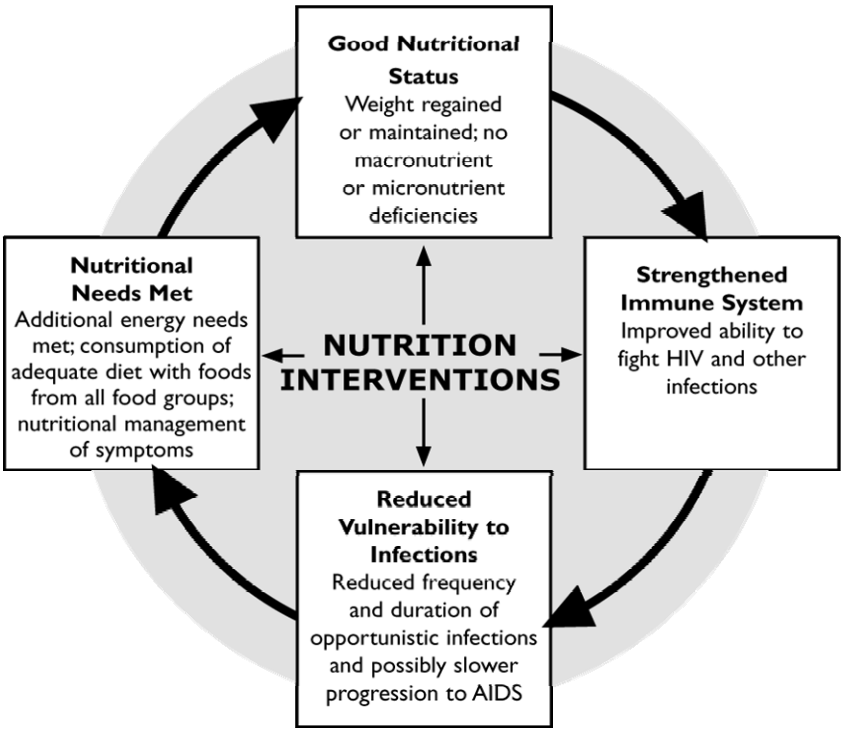


Source: Adapted from RCQHC and FANTA 2003a.

Nutrition care and support helps break this cycle by helping people living with HIV (PLHIV) maintain and improve their nutritional status, boost their immune response, manage the frequency and severity of symptoms, and improve their response to antiretroviral therapy (ART) and other medical treatment.

Figure 2 illustrates how effective nutrition interventions can help transform the vicious cycle of HIV and undernutrition into a positive relationship between improved nutritional status and stronger immune response (slide 9).

Figure 2. Nutrition and HIV: The cycle of benefits from nutrition interventions



Source: Adapted from: RCQHC and FANTA 2003a.

Effects of poor nutrition on HIV (slide 10)

Poor nutritional status can affect HIV in the following ways:

- Weakened immune system
- Increased susceptibility to OIs
- Slower healing process
- Possibly faster progression of disease
- Poorer response to treatment
- Despair and worsening depression

Improving and maintaining good nutrition may prolong health and delay the progression of HIV to AIDS. The impact of proper nutrition begins early in the course of HIV infection, even before other symptoms are observed.

Effects of HIV on nutrition (slide 11)

HIV affects nutritional status in three distinct ways, listed below. These effects can occur simultaneously in the same person.

1. **Reduced food consumption** (slide 12).

Symptoms of OIs can result in reduced food intake because of the following:

- Inability to eat or swallow because of nausea or painful sores in the mouth or throat
- Loss of appetite because of fatigue, depression, and other changes in mental state
- Side effects of medications including nausea, appetite loss, taste changes, diarrhea, vomiting, and abdominal cramps
- Reduced quantity or quality of household food because of inability to work or absenteeism resulting from HIV-related illness or the need to divert money to pay for treatment or other HIV-related expenses

2. **Increased energy needs** (slide 13).

The body's response to HIV infection and viral replication uses additional energy. As the disease progresses and OIs occur, infections and symptoms such as fever further increase energy expenditure. When infection is prolonged, muscle wasting occurs and muscle tissue is broken down. These processes increase PLHIV's energy requirements during the asymptomatic phase by 10 percent over those recommended for healthy, non-HIV-infected people of the same age, sex, and physical activity level. During the symptomatic phase, energy requirements increase by 20–30 percent over those recommended for healthy, non-HIV-infected people of the same age, sex, and physical activity level. The range in the requirement reflects the fact that people with more frequent and severe symptoms need up to 20 percent more energy. Energy requirements for symptomatic children who experience weight loss increase by 50–100 percent (WHO 2003, 2005).

Data are insufficient to recommend an increase in protein intake for PLHIV. WHO recommends that they eat the same amount of protein as people without HIV, that is, enough to make up 12–15 percent of their total energy intake (WHO 2003, 2005). There is no evidence that PLHIV need have increased fat requirements, and WHO (2003) recommends that they eat the same amount of fat as non-infected people.

PLHIV frequently have micronutrient deficiencies, and there is some evidence that low intake of certain micronutrients may contribute to disease progression. There is not enough evidence, however, to support increased micronutrient requirements of PLHIV. WHO (2003, 2005) recommends that PLHIV get 1 recommended daily allowance (RDA) of all micronutrients, if possible from food. If the diet does not provide enough micronutrients, supplementation at 1 RDA may be necessary. PLHIV with micronutrient deficiencies may need higher intake.

Box 1 summarizes the nutrient requirements of PLHIV.

Box 1. Nutrient requirements of PLHIV

Energy. Asymptomatic PLHIV need 10 percent more energy, and symptomatic PLHIV 20–30 percent more energy, than healthy, non-HIV-infected people of the same age, sex, and physical activity level. Symptomatic children with HIV need 50–100 percent more energy than healthy, non-HIV-infected children of the same age, sex, and physical activity level.

Protein. Protein requirements for PLHIV are the same as for non-HIV-infected people; that is, 12–15 percent of energy intake should come from protein.

Fat. Fat requirements for PLHIV are the same as for non-HIV-infected people.

Micronutrients. PLHIV should consume 1 RDA of micronutrients, or more if deficiencies exist.

Source: Adapted from RCQHC and FANTA 2003a

3. **Reduced absorption of nutrients** (slide 14).

HIV interferes with the body's ability to absorb nutrients, an effect that occurs with many infections. Poor absorption is also caused by OI symptoms such as diarrhea and vomiting. Poor absorption can occur in any phase of HIV infection in both adults and children and leads to excess nutrient loss. Poor fat absorption reduces the absorption and use of fat-soluble vitamins such as A and E, which can further compromise nutritional and immune status.

Exercise 1. Post the poster-sized paper or card marked with "Effects of Poor Nutrition on HIV" and "Effects of HIV on Nutrition" on a wall where all students can see them. Give one of the index cards marked with an effect of poor nutrition on HIV or an effect of HIV on nutrition to each of 11 students. Ask the students to walk to the wall and tape their index cards under the appropriate heading. The result should like the illustration below.

Effects of Poor Nutrition on HIV	Effects of HIV on Nutrition
Lower immune system functioning	Increased nutrient needs
Slower healing	Nutrient malabsorption
Faster disease progression	Adverse drug effects
	Frequent diarrhea
	Anorexia
	Nausea
	Recurrent infections
	Abnormal metabolic response

Allow time for discussion. Then ask students to explain their choices, for example, why "Anorexia" was placed under "Effects of HIV on Nutrition" rather than under "Effects of Poor Nutrition on HIV."

AIDS-associated wasting syndrome (slide 15)

AIDS-associated wasting is the involuntary loss of at least 10 percent of body weight. Wasting is a complication of HIV that is well known to be associated with increased morbidity and mortality. AIDS-associated wasting syndrome may be caused by reduced energy intake, reduced nutrient absorption resulting from infections and gastrointestinal disorders including diarrhea, and metabolic changes.

Changes in body composition (slide 16)

When a healthy person has an acute illness that reduces food intake, the body does not ingest and absorb adequate nutrients to meet increased energy needs. As a result, the person may lose fat mass first, though this is usually regained immediately after normal eating habits return. The body stores and uses fats to fuel its energy needs, leaving amino acids needed to build or preserve lean body mass.

However, the opposite seems to happen with HIV in some cases. Amino acids are used to fuel energy needs, while fat continues to accrue. The person with HIV may eat adequate nutrients but utilize and store them inadequately. Such a person has excess fat-storing tissue in proportion to lean tissue as the body converts the digested nutrients into fat instead of lean tissue. The underlying causes of the inability to preserve or regain lean tissue are unknown. This process can lead to excess fat deposits and loss of lean body tissue, especially if the person is taking certain antiretroviral drugs.

Nutrition in the different phases of HIV (slides 17 and 18)

The effects of HIV on nutrition vary according to the phase of the disease, as described below.

1. **Acute phase**

Initial infection. As soon as HIV enters the body, it replicates quickly. This rapid replication requires energy and nutrients, which the virus takes from the body. HIV relies completely on the host for survival and will deplete the host of whatever it needs to multiply and survive. The HIV infection may have a rapid onset, leading to hypermetabolism (an abnormal increase in metabolic rate) with catabolism (the metabolic breakdown of complex molecules into simpler ones, often resulting in a release of energy). Some PLHIV may not have symptoms at this stage, but they need more energy and nutrients, and their food intake should increase accordingly. A PLHIV who does not increase food intake will not have enough nutrients to meet the body's needs. This period lasts from 1 to 6 weeks, depending on the person.

Seroconversion. During this phase the body produces antibodies to fight the virus. The body needs more energy and nutrients to mount this immune response. If the diet does not provide these, the person loses weight and may gradually become undernourished, which weakens the immune system and makes the host more vulnerable to OIs.

2. **Asymptomatic phase**

The length of the asymptomatic phase varies and may last several years, depending on the person's health and nutritional status before HIV infection and during the initial years

of infection. The asymptomatic phase is marked by hypermetabolism. As mentioned above, energy requirements increase by 10 percent during this phase.

3. **Symptomatic phase**

The initial symptomatic phase is marked by the onset of OIs. Common symptoms include fever, night sweats, fungal infection of the mouth, chronic diarrhea, and weight loss. The onset of OIs is a sign of a weakened immune system. Apart from the "true" OIs that generally affect only immunosuppressed people, a number of other infections such as TB that may affect immunocompetent people occur more often in PLHIV. Symptoms that accompany infections, such as appetite loss, diarrhea, and fever, lead to reduced food intake, malabsorption, nutrient losses, and changed metabolism, which in turn lead to weight loss, growth faltering, and further weakening of the immune system. Negative nitrogen balance occurs early in acute infections because of the decrease in food intake and increased urinary protein losses. OIs further increase the nutritional needs of PLHIV and continue to weaken their immune systems and hasten disease progression.

Persistent symptoms and OIs lead to increased energy needs, reduced food intake, nutrient malabsorption, weight loss, and wasting. Wasting is often accompanied by changes in lead body mass and body cell mass (Babameto and Kotler 1997). Persistent reduced food intake, nutrient malabsorption, weight loss, and wasting contribute to progression to full-blown AIDS.

As mentioned above, energy requirements increase by 20–30 percent during the symptomatic phase and by 50–100 percent for symptomatic HIV-affected children who are losing weight.

4. **Full-blown AIDS**

The late phase is marked by metabolic change, weight loss, and wasting. Other characteristics are high viral load, lower CD4 count, and infections such as pneumonia, Kaposi's sarcoma, systemic fungal infection, bacterial infection, and certain types of cancer. Energy requirements at this stage of 20–30 percent higher than those of non-infected people, generally at the higher end of the range. Weakness and symptoms can make it difficult for PLHIV to eat enough food during this phase to meet these requirements.

Evidence base (slide 19)

Early observational studies showed that nutritional status and HIV were inter-related. These studies reported that weight loss, body cell mass depletion, and low body mass index (BMI) were significantly associated with reduced survival rates, accelerated disease progression, and reduced capacity to prevent OIs (Kotler 1989; Guenter et al 1993; Suttmann et al 1995; Wheeler et al 1998; can der Sande et al 2004). A recent study (Paton et al 2006) showed that malnutrition at the time of starting ART is significantly associated with decreased survival among patients starting ART. While evidence of the impact of nutrition interventions on HIV is more limited, studies are ongoing on this topic.

Some studies (e.g., Kaiser et al 2006; Fawzi et al 2004) have found benefits in providing micronutrient supplementation for PLHIV, but evidence is still emerging, and the impacts

of specific micronutrients are still not known. For example, studies on vitamin A supplementation for PLHIV have yielded mixed results. There is also no evidence of the optimal dosage and combination of micronutrients. Meanwhile, as mentioned earlier, WHO currently recommends that PLHIV obtain 1 RDS of all micronutrients, if possible from the diet. People with micronutrient deficiencies may need higher levels.

Additional studies are ongoing, including studies of the impact of food supplementation. More evidence is needed on the impact of specific nutrition interventions on nutritional status, immune response, HIV progression, quality of life, adherence to drug regimens, and survival.

Conclusions (slide 20)

HIV affects nutrition by:

- Reducing food consumption
- Impairing nutrient absorption
- Increasing energy needs
- Causing HIV-associated wasting
- Changing metabolism
- Changing body composition

Poor nutrition affects HIV by:

- Decreasing immunity
- Slowing the healing process
- Possibly hastening disease progression

Other interactions between nutrition and HIV (slide 21)

Specific interactions between nutrition and HIV are discussed in the following sessions:

- Session 4: Nutrition actions to manage symptoms of OIs
- Session 5: Interaction between drugs to treat HIV or OIs and food, affecting drug efficacy, adherence to drug regimens, and nutritional status
- Session 6: Infant feeding choices for HIV-infected women that affect mother-to-child transmission of HIV and infant nutrition
- Session 7: Effect of reduced production or wages lost because of illness on household food security of PLHIV

Exercise 2 (optional). Ask students to list on a flipchart or board factors that are likely to influence the nutritional status of PLHIV in their country. When the factors are listed, ask the students to categorize them according to the following:

- Social factors
- Biological factors
- Programmatic factors.

Allow students time for discussion. Then ask them to explain how each factor influences nutrition outcomes for PLHIV. Make sure the explanations are relevant to the local context.

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Session Three:
Links between Nutrition and HIV

Purpose

Provide information about the relationship between nutrition and HIV.

2

Learning Objectives

- Describe the relationship between nutrition and infection.
- Explain how HIV affects nutrition.
- Explain how nutrition affects HIV.

3

Session Outline

- Nutrition and infection
- Relationship between nutrition and HIV
- Effects of poor nutrition on HIV and IADS
- Effective of HIV and AIDS on nutrition

4

Nutrition and Infection

- Poor nutrition increases vulnerability to infection.
- Infections cause and aggravate poor nutrition.
- Poor nutrition weakens the immune system.
- Poor nutrition helps increase the incidence, severity, and duration of infections.
- Symptoms of infections lead to weight loss and growth faltering, further weakening immunity.

5

HIV and Nutrition: Effects on the Immune System

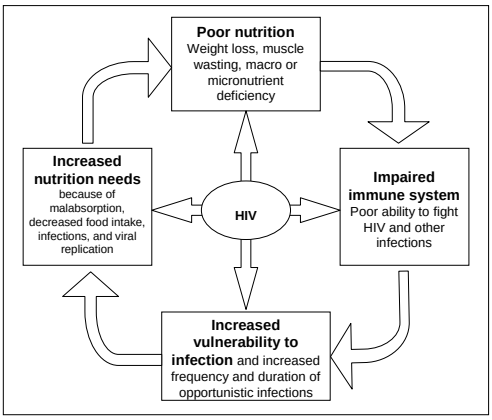
- HIV progressively destroys the immune system, leading to opportunistic infections (OI) and debilitation.
- Pre-existing undernutrition makes it difficult for PLHIV to stay healthy and productive.
- Both HIV and undernutrition limit the ability to fight infection and stay healthy.

6

Nutrition and HIV: A Vicious Cycle

- Weight loss
- Loss of muscle tissue and body fat
- Vitamin and mineral deficiencies
- Increased nutritional needs
- Reduced immune function
- Increased susceptibility to infection
- Weakness and reduced productivity

7



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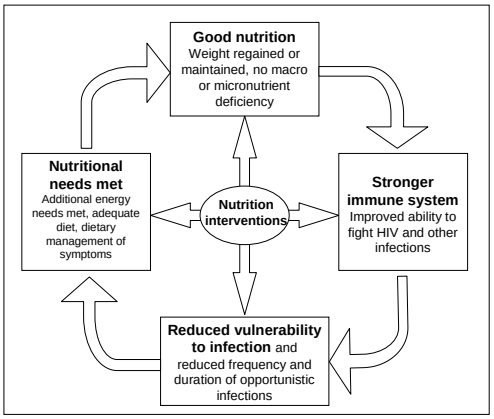

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Nutrition's Effect on HIV

- Weakened immune system
- Increased susceptibility to OI
- Slower healing
- Possibly faster disease progression
- Poorer response to treatment
- Sense of despair, depression

10

HIV's Effect on Nutrition

1. Reduced food intake
2. Increased energy needs
3. Altered nutrient metabolism and absorption

11

1. Reduced Food Intake

- Symptoms of OI (e.g., mouth sores, taste changes, nausea, appetite loss)
- Side effects of medications
- Reduced quantity or quality of food

12

2. Increased Energy Needs

- Because of viral replication and OI
  - Asymptomatic: 10% more than healthy people
  - Symptomatic: 20−30% more than healthy people
  - Symptomatic children with weight loss: 50−100% more than healthy people
- No change in protein, fat, and micronutrient requirements for PLHIV
  - Protein: 12−15% of energy intake
  - Micronutrients: 1 RDA, possibly more if deficiencies

13

3. Poor Absorption

- Can be caused by HIV infection and OI symptoms (diarrhea, vomiting)
- Can occur at any stage
- Results in excess nutrient loss

14

AIDS-Associated Wasting Syndrome

- Increases morbidity and mortality
- Associated with
  - Reduced energy intake
  - Infections and gastrointestinal disorders including diarrhea and malabsorption
  - Metabolic changes

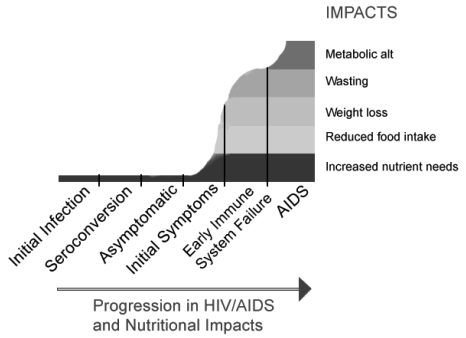
15

Changes in Body Composition

- Body responds differently after illness
  - Amino acids used for energy
  - Fat continues to accrue
- Nutrient intake may be adequate, but inadequate nutrient storage and use
- Increased resting energy expenditure

16

Nutrition in the Different Phases of HIV



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Nutrition in the Different Phases of HIV, Cont.

- Asymptomatic phase: Energy and nutrient needs increase because of virus replication
- Symptomatic phase: Energy and nutrient needs increase even more because of virus replication and the effects of HIV-related symptoms

18

Evidence Base

- Evidence of association between nutritional status and OI, disease progression, and survival
- Limited evidence of impact of food and micronutrient (MN) supplementation; studies ongoing
- Some positive outcomes from MN supplements, but impacts of specific MN unknown (mixed evidence on some MN, such as vitamin A)
- WHO recommendation: 1 RDA MN for PLHIV, if possible through diet, possibly more if specific deficiencies

19

Conclusions

- HIV affects nutrition by:
  - Reducing food consumption
  - Impairing nutrient absorption
  - Increasing energy needs
  - Causing HIV-associated wasting
  - Changing metabolism
  - Changing body composition
- Poor nutrition affects HIV by:
  - Decreasing immunity
  - Slowing the healing process
  - Possibly hastening disease progression

20

Nutrition and HIV: Beyond Nutritional Status and Infection

- Management of symptoms (Session 4)
- Drug-food interactions in HIV and AIDS therapy (Session 5)
- Infant feeding (mother-to-child transmission of HIV) (Session 6)
- Food security (Session 7)

21

Part II. Knowledge: Technical Update

SESSION 4. NUTRITION MANAGEMENT OF HIV-RELATED SYMPTOMS

Purpose (slide 2)

The purpose of this session is to equip students with knowledge and skills for the nutrition management of HIV-related symptoms.

Learning objectives (slide 3)

By the end of this session, students will be able to:

Explain the nutrition implications of HIV-related symptoms.
Describe the dietary management of HIV-related symptoms.
Explain the advantages of proper nutrition for people living with HIV (PLHIV).

Prerequisite knowledge

Knowledge of basic facts about HIV and AIDS (Session 1)
Knowledge of basic nutrition (Session 2)
Knowledge of the relationship between nutrition and infection (Session 3)
Knowledge of the links between nutrition and HIV (Session 3)
Basic counseling skills
Knowledge of the principles of nursing practices

Estimated time: 120 minutes

Session guide (slide 4)

Content	Methodology	Activities	Estimated time (minutes)
Effects of HIV on nutritional status Acute phase Asymptomatic phase Symptomatic phase Full-blown AIDS	Participatory lecture	Review the effects of HIV on nutritional status.	20
Nutrition implications of HIV-related symptoms Reduced food intake Poor nutrient absorption Increased nutrient needs	Participatory lecture	Present HIV-related symptoms and nutrition implications.	20
Importance of proper nutrition for PLHIV	Participatory lecture	Review the importance of good nutrition for PLHIV.	10
Goals and components of nutrition management of HIV-related symptoms	Participatory lecture	Present nutrition management of HIV-related symptoms.	25
Nutrition assessment and counseling of people with HIV-related symptoms	Group activity Role-play	Divide participants into two groups. Pass out examples of HIV-related symptoms to each group. Assign time for groups to discuss and identify the dietary management of the symptoms. In plenary, ask each group to present its results and explain the reasons for the recommended food, nutrition, and care practices. Ask students to volunteer for a counseling role-play. Facilitate group discussion.	20 15
Conclusions			5
Review			5
Total time			120

Required materials

Flipchart paper and stand
Writing pens
Blackboard and chalk or whiteboard and markers
Overhead projector or LCD projector

Materials provided

PowerPoint 4
Handout 4.1. Caring for Symptoms Associated with HIV in Adults
Handout 4.2. Case Study on Management of HIV-Related Symptoms

Preparation

Review Lecture Notes and PowerPoint 4.
Be familiar with related content.
Review handouts and exercises to identify questions that can help students master the concepts.

Suggested reading

Bijlsma, M. 1996. Living Positively: A Nutrition Guide for People with HIV/AIDS. Mutare, Zimbabwe: Mutare City Health Department.

Fan, H., R. Conner, and L. Villareal. 2000. The Biology of AIDS. 4th edition. Boston: Jones and Bartlett Publishers.

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Related terms

Catabolism is the breakdown of body tissues as a source of calories.

Hypermetabolism an abnormal increase in metabolic rate.

Resting energy expenditure is the amount of calories required for a 24-hour period by the body during a non-active period.

Introduction (slides 4 and 5)

HIV weakens the immune system and increases vulnerability to opportunistic infections (OIs). OIs cause symptoms that can have negative effects on the nutritional status of PLHIV by reducing food intake or impairing nutrient absorption or metabolism. Nutrition management of HIV-related symptoms is using food and nutrition practices to manage the effects of HIV-related symptoms and maintain food intake and nutrient absorption. Proper nutrition management of HIV-related symptoms can help reduce the severity of symptoms, increase functioning and quality of life, and improve the ability to eat, thereby improving and maintaining nutritional status. Good nutritional status also can boost immune response and reduce vulnerability to OIs.

Nutrition implications of HIV-related symptoms (slide 6)

As we learned in Session 3, HIV affects nutrition differently in different phases of the infection. Symptoms appear at a critical time when the virus has already begun damaging the immune system and is gradually decreasing the body's capacity to fight infections. CD4 cells, also known as T4 cells, are the main cells to which HIV binds, causing cell death, and are critical to the health of the immune system. The progression of HIV is marked by a progressive depletion of CD4 cells. Monitoring the number of CD4 cells helps monitor the progression of the disease (Fan et al 2000). Medical treatment is critical to treat both symptoms and the underlying OIs. Nutrition interventions complement medical treatment.

Nutrition implications of HIV-related symptoms are categorized according to the effects of HIV on nutritional status, as discussed in Session 3.

Reduced food consumption because of appetite loss or anorexia, nausea, oral thrush, constipation, bloating or heartburn. People with HIV tend to have various oral conditions that can make it difficult to eat. These conditions include bacterial infections such as gingivitis or periodontal disease, viral infections such as herpes, and fungal infections such as thrush. Common oral lesions in PLHIV include gingivitis, pyorrhea, peridontitis, aphthous ulcers, stomatitis, chelitis, and secondary syphilis. Most of these lesions require medical treatment, oral hygiene, and proper dietary management to alleviate the symptoms and maintain food intake. **Handout 4.1. Caring for Symptoms Associated with HIV in Adults** includes recommendations for dietary management of some oral conditions. Other oral diseases that are not related to HIV also can affect food intake. Prompt treatment will help PLHIV maintain adequate food intake.

Increased energy needs because of fever and sometimes increased needs for other nutrients because of symptoms such as anemia. The body needs additional energy and nutrients to replicate the virus, compensate for nutrient losses, and address symptoms such as fever or anemia that are often present in HIV infection. Fever increases resting energy expenditure and consequently total energy expenditure, increasing energy needs. Often PLHIV gradually decrease their physical activity to maintain their energy balance, limiting their capacity to carry out regular daily activities. As discussed below, symptoms can also reduce absorption of nutrients, further increasing nutrient gaps. In addition to energy, some PLHIV have other symptoms that increase needs for other nutrients. Anemia is common in PLHIV and may result from cytokinine-induced suppression of red blood cell production, chronic inflammation, reduced food intake, side

effects of ART such as Zidovudine, or nutritional deficiencies of iron, folate, riboflavin, vitamin A, and vitamin B_{12}.

Poor nutrient absorption because of symptoms such as diarrhea or vomiting prevents the body from using the nutrients in food and contributes to nutrient losses, which increasingly hamper the ability of PLHIV to meet their nutritional needs. If poor absorption of nutrients is not properly addressed, the deficit in nutrients weakens the body and immune system.

Importance of proper nutrition (slides 7 and 8)

Good nutrition helps maintain good health and prevent disease, regardless of HIV status. Box 1 contains the WHO statement on adequate nutrition (slide 7).

Box 1. Adequate nutrition for all regardless of HIV status Adequate nutrition, which is best achieved through consumption of a balanced healthy diet, is vital for the health and survival of all individuals, regardless of HIV status.

Source: WHO 2003.

Good nutritional status is important in the early stages of HIV when proper nutrition strengthens the immune system to fight OIs and may delay disease progression (slide 8). At the onset of symptoms, nutrition interventions can help reduce the severity of infections and the likelihood of weakening the immune system. Proper nutrition also contributes to weight gain and reduces wasting.

Objectives and components of nutrition management of HIV-related symptoms (slides 9 and 10)

Nutrition management of HIV-related symptoms has the following objectives (slide 9):

Reduce severity of symptoms.
Improve functioning and quality of life.
Enable adequate food intake and absorption during symptomatic periods.
Prevent malnutrition and wasting.
Complement and strengthen medical treatment.
Minimize discomfort and pain while eating by counseling PLHIV to eat small but frequent meals and prepare foods so they are easy to eat.
Provide additional nutrients to compensate for nutrient losses.
Prevent dehydration during diarrhea and fever.

Nutrition management of HIV-related symptoms includes the following components (slide 10):

- Assessment to identify symptoms and their effects on diet and nutritional status (For more information on nutrition assessment, refer to Session 8.)

- Nutrition counseling for proper dietary management of HIV-related symptoms, based on the use of locally available food and diets. **Handout 4.1. Caring for Symptoms Associated with HIV in Adults** provides recommendations for specific symptoms.

- Provision of supplementary food and/or micronutrient supplementation, if necessary and available

Approaches and practices of symptom management (slides 11–13)

Dietary management of HIV-related symptoms should be integrated into health services and outreach activities where health workers and counselors have contact with PLHIV (e.g., counseling, testing, and antenatal visits). Health workers and counselors can use counseling to assess how clients are managing symptoms and identify alternative options when needed.

Handout 4.1. Caring for Symptoms Associated with HIV in Adults lists nutrition practices to manage specific HIV-related symptoms. This dietary advice has been used successfully in some countries but should be adapted to local and personal food habits, food ability, and food preferences. If possible, countries should collect information on such practices and make them available to PLHIV, caregivers, and affected households and communities.

Nurses and program managers can refer to national guidelines on nutrition responses to HIV-related symptoms, if are available, and draw from existing ministry of health guidelines on management of symptoms and illnesses.

Exercise 1. Divide students into two equal groups for a question and answer session. Distribute a copy of **Handout 4.1. Caring for Symptoms Associated with HIV in Adults** to each student for reference. Give group 1 a list of the following dietary symptoms: Fever, anorexia, nausea, and vomiting. Give group 2 a list of the following dietary symptoms: Diarrhea, thrush, and constipation. Give each group 10 minutes to identify and master the dietary management of its list of symptoms. In plenary, ask each group present the dietary management of its symptoms. Correct any misinformation and facilitate discussion.

If time allows, give each group another list of symptoms for the same exercise.

When the students have mastered the dietary management of all the symptoms, quiz them orally on the dietary management of all symptoms and ask them to give reasons for the recommended food and nutrition and care practices.

Exercise 2. Divide students into pairs for a role-play on nutrition assessment and counseling to help them master this task. Explain that one student in the pair will role-play the counselor and the other will role-play the PLHIV (John). Distribute a copy of **Handout 4.3. Case Study on Management of HIV-Related Symptoms** to each student. Ask the students who will role-play the counselor to assess the client's symptoms and use the information to counsel him on dietary management of his symptoms. Give the pairs 15 minutes for the role-play.

After the role-play, ask two or three students who role-played the counselor to share what was easy or difficult during the assessment and counseling. Ask two or three students who role-played the client to provide feedback first on what the "counselors" did well and then what they could have improved.

Summarize the exercise, highlighting the importance of considering food security issues in the dietary management of symptoms. Remind students to use the related resource materials.

Conclusions (slide 14)

HIV weakens the immune system and increases vulnerability to OIs, which cause symptoms that can have negative effects on nutritional status by reducing food intake or impairing nutrient absorption or metabolism. Proper nutrition management of HIV-related symptoms can help reduce the severity of symptoms, increase functioning and quality of life, improve nutritional status, and boost immune response to OIs. Nutrition management of HIV-related symptoms includes 1) assessment of the effects of the symptoms on diet and nutritional status, 2) counseling on practices to manage specific symptoms based on locally available foods and diets, and 3) supplementary feeding and/or micronutrient supplementation if needed and available.

After the PowerPoint presentation, if there is still time, ask the students to do one or both of the following exercises.

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Handout 4.1. Caring for Symptoms Associated with HIV in Adults

Symptom	Dietary management	Care and nutrition practice
Anorexia (appetite loss)	Stimulate appetite by eating favorite foods. Eat small amounts of food more often. Eat more energy-dense foods. Avoid strong-smelling foods.	If appetite loss is a result of illness, seek medical treatment
Diarrhea	Drink plenty of fluids (soup, fruit juice, boiled water, tea) to avoid dehydration. Avoid strong citrus fruits such as oranges and lemons, which may irritate the stomach. Eat foods rich in soluble fiber (millet, bananas, peas, and lentils) to help retain fluids. Eat fermented foods such as porridges and yoghurt. Eat easily digestible foods such as rice, bread, millet, maize porridge, potatoes, sweet potatoes, and crackers. Eat small amounts of food frequently and continue to eat after illness to recover weight and nutrients lost. Eat soft fruits and vegetables such as bananas, squash, cooked and mashed green bananas, mashed sweet potatoes, and mashed carrots. Eat eggs, chicken, or fish for protein. Drink nonfat milk if there is no problem with lactose. Boil or steam foods. Avoid the following foods: Dairy products such as milk Caffeine (coffee and teas) Alcohol Fried foods and extra oil, butter, or lard Gas-forming foods such as cabbage, onions, and carbonated soft drinks.	Prevention Drink plenty of clean, boiled water. Wash hands with soap and water before handling, preparing, serving, or storing food. Wash hands with soap after using the toilet or latrine or cleaning a child after defecation. Treatment Drink more fluids to prevent dehydration. Prepare rehydration solutions using oral rehydration salt packets or a home-made solution of 1 liter of boiled water, 4 teaspoons of sugar, and ½ teaspoon of iodized salt. Go to a health center if you have symptoms such as severe dehydration (low or no urine output), fainting, dizziness, shortness of breath, bloody stools, high fever, vomiting, severe abdominal pain, or diarrhea for more than 3 days.
Fever	Eat soups with energy-and nutrient-rich foods such as maize, potatoes, and carrots.	Drink fluids, especially clean boiled water, to prevent dehydration. Bathe in cool water.

Symptom	Dietary management	Care and nutrition practice
	Drink plenty of liquids. Drink tea made from lemon, guava, or gum leaves. Drink more, beyond thirst. Continue to eat small, frequent meals as tolerated.	Rest. Take two aspirin or Panadol, if available, with meals three times a day. Go to a health center if you have a fever for several days that is not relieved with aspirin, loss of consciousness, severe body pain, yellow eyes, severe diarrhea, convulsions, or seizures.
Nausea and vomiting	Eat small and frequent meals. Eat soups, unsweetened porridge, and fruit such as bananas. Eat lightly salty and dry foods such as crackers to calm the stomach. Drink herbal teas and lemon juice in hot water. Avoid spicy or fatty foods. Avoid caffeine (coffee and tea) and alcohol. Drink liquids such as clean boiled water.	Avoid an empty stomach, which makes nausea worse. Avoid lying down immediately after eating; wait at least 20 minutes to avoid nausea. Rest between meals.
Thrush	Eat soft mashed foods such as carrots, sweet potatoes, bananas, scrambled eggs, soup, and porridge. Eat cold foods or foods at room temperature. Avoid spicy, salty, or sticky foods that can irritate mouth sores. Avoid strong citrus fruits and juices that can irritate mouth sores. Avoid sugary foods that cause yeast to grow. Avoid alcohol. Drink plenty of liquids.	Seek medical treatment. Use a spoon or cup to eat small amounts of food. Tilt your head back when eating to help you swallow. Rinse your mouth with warm boiled salt water after eating to reduce irritation and keep infected areas clean so yeast cannot grow.
Anemia	Eat more iron-rich foods such as eggs, meat, fish, and liver; green leafy vegetables such as collard greens and spinach; legumes such as beans, lentils, and groundnuts; nuts; oil seeds; and	If available, take one iron tablet a day with food and with vitamin C (tomato or orange juice) to help with absorption. Seek treatment for malaria and hookworm.

Symptom	Dietary management	Care and nutrition practice
	fortified cereals. Take iron supplements.	Drink plenty of fluids to avoid constipation.
Muscle wasting	Eat small meals more often. Improve the quality and quantity of your diet by eating a variety of foods. Eat more protein. Eat more starchy foods such as cereals and other staples.	Do regular weight-bearing exercises to build muscles.
Constipation	Eat high-fiber foods such as maize, whole wheat bread, green vegetables, and washed fruits with the peel. Drink plenty of liquids. Avoid processed or refined foods.	Avoid using enemas and medications to cleanse the bowels. Drink plenty of liquids, including boiled water.
Bloating or heartburn	Eat small, frequent meals. Avoid gas-forming foods such as cabbage, onions, and carbonated sodas. Drink plenty of fluids.	Eat long enough before sleeping to let food digest.
Tuberculosis	Eat foods high in protein, energy, and vitamins.	Seek medical attention immediately. Ask health workers about taking medication with food. If taking Isoniazid for treatment, take a vitamin B_6 supplement to avoid deficiency.
Loss of taste or abnormal taste	Enhance the flavor of food with salt, spices, herbs, or lemon. Chew food well and move it around your mouth to stimulate taste receptors.	

Handout 4.2. Case Study on Management of HIV-Related Symptoms

John, 35, was tested for HIV 2 years ago when he donated blood to his brother, who just had an accident. John was informed the day after the blood donation that he was HIV positive. He attended several counseling sessions to help cope with the infection and remembered that the counselor insisted that he seek prompt treatment for any symptom. John has not been feeling well for the past 2 days. He is suffering from nausea, thrush, and fever, and has decided to go to the counselor again for advice.

Session Four: Nutrition Management of HIV-Related Symptoms

Purpose

Provide knowledge and skills for nutrition management of symptoms related to HIV.

2

Learning Objectives

- Explain the nutritional implications of HIV-related symptoms.
- Describe the dietary management of HIV-related symptoms.
- Explain the advantages of proper nutrition for PLHIV.

3

Session Outline

- Effects of HIV on nutritional status
- HIV-related symptoms and nutrition implications
- Importance of proper nutrition for PLHIV
- Nutrition management of HIV-related symptoms

4

Rationale

- HIV causes opportunistic infections (OIs), which have symptoms that affect nutritional status negatively.
- Nutrition practices can help manage symptoms and reduce negative nutrition impacts.
- Nutrition management of HIV-related symptoms can help reduce the severity of symptoms, increase functioning and quality of life, and improve the ability to eat, thereby improving and maintaining nutritional status.

5

Nutrition Implications of HIV-Related Symptoms

- Reduced food consumption from appetite loss or anorexia, nausea, oral thrush, constipation, bloating, or heartburn
- Increased energy needs because of fever and other nutrient deficiencies such as anemia
- Reduced nutrient absorption because of diarrhea and vomiting

6

Importance of Good Nutrition Regardless of HIV Status

Adequate nutrition, best achieved by eating a a balanced, healthy diet, is vital for health and survival for all people, regardless of HIV status (WHO 2003).

7

Importance of Good Nutrition for PLHIV

- In the early stages of HIV infection, strengthens the immune system and reduces vulnerability to OIs
- In later stages, reduces the severity of infections and prevents weight loss and wasting

8

Goals of Nutrition Management of HIV-Related Symptoms

- Reduce severity of symptoms.
- Improve functioning and quality of life.
- Enable adequate food intake and absorption during symptomatic periods.
- Prevent malnutrition and wasting.
- Complement and strengthen medical treatment.
- Increase comfort and reduce pain.
- Provide nutrients to compensate for nutrient loss.
- Prevents dehydration in diarrhea fever.

9

Components of Nutrition Management of HIV-Related Symptoms

- Nutrition assessment
- Nutrition counseling for proper dietary management
- Micronutrient supplementation if necessary and available

10

Approaches to Symptom Management

- Adapt dietary management to the client's food habits and diet.
- During counseling, assess how the client is managing symptoms.

11

Managing Specific Symptoms

- Anorexia: Eat small amounts of food more often.
- Diarrhea: Drink lots of fluids, eat small amounts of food more often, and continue to eat after illness.
- Anemia: Eat iron-rich foods (animal products, green leafy vegetables) and take iron supplements.
- Thrush: Eat soft mashed foods, avoid spicy food, and drink plenty of fluids.
- Loss of taste: Enhance flavor with salt, spices, herbs, or lemon; chew food well and move it around in the mouth.

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Managing Specific Symptoms, Cont.

- Bloating and heartburn: Eat small, frequent meals, avoid gas-forming foods, and eat long enough before sleeping.
- Nausea: Eat small, frequent meals, avoid lying down immediately after eating, and rest between meals.
- Fever: Drink plenty of fluids and eat energy- and nutrient-rich soups and foods.
- Constipation: Eat more high-fiber foods and drink plenty of fluids.

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Conclusions

- HIV increases vulnerability to OIs, which cause symptoms that can reduce food intake or impair nutrient absorption or metabolism.
- Nutrition management of HIV-related symptoms can reduce the severity of symptoms, improve nutritional status, and boost immune response.
- Nutrition management includes assessing the effects of the symptoms on diet and nutritional status, counseling on specific symptoms, and food and/or micronutrient supplementation if needed and available.

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SESSION 5: MANAGEMENT OF NUTRITION IMPLICATIONS OF HIV AND AIDS THERAPY

Purpose (slide 2)

The purpose of this session is to provide nursing and midwifery students with information about the nutrition implications of drugs used in HIV therapy and the effective management of these implications to support more successful HIV and AIDS therapy and provide higher quality care and support to people living with HIV (PLHIV).

Learning objectives (slide 3)

By the end of the session, students will be able to:

- Explain why nutrition management of drug and food interactions is important in HIV and AIDS therapy;
- Cite the common drugs taken by PLHIV, drug-food interactions, nutrition implications, and appropriate dietary responses.
- Describe approaches to help PLHIV identify and implement appropriate actions to promote response to treatment and manage nutrition implications.

Prerequisite knowledge

- Knowledge of basic nutrition (Session 1)
- Knowledge of basic facts about HIV and AIDS (Session 2).
- Knowledge of nutrition management of HIV symptoms (Session 4).
- Basic knowledge of antiretroviral drugs (ARVs) and other drugs commonly taken by PLHIV.
- Basic counseling skills.

Estimated time: 120 minutes

Session guide (slide 4)

Content	Methodology	Activities	Estimated time (minutes)
Rationale for addressing nutrition implications of HIV and AIDS therapies	Participatory lecture	Review the reason to address nutrition implications of HIV and AIDS therapies.	10
Overview of HIV and AIDS therapies: modern medications and traditional therapies	Participatory lecture	Present modern and traditional HIV and AIDS therapies.	15
Drug-food interactions and their dietary management	Participatory lecture	Review interactions between common ARVs and food and dietary management of nutrition implications of ARVs.	10
Common HIV and AIDS therapies, dietary recommendations, and side effects	Participatory lecture	Review drug side effects that affect food intake or nutrient absorption and their management.	20
Managing nutrition implications of HIV and AIDS therapies	Group activity	Review interactions of common ARVs and food and approaches to managing each interaction.	20
Client assessment	Small group discussion	Facilitate a question and answer session on nutrition implications and management of the ARV Isoniazid.	15
	Role-play	Facilitate a counseling role-play on managing drug-food interactions using the case study in **Handout 5.3** and class discussion.	20
Conclusions			5
Review			5
Total time			120

Required materials

- Flipchart paper and stand
- Writing pens
- Blackboard and chalk or whiteboard and markers
- Overhead projector or LCD projector

Materials provided

- PowerPoint 5
- **Handout 5.1. Common Drugs Taken by PLHIV, Likely Side Effects, and Recommended Dietary Practices to Increase Drug Efficacy**
- **Handout 5.2. Observation Checklist for Counseling on Management of Drug-Food Interactions**

Preparation

1. Review Lecture Notes and PowerPoint 5.
2. Be familiar with related content and identify questions to facilitate discussion.
3. Review handouts and exercises to identify questions that can help students master the concepts.

Suggested reading

Attawell, K. and J. Mundy. 2003. Provision of Antiretroviral Therapy in Resource-Limited Settings: A Review of Experience up to August 2003. Health Systems Resource Centre. London: UK Department of International Development (DfID) and Geneva: World Health Organization (WHO).

Castleman, T., E. Seumo, and B. Cogill. 2004. Food and Nutrition Implications of Antiretroviral Therapy in Resource Limited Settings. Washington, DC: Food and Nutrition Technical Assistance (FANTA) Project, Academy for Educational Development.

Lourenco, P. 2001. Enteral Feeding: Drug/Nutrient Interaction. *Clinical Nutrition* 20(2): 187–93.

Nerad, J., M. Romeyn, E. Silverman, J. Allen-Reid, D. Dietrich, J. Merchant, V. Pelletier, D. Tinnerello, and M. Fenton. 2003. General Nutrition Management in Patients Infected with Human Immunodeficiency Virus. *Clinical Infectious Diseases* 36.

Pronsky, Z. M., S. A. Meyer, and C. Fields-Gardner. 2001. HIV Medications, Food Interactions (and So Much More). 2nd edition. Birchrunville, PA: Food-Medication Interactions.

Raiten, D., S. Grinspoon, and S. Arpadi. 2005. Nutritional Considerations in the Use of ART in Resource-Limited Settings. Nutrition and HIV/AIDS in Africa: Durban, South Africa, April 10-13, 2005.

Regional Centre for Quality of Health Care. 2004. Food and Nutrition Counseling for PLWHA on Antiretroviral Therapy. Kampala, Uganda.

Tawfik, Y., S. Kinoti, and C. Blain. 2002. Introducing Antiretroviral Therapy (ART) on a Large Scale: Hope and Caution. Washington, DC: Academy for Educational Development.

World Health Organization (WHO). 2006. Antiretroviral Therapy for Adolescents and Adults in Resource-Limited Settings: Towards Universal Access. Recommendations for a Public Health Approach. Geneva.

Related terms

Drug efficacy – The ability of a drug to carry out its function, i.e., to control or cure an illness.

Non-adherence – Not taking the full course of a prescribed medication or not following medication schedules, doses, or other directions

Nutrient utilization – The absorption, metabolism, distribution, and excretion of nutrients in the body

Opportunistic infection (OI) – An infection that takes advantage of weakness in the immune system. Pneumonia and Kaposi's sarcoma are the more common OIs in the United States and United Kingdom, while tuberculosis and persistent diarrhea are the more common conditions associated with HIV in some parts of Africa.

Introduction (slide 5)

PLHIV take medications to treat HIV and OIs caused by HIV, reduce symptoms, and treat other diseases such as malaria, tuberculosis, and intestinal parasites. Medical treatment can slow the progress of HIV, reduce OIs, and ease symptoms. By reducing viral loads, antiretroviral therapy (ART) can help improve nutritional status. Drugs can also interact with certain foods and nutrients, affecting the drugs' efficacy and clients' adherence to the drugs. Interactions between drugs and food and nutrients can also affect nutritional status negatively by reducing food intake or nutrient utilization, which may lead to weight loss and undernutrition. Side effects of medications can affect food intake and nutrient absorption and can also reduce adherence to medications. Proper nutrition management of side effects can help minimize these effects and improve adherence to treatment. Ultimately, interactions between drugs and food and nutrients can result in poorer health and nutritional status if they are not addressed.

To ensure successful ART, nurses and other service providers should help clients understand the food and nutrition implications of the drugs they are taking and help them identify and implement appropriate responses.

Overview of HIV and AIDS therapies in resource-constrained settings (slide 6)

PLHIV may use both modern and traditional therapies to treat HIV and OIs and alleviate symptoms.

Modern medications

ARVs significantly reduce the replication of HIV in the body and slow progression of the disease. The main types of ARVs used in sub-Saharan Africa are non-nucleoside reverse transcriptase inhibitors (NNRTI), nucleoside/nucleotide analogue reverse transcriptase inhibitors (NRTI), and protease inhibitors (PI). Table 1 lists these types of ARVs with examples.

Table 1. Major types of ARVs

Type	Examples of drugs
Non-nucleoside reverse transcriptase inhibitor (NNRTI)	Efavirenz, Nevirapine
Nucleoside/nucleotide reverse transcriptase inhibitor (NRTI)	Abacavir, Didanosine, Lamivudine, Stavudine, Tenofovir, Zidovudine
Protease Inhibitor (PI)	Indinavir, Lopinavir, Nelfinavir Ritonavir, Saquinavir

Sources: WHO 2003 and Castleman et al 2004.

Each type of ARV is active at different stages of viral replication. Multiple ARVs are combined to enhance their efficacy in suppressing viral replication. This is referred to as combination therapy or highly active antiretroviral therapy (HAART). During combination therapy, one medication acts in combination with another to treat HIV. The four first-line ARV combinations recommended by WHO for resource-limited settings are 1) Stavudine, Lamivudine, and Nevirapine, 2) Zidovudine, Lamivudine, and Nevirapine, 3)

Stavudine, Lamivudine, and Efavirenz, and 4) Zidovudine, Lamivudine, and Efavirenz (WHO 2003).

Other types of drugs taken by PLHIV are listed below.

- **Antifungal drugs** such as Nystatin and Nizoral to treat thrush
- **Antibiotics** such as Rifampin and Cotrimoxazole to treat bacterial infections
- **Antimalarial drugs** such as quinine and pyrimethamine to treat malaria in endemic regions
- **Antihelminthic drugs** such as Ivermectin and Provamicina to treat intestinal parasites and worms
- **Dietary supplements** such as iron and vitamins A, B, and E to treat nutrition deficiencies

Traditional therapies

PLHIV commonly used traditional therapies such as herbs, teas, and infusions to alleviate symptoms and increase their sense of hope and control over their health problems. Traditional therapies vary from one place to another, and the efficacy of most traditional therapies has not been well documented.

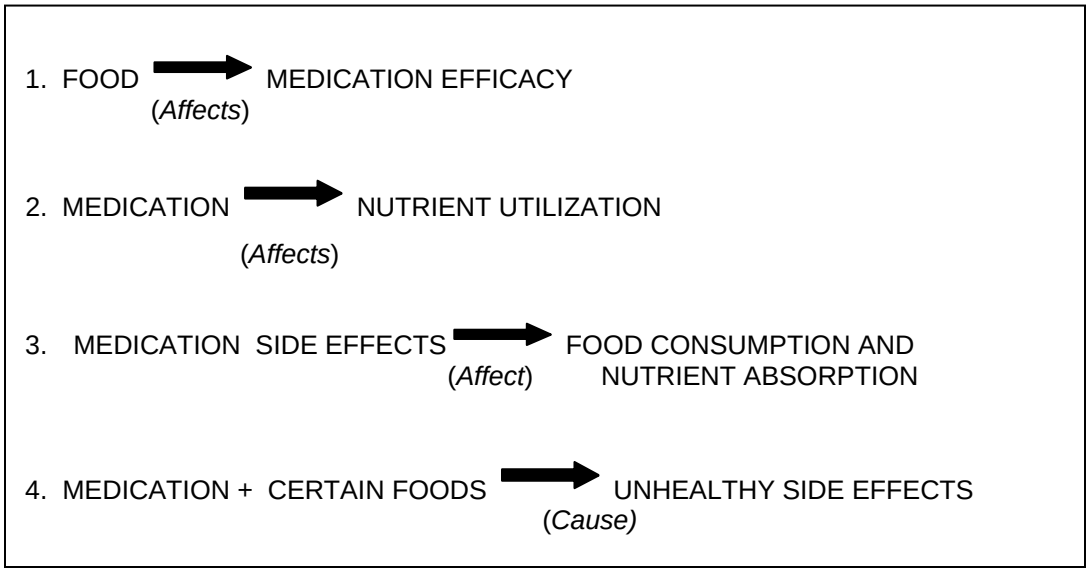
This session focuses primarily on modern medications, but traditional medications can also interact with certain foods or other drugs and can also have side effects. To the extent possible, nurses and other service providers should use the same principles and approaches as for ARV-food interactions to help PLHIV understand and manage interactions between traditional medications and food and avoid any known negative interactions between traditional and modern medications.

Drug-food interactions and their dietary management (slide 7)

The main kinds of interactions between drugs and food and nutrition are listed below and in figure 1.

1. Food can affect drug efficacy.
2. Drugs can affect nutrient utilization.
3. Drug side effects can affect food intake or nutrient absorption.
4. The combination of certain drugs and foods can create unhealthy side effects.

Figure 1. Types of drug-food interactions



Source: Adapted from Castleman et al 2004.

1. **Food can affect drug efficacy.** (slide 8)

Some foods can enhance or inhibit the absorption, metabolism, distribution, or excretion of certain drugs. Whether and how food will affect drug efficacy varies from one drug to another. Dietary responses to optimize drug efficacy should be based on the specific interactions of the drugs taken. Dietary responses to improve the efficacy of a drug may include taking the drug with food, on an empty stomach, or with or without certain types of foods.

Examples of how food intake affects drug efficacy are listed below.

- Food reduces the rate of absorption of aspirin (acetylsalicylic acid), commonly used to treat fever and pain. Aspirin is best taken 2 hours after meals with a full glass of water.
- Food reduces the absorption of Isoniazid, a medication commonly used to treat tuberculosis. Isoniazid should be taken 1 hour before or 2 hours after meals.
- Food also reduces the absorption of Rifampin, another medication commonly used to treat tuberculosis. Rifampin should be taken 1 or 2 hours after meals to increase its absorption.
- Food enhances the absorption or metabolism of some ARVs and inhibits the absorption or metabolism of others. For example, a high-fat meal increases the bioavailability of the nucleoside analogue Tenofovir (Pronsky, Meyer, and Fields-Gardner 2001). A high-calorie, high-fat, high-protein meal decreases the absorption of the nucleoside reverse transcriptase inhibitor Zidovudine. It is therefore recommended not to take Zidovudine with high-fat meals (> 40 g of fat).

Nurses can help clients draw up food-drug timetables based on the known effects of food on the drugs clients are taking. This timetable should take into account other food-drug interactions of each drug taken and the client's eating habits.

2. **Drugs can affect nutrient utilization.** (slide 9)

Certain drugs affect nutrient absorption, metabolism, distribution, or excretion. Drugs that inhibit or enhance nutrient utilization may have negative effects on nutritional status. Dietary management may require either increasing food intake, taking a nutrient supplement to compensate for the nutrient affected, or reducing nutrient intake if the metabolite produced can affect health negatively.

Drugs that may require increased food or nutrient intake

- The tuberculosis medication Isoniazid inhibits the metabolism of vitamin B_6. Supplementation of vitamin B_6 is therefore recommended for people taking Isoniazid.
- The antibiotic and tuberculosis medication Rifampin may increase vitamin D metabolism. Supplementation of vitamin D may be needed.

Studies have reported lipid (or fat) abnormalities, including elevated levels of triglycerides, cholesterol, and fat maldistribution, in people who take certain ARVs.

Drugs that may require reduced food or nutrient intake

- The PIs Saquinavir and Ritonavir may cause elevated cholesterol and triglyceride levels, which may increase the risk of cardiovascular (heart) diseases (Pronsky et al 2001).

Changes in lipid levels may require both dietary and medical responses. To lower triglycerides, PLHIV should maintain a healthy weight, eat a variety of foods, reduce their intake of refined sugar and excessive carbohydrates, increase their intake of fiber, avoid alcohol, exercise daily, and take medication if needed. To reduce cholesterol, PLHIV should maintain a healthy weight, eat a diet low in fat and limited saturated fat, increase intake of fruits and vegetables, limit foods rich in cholesterol, avoid alcohol and smoking, exercise daily, and take medication if needed (Pronsky et al 2001).

The effective management of fat maldistribution (or lipodystrophy syndrome) has not yet been established. Diet and exercise, use of medications, and a change in the ARV regimen may help.

Some ARVs may affect glucose metabolism and cause insulin resistance. Insulin resistance is associated with increased risk of diabetes (Gelato 2003). For diabetes, reduced intake of refined sugar and saturated fat, a specific carbohydrate controlled diet, exercise, and anti-diabetic medications are recommended.

3. **Drug side effects can affect food intake or nutrient absorption.** (slide 9)

Both modern and traditional medications can cause side effects that negatively affect food intake and nutrient absorption. Side effects such as changes in taste, loss of appetite (anorexia), nausea, bloating and heartburn, and constipation may lead to reduced food intake, and vomiting and diarrhoea can cause poor nutrient absorption. Reduced food intake and poor nutrient absorption can contribute to weight loss, malnutrition, and wasting.

Side effects also can contribute to non-adherence to a drug regimen. Non-adherence is failure to take a drug properly or discontinuing a drug altogether before completing the necessary course, which for ARVs may be many years. Non-adherence can have a significant negative impact on the health status of PLHIV, leading to increased incidence of OIs and more rapid progression of HIV disease.

Drug side effects and symptoms of OIs are often difficult to distinguish from each other. For example, diarrhoea, vomiting, headaches, malaise, and fever may be side effects of both drugs and OIs. In both cases, appropriate dietary responses may help address these effects, but medical treatment may be needed if the effects are symptoms of infections.

Adherence

Side effects that cause a lot of discomfort or that prevent clients from eating properly may lead to non-adherence. Interrupting or terminating drug regimens can lead to significant worsening of health and even drug-resistant strains of HIV, which are difficult or impossible to treat with available drugs. Managing side effects and other food-drug interactions can help ensure adherence to drug regimens.

Dietary responses to side effects

Appropriate dietary responses can help maintain food intake and compensate for nutrient losses, and in some cases can help reduce the severity of the side effects. For example, if drugs cause taste changes, PLHIV can add salt, sugar, spices, vinegar, or lemon to enhance the flavor of food, stimulate the taste buds, increase taste acuity, and mask unpleasant flavors. Eating energy- and nutrient-dense foods such as maize, groundnuts, and carrots and drinking plenty of liquids may help replace nutrient losses and prevent dehydration during fever or diarrhea.

Dietary management of drug side effects (e.g., changes in taste, loss of appetite, nausea, bloating and heartburn, constipation, vomiting, and diarrhea) is the same as that for similar HIV-related symptoms. Session 4 contains more information on the dietary management of HIV-related symptoms.

Some side effects that do not directly affect food consumption or nutrient absorption may require dietary responses to help reduce the effect. Some ARVs are associated with increased risk of bone disorders such as osteoporosis, osteopenia, and osteomalacia (Tebas et al 2000) and may require medical and dietary responses. A balanced diet with high-calcium foods such as milk, yogurt, cheese, or calcium and vitamin D supplements may be required along with a medical response. This is especially important for populations already at risk of calcium deficiency and for pregnant and lactating women whose calcium need increases.

Some drug side effects do not have specific dietary management responses. For example, there is no evidence that changes in diet affect lipodystrophy, which involves redistribution of fat.

Managing side effects requires timely responses, and nurses should help clients identify and act on appropriate dietary responses that help them continue proper eating habits, maintain weight, and adhere to the medications.

The combination of certain drugs and foods can create unhealthy side effects (slide 11)

Combinations of specific drugs and food can cause unhealthy side effects. Such food should not be taken at the same time as these drugs. Drinking alcohol while taking the ARV Didanosine can cause inflammation of the pancreas and should be avoided. Alcohol should also be avoided while taking the antituberculosis medication Isoniazid, as this combination may increase the risk of inflammation of the liver.

Table 2 lists some of the known contraindications for some drugs taken by PLHIV. The list is not comprehensive, and nurses and trainers are encouraged to add or update the list based on information about drugs used in their contexts.

Table 2: Examples of modern medications with food contraindications

Medication	Purpose	Contraindications
Isoniazid	Treatment of tuberculosis	May cause reactions with foods such as bananas, beer, avocados, liver, smoked pickled fish, yeast, and yogurt Avoid alcohol.
Rifampin	Treatment of tuberculosis	Avoid alcohol.
Indinavir (IDV)	Antiretroviral	Do not eat grapefruit or drink grapefruit juice, which may lower the level of medicine in the blood.
Zidovudine (AZT)	Antiretroviral	Avoid alcohol.

Drug–drug interactions (slides 12–14)

PLHIV often take multiple modern and traditional therapies simultaneously. Therapies can interact with each other, affecting drug efficacy and nutritional status. Such interactions need to be managed appropriately to facilitate the optimal efficacy of therapies and ensure that interactions do not affect food intake or nutrient utilization.
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Antiacid medications containing magnesium and aluminum interact with the ARV Didanosine and lead to increased side effects. Didanosine should therefore not be taken at the same time as an antacid containing magnesium and aluminum.

Studies have shown that the blood concentration of the ARV Saquinavir decreases by 50 percent if taken with a garlic supplement. Garlic supplements, which are sometimes taken as a traditional therapy to strengthen the immune system, should not be taken with Saquinavir (Piscitelli et al 2002). The antifungal agents Fluconazole (Diflucan®) and Ketoconazole (Nizoral®) may inhibit the metabolism of protease inhibitors and contribute to increase the toxicity of these drugs.

Common HIV and AIDS therapies, dietary recommendations, and side effects

Handout 5.1 lists the purposes, food recommendation, and potential side effects of some drugs (ARVs and drugs used to treat OIs) commonly taken by PLHIV in resource-limited settings. The handout can be useful for nurses and other health care workers to guide clients in managing nutritional implications and side effects of drugs. The list is not comprehensive, however, and nurses and trainers are encouraged to add to or update it to include drugs used in their contexts. Dietary responses to help manage common side effects are found in **Handout 4.1** in Session 4.

Components of managing nutritional implications of HIV/AIDS therapies (slide 15)

Managing the nutritional implications of HIV and AIDS therapy involves 1) information, 2) identification of food and nutrition responses, and 3) implementation and follow-up.

1. Nurses should understand the following in order to obtain and provide needed **information** (slides 16 and 17):

   - The client's nutritional status, pre-existing nutrition issues, and changes in his/her nutritional status
   - Reasons for poor nutritional status for clients who have BMI <18.5 or who have unintentionally lost more than 5 percent of body weight in the past 3 months. Reasons may include infections or inadequate dietary intake because of to symptoms, poor access to food, or psychosocial factors.
   - The drugs a client is taking or will take in the near future, including both ARVs and other drugs
   - The specific interactions between the drugs taken and food and nutrition.
   - Foods available to the client, including local foods
   - The client's dietary practices and preferences
   - The client's access to food, factors limiting access, and opportunities to improve access
   - Herbal or other traditional therapies the client is taking

2. **Identification of food and nutrition responses** involves the following (slide 18):

   - Identifying foods to eat more of and foods to eat less of or avoid
   - Planning and preparing a drug-food timetable based on the client's context, drug regimen, food interactions, constraints, and preferences
   - Identifying ways to reduce constraints and increase food access if needed
   - Helping the client identify the best feasible options for improving nutrient intake and managing drug-food interactions. Options will depend on the drugs used, their specific food and nutrition implications, the availability of food and supplements, and the client's circumstances and constraints.
   - Referring the client for therapeutic feeding and nutritional rehabilitation if he or she is severely malnourished
   - Related steps to help maintain good nutritional status, such as performing regular physical activity and drinking clean, safe water.

3. **Implementation and follow-up** involves the following (slide 19)

- Supporting implementation through continued regular contact
- Involving other household members to support the responses
- Linking or referring the client to other resources as needed.
- Eliciting and responding to feedback about the feasibility of chosen options, opportunities to improve them, and challenges faced
- Assessing adherence to drugs and the drug-food timetable and reasons for non-adherence
- Helping the client make adjustments as needed

Session 9 includes additional information on nutrition counseling for PLHIV in Handouts 9.3, 9.4, and 9.5).

Key issues for managing nutrition implications of HIV and AIDS therapy (slide 20)

ART is becoming simpler, with fewer doses and fewer pills. Given this evolution and the scale-up of access to ART, it is important for nurses to stay up to date on the possible interactions between drugs and food and nutrition and steps to manage these interactions. The following recommendations can guide nurses in addressing food and nutrition implications of HIV and AIDS therapy. These can be supplemented by national guidelines if available.

- Because different drugs have different food interactions, recommendations should be drug specific. Understand the specific interactions of each drug used and counsel accordingly.

- If a client is taking several drugs, consider the interactions of each drug, as well as possible drug-drug interactions. In some cases, the nutrition implications of a drug combination differ from the implications of the drugs individually. For example, food reduces the absorption of the PI Indinavir, but studies have shown that when Indinavir is taken in combination with Ritonavir, food has no effect on its absorption, so that it can be taken with or without food.

- Some side effects are similar to symptoms of OIs. It is important to try to distinguish between side effects and OI symptoms that may require referral for treatment.

- Involve the client fully in understanding interactions, identifying feasible responses, and adjusting or improving responses as needed.

- When possible, make sure that recommended dietary actions build on the client's practices and preferences.

- If the client is taking traditional therapies, pay attention to their side effects and nutrition implications. Some side effects of traditional medicines are known, but there may be other side effects or nutrition implications that are not known. Help clients who are using traditional therapies to identify side effects and food interactions, and any dietary responses that can help address them.

- Be attentive to any side effects and nutrition implications of ARVs for undernourished clients. Documentation of the effects of ARVs on undernourished people is very limited, and nurses should help clients act promptly to alleviate any observed negative impacts on nutritional status.

- Food insecurity may keep PLHIV from following optimal food and nutrition recommendations. Nurses should help clients identify alternative responses that are feasible in the circumstances and when possible seek options to improve food security. Session 7 provides more information on food insecurity faced by PLHIV.

- Recognize that each client will have an individual response to drugs. All clients taking the same drugs should not be treated the same. Stay attentive and responsive to client-specific reactions.

- Pregnant and lactating women with HIV have increased nutrition needs. Therefore, it is important to ensure that drug and food interactions do not reduce their food intake or nutrient absorption. Timely management of drug-food interactions is needed to protect the health of the mother and infant. Managing drug-food interactions for pregnant and lactating women is similar to that for other PLHIV. Session 9 provides more information on general nutrition care and support for pregnant and lactating women.

- Many countries have national guidelines on nutrition and HIV with information and recommendations about drug-food interactions. These guidelines are an important reference for service provision.

Client situation assessment

Assessing the client's household food situation will help the nurse understand the client's eating practices, access to different foods, and constraints. This information—combined with information about the drugs the client is taking—helps the nurse work with the client to identify optimal, feasible responses to manage side effects and address interactions between drugs and food and nutrition.

Sample questions to include in an assessment

Eating habits and food security

- What foods does the client eat often?
- How many meals does the client eat per day?
- Does the client make his/her own decisions about what food to eat? If not, who makes these decisions?
- Who prepares the client's food?
- What is the period of food shortages?
- What foods are affected?
- How does the client cope during food shortages?
- What foods are the most available and affordable for the client?

Medications

- What drugs is the client taking?
- What are the specific food-drug interactions for each drug and for all the drugs combined? Which drugs need to be taken on an empty stomach and which with meals? What foods should be avoided? What nutrients are affected by drugs?
- What dietary or other responses are needed?
- What are the side effects of each drug and of the combined drugs?
- What dietary responses are recommended to alleviate the side effects?
- What are the food access or other constraints to implementing identified dietary responses?
- What alternative solutions are feasible given the constraints?
- What options and opportunities exist to address or reduce the constraints?
- What is the recommended timing for each drug? In relation to meals?
- What are the constraints to following the food-drug timetable?
- What alternatives are there to the food-drug timetable?

Exercise 1. Facilitate a question and answer session on the nutrition implications and management of Isoniazid (or another drug) to help students understand how to identify and manage food-drug interactions in ART. Read the following situation: *Joseph has HIV and has been taking Isoniazid for 3 months. He is complaining of nausea and fatigue. His doctor asked the nurse to provide nutrition counseling to Joseph*. Ask students to discuss the nutrition implications of Isoniazid for this patient and the appropriate dietary management. Ask students which reference materials provided in this session they would check in this case. (Refer students to **Handout 5.1**: **Common Drugs Taken by PLHIV, Likely Side Effects, and Recommended Dietary Practices to Increase Drug Efficacy**.) You can also use other drugs in place of Isoniazid in the example.

Exercise 2. Ask for two volunteers to role-play an assessment of drug-food interactions in ART during counseling. Give each student a copy of **Handout 5.3. Case Study for Counseling on Managing Drug-Food Interactions**. Ask one volunteer to role-play the counselor and the other to role-pay the client. The rest of the students will observe to assess the quality of counseling. Distribute **Handout 5.2: Observation Checklist for Counseling on Management of Drug-Food Interactions in ART** to the rest of the students to use for observation and feedback. Ask the students to write their comments in the "Comments" column.

Remind students to bear in mind potential side effects and drug-food interactions of the ARVs prescribed to the client. The "counselor" should try to help the client maintain food intake and adhere to treatment as well as to ensure drug efficacy. The role-play should include assessment, identification of options based on the assessment, and support to implement options selected.

After the role-play, ask the "counselor" to explain what he or she found easy or difficult during the assessment. Ask the other students to provide feedback using the checklist and following the order of the checklist. Ask the students to start with what the counselor did well and then add what needs to be improved and suggest how to improve.

Conclusions (slide 21)

Careful consideration and management of drug-food interactions is an important component of successful HIV and AIDS therapy. Proper management of interactions between drugs and food and nutrition will help ensure efficacy of treatment, minimize the side effects of drugs, ensure adherence to therapy, and minimize any negative impact on nutritional status.

To support successful management of the food and nutrition implications of a client's ART, the nurse needs to understand the client's situation, including the specific food and nutrition interactions of drugs taken, food security constraints and available foods, and the client's individual responses, needs, and preferences. Nurses can integrate management of nutrition implications of therapies into all stages of treatment: client assessment, provision of medicines, counseling, and follow-up.

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Handout 5.1. Common Drugs Taken by PLHIV, Likely Side Effects, and Recommended Dietary Practices to Increase Drug Efficacy

Medication	Purpose	How to take	Potential side effects
Abacavir (ABC)	Antiretroviral	Take without regard to food.	Nausea, vomiting, fever, allergic reaction, anorexia, abdominal pain, diarrhea, anemia, rash, hypotension, pancreatitis, dyspnea, weakness and insomnia, cough, and headache
Didanosine (ddl)	Antiretroviral	Take with water only, 1 hour before or 2 hours after eating Avoid alcohol. Do not take with juice or antacid that contains aluminum or magnesium.	Anorexia, diarrhea, nausea, vomiting, pain, headache, weakness, insomnia, rash, dry mouth, lost of taste, constipation, stomatitis, anemia, fever, dizziness, and pancreatitis
Efavirenz	Antiretroviral	Take with food, but not with a high-fat meal. Avoid alcohol.	Elevated blood cholesterol levels, elevated triglycerides levels, rash, dizziness, anorexia, nausea, vomiting, diarrhea, dyspepsia, abdominal pain, flatulence
Indinavir (IDV)	Antiretroviral	Take 1 hour before or 2 hours after meal. Drink at least 1,500 ml of liquid daily. Do not drink grapefruit juice, which may lower the level of medicine in the blood. Avoid St. John's wort.	Nausea, abdominal pain, headache, kidney stones, taste changes, vomiting, regurgitation, diarrhea, insomnia, ascites, weakness, and dizziness May increase the risk of lipodystrophy
Lamivudine (3TC)	Antiretroviral	Take without regard to food. Avoid alcohol.	Nausea, vomiting, headache, dizziness, diarrhea, abdominal pain, nasal symptoms, cough, fatigue, pancreatitis, anemia, insomnia, muscle pain, and rash.
Lopinavir	Antiretroviral	Take without regard to food. Avoid St John's wort.	Abdominal pain, diarrhea, headache, weakness, nausea

Medication	Purpose	How to take	Potential side effects
			May increase the risk of lipodystrophy and/or diabetes.
Lopinavir	Antiretroviral	Take without regard to food. Avoid St John's wort.	Abdominal pain, diarrhea, headache, weakness, nausea May increase the risk of lipodystrophy and/or diabetes.
Nelfinavir	Antiretroviral	Take with a meal or light snack. Avoid St John's wort.	Diarrhea, flatulence, nausea, abdominal pain, and rash May increase the risk of lipodystrophy
Nevirapine (NVP)	Antiretroviral	Take without regard to food. Avoid St John's wort.	Nausea, vomiting rash, fever, headache, skin reactions, fatigue, stomatitis, abdominal pain, drowsiness, paresthesia High hepatoxicity
Ritonavir	Antiretroviral	Take with a meal if possible. Avoid St John's wort.	Nausea, vomiting, diarrhea, hepatitis, jaundice, weakness, anorexia, abdominal pain, fever, diabetes, headache, dizziness May increase the risk of lipodystrophy
Saquinavir	Antiretroviral	Take with a meal or light snack within 2 hours of a high-fat meal and high-calcium meal. Avoid garlic supplements and St John's wort.	Mouth ulceration, taste changes, nausea, vomiting, abdominal pain, diarrhoea, constipation, flatulence, weakness rash, and headache. May increase the risk of lipodystrophy.
Stavudine (d4T)	Antiretroviral	Take without regard to food. Limit consumption of alcohol,	Nausea, vomiting, diarrhea, peripheral neuropathy, chills and fever, anorexia, stomatitis, anemia, headaches, rash, bone marrow, and pancreatitis May increase the risk lipodystrophy

Medication	Purpose	How to take	Potential side effects
Tenefovir (TDF)	Antiretroviral	Take with food.	Abdominal pain, headache, fatigue, and dizziness
Zidovudine (AZT)	Antiretroviral	Take without food or with a low-fat meal. Do not take with a high fat meal. Avoid alcohol.	Anorexia, anemia, nausea, vomiting, bone marrow suppression, headache, fatigue, constipation, fever dizziness, dyspnea, insomnia, muscle pain, and rash
Isoniazid	Treatment of tuberculosis	Take 1hour before or 2 hours after meals. May react with foods such as bananas, beer, avocados, liver, smoked pickled fish, yeast and yogurt. May interfere with vitamin B_6 metabolism and require vitamin B_6 supplementation. Avoid alcohol.	Anorexia and diarrhea.
Rifampin	Treatment of tuberculosis	Take on an empty stomach 1hour before or 2 hours after meals. Avoid alcohol.	Nausea, vomiting, diarrhea, and loss of appetite
Fluconazole	Treatment of candida (thrush)	Take with food.	Nausea, vomiting, diarrhea Can be taken during breastfeeding
Nystatin	Treatment of thrush	Take with food.	Infrequent occurrence of diarrhea, vomiting, nausea
Sulfonamides: Sulfamethox-azole, Cotrimoxazole (Bactrim® and Septra®)	Antibiotic for treatment of pneumonia and toxoplasmosis	Take with food.	Nausea, vomiting, and abdominal pain
Chloroquine	Treatment of malaria	Take with food.	Stomach pain, loss of appetite, nausea, vomiting Not recommended for breastfeeding women

Medication	Purpose	How to take	Potential side effects
Quinine	Treatment of malaria	Take with food.	Abdominal or stomach pain, diarrhea, nausea, vomiting, lower blood sugar
Sulfadoxine and Pyrimethamine (Fansidar®)	Treatment of malaria	Take with food and continuously drink clean boiled water.	Nausea, vomiting, taste loss, and diarrhea Not recommended if folate deficient or breastfeeding

Source: Adapted from FANTA 2001, Pronsky et al 2001, Nerad 2003, Castleman et al 2003, and WHO 2003.

Note: This table is not comprehensive, and nurses and trainers are encouraged to add or update the list to reflect medications used in their contexts.

Handout 5.2. Observation Checklist for Counseling on Management of Drug-Food Interactions

Problem: The client is experiencing drug side effects and drug-food interactions.

Purpose: The purpose of the assessment is to improve the counselor's understanding of the client's eating habits, access to different foods, and constraints. This information, combined with information about the drugs the client is taking, allows the counselor to help the client choose the best feasible dietary responses to manage the side effects and address the food-drug interactions.

	Yes	No	Comments
1. Did the counselor ask the client about:			
Eating practices			
Foods frequently eaten?			
Number of meals per day?			
Decision-maker about foods and meal?			
Preparer of meals?			
Period of food shortage?			
Foods affected by food shortage?			
Client's coping strategy during food shortage?			
Most available and affordable foods?			
Medications			
Drugs the client will take?			
Types and frequency of problem experienced with these drugs?			
2. From the counselor's own knowledge and information from the client, did the counselor find out about:			
Side effects of each drug and drug combinations?			
Food-drug interactions for each drug and drug combinations?			
Dietary responses that address the food-drug interactions and alleviate the side effects?			

3. Did the counselor discuss with the client:			
Recommended dietary and other responses to address food-drug interactions, including side effects?			
Constraints the client faces to implementing identified dietary responses?			
Alternative options feasible within constraints?			
Options and opportunities to reduce constraints?			
Recommended timing for each drug?			
Constraints of the drug timetable?			
Ways to adjust eating practices to follow the drug-food timetable and other recommendations?			

Handout 5.3. Case Study for Counseling on Managing Food-Drug Interactions

George is 38 and HIV positive. His health condition has declined seriously in the past few months. After measuring George's CD4 count and viral load, the doctor informed him that he was eligible to enroll in the ART program. He explained the program in detail, and John agreed. The doctor prescribed a combination of Zidovudine/Lamivudine/ Efavirenz (ZDV/3TC/EFV) and explained how many tablets George should take per day and how often. The doctor referred him to the nurse for counseling on how to manage the food and nutrition implications of these drugs.

Session 5. Management of Nutrition Implications of Antiretroviral Therapy

Purpose

Provide information about the nutrition implications of drugs used to treat HIV and effective management of these implications.

2

Learning Objectives

- Explain the importance of managing drug-food interactions in HIV treatment.
- Know the most common drugs taken by people living with HIV (PLHIV), their nutrition implications, and responses to manage those implications.
- Be able to help PLHIV identify and implement actions to manage nutrition implications of drugs.

3

Session Outline

- Overview
- Drug-food interactions
- Management of nutrition implications of ART
- Conclusions

4

Rationale

- PLHIV take a variety of drugs to treat symptoms of HIV and AIDS.
- Drugs can interact with food and nutrients, affecting the efficacy of the drugs and nutritional status.
- Management of nutrition implications of HIV and AIDS therapy aims to do the following:
  - Improve medication efficacy
  - Prevent deterioration in nutritional status
  - Ensure adherence to drugs

5

Overview of HIV Therapies

- Antiretroviral drugs (ARVs)
- Antifungals
- Antibiotics
- Antimalarials
- Antihelminthics
- Dietary supplements
- Traditional therapies

6

Interaction between Drugs and Food/Nutrition

- Food can affect drug efficacy.
- Drugs can affect nutrient utilization.
- Drug side effects can affect food consumption or nutrient absorption.
- Combinations of certain drugs and foods can create unhealthy side effects.

7

Food ⇨ Drug Efficacy
Affects

Examples

- Food reduces absorption of:
  - Aspirin (analgesic)
  - Isoniazid (antituberculosis)
  - Rifampin (antituberculosis)
- A high fat meal:
  - Enhances the bioavailability of Tenofovir (ARV)
  - Reduces the absorption of Indinavir (ARV)

8

Food ⇨ Nutrient Utilization
Affects

Examples

- Ritonavir (ARV) and lipids: Elevated cholesterol and triglycerides
- Isoniazid and vitamin B_6
- Rifampin and vitamin D

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Drug Side Effects ⇨ *Affect* Food Consumption and Nutrient Absorption

Examples

- Changes in taste
- Nausea
- Anorexia
- Vomiting
- Diarrhea

10

Drug-Food Combinations ⇨ *Cause* Unhealthy Side Effects

Examples

- Alcohol and Didanosine (ARV) can cause inflammation of the pancreas.
- Alcohol and Isoniazid can cause inflammation of the liver.

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Interaction of Therapies

Examples

- Saquinavir (ARV) and garlic
- Didanosine (ARV) and antacids

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Management of Nutrition Implications Example: Ziduvodine (ARV)

Interaction 1

- A high-fat meal reduces absorption

Management

- Take the drug without food.
- If nausea of stomach upset, take with a low-fat meal. Do not eat with a high-fat meal.

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Management of Nutrition Implications Example: Ziduvodine, Cont.

Interaction 2: Possible side effects: Anorexia, anemia, nausea, vomiting, headache, diarrhoea, taste changes, constipation

Management

- Anorexia: Eat small, frequent meals.
- Nausea and vomiting: Eat small amounts often.
- Diarrhea: Drink plenty of liquids, continue eating.
- Taste changes: Use salt, spices, or lemon.
- Constipation: Eat high-fiber foods and drink plenty of liquids.

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Managing Nutrition Implications of ARVs: Components for Nurses

1. Information
2. Identification of food and nutrition responses
3. Implementation and follow-up.

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1. Information

- Understand the food/nutrition interactions with drugs the PLHIV is taking.
  - Different drugs have different interactions.
  - Consider drug combinations.
  - Help the client understand interactions in terms of specific foods.
- Understand what foods are available and currently eaten by the client and help the client find ways to diversify the diet.

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1. Information, cont.

- Conduct a nutrition assessment of the client.
  - Nutritional status
  - Eating habits
  - Meal frequency
  - Copies strategies
- Assess the client's access to food
  - How poor access prevents proper food-drug management
  - Factors that limit access
  - Opportunities to strengthen access

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2. Identification of Food and Nutrition Responses

- Help PLHIV identify the best feasible options.
- Identify which foods to eat more of and which to avoid based on drug-food interactions and foods that are available and accessible.
- Plan a feasible drug-food timetable with the client.
- Identify ways to increase access to food and care.
  - Linkages and referrals to other services
  - Opportunities and adjustments in the household

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3. Implementation and Follow-up

- Support PLHIV through regular contact and referral to needed resources.
- Involve other household members.
- Seek feedback from PLHIV on what is working and what isn't, sources of problems, and opportunities to improve.
- Adjust as needed if conditions or drugs change.

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Key Issues

- Involve PLHIV throughout!
- Distinguish between symptoms OIs that require treatment and drug side effects.
- Consider how traditional therapies may affect nutrition.
- Refer to national guidelines.

20

Conclusions

- Managing nutrition implications of ARVs is critical for:
  - Drug efficacy
  - Nutritional status
  - Adherence to therapy
- Integration of nutrition management into medical services is important for:
  - Assessment
  - Drug provision
  - Counseling
  - Follow-up

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SESSION 6. INFANT FEEDING AND PREVENTION OF MOTHER-TO-CHILD TRANSMISSION OF HIV/AIDS

Purpose (slide 2)

The purpose of this session is to provide students with the concepts and latest research findings related to prevention of mother-to-child transmission of HIV (PMTCT) and lessons for future application to services.

Learning objectives (slide 3)

At the end of this session, students will be able to:

- Describe modes of HIV transmission from mother to child.
- Understand a risk analysis associated with vertical transmission of HIV in pregnancy, labor, and breastfeeding
- Summarize the key research findings on mother-to-child transmission of HIV (MTCT).
- Explain infant feeding challenges faced by HIV-infected and -affected mothers and households, including cultural and social influences on breastfeeding.
- Describe PMTCT interventions.

Prerequisite knowledge

- Basic understanding of reproductive health, including pregnancy, labor, and delivery
- Knowledge of and experience in labor and delivery techniques
- Understanding of infant and young child and maternal nutrition
- Knowledge and understanding of lactation management
- Basic counseling skills
- Knowledge of prenatal, intranatal, and post-natal care
- Understanding of social and cultural aspects of infant and young child feeding

Estimated time: 180 minutes excluding field work

Session guide (slide 4)

Content	Methodology	Activities	Estimated time (minutes)
HIV epidemic in women, infants, and children in east, southern, and central Africa (ECSA)	Presentation	Briefly present transmission of HIV from an infected mother to her child.	5
	Small group work	Have participants form three groups to brainstorm the size of the problem, consequences, and strategies to prevent HIV infection in women, infants, and children.	15
Risk factors associated with mother-to-child transmission of HIV (MTCT)	Participatory lecture	Present the magnitude of risk of MTCT and risk factors during pregnancy, labor, and delivery.	35
	Large group discussion	Discuss possible mechanisms of MTCT during breastfeeding, including risk factors for mothers and infants.	15
Risk analysis of infant feeding options in the context of HIV	Large group discussion	Present the evidence on risks associated with different infant feeding options in the context of HIV and define “informed choice.”	30
		Ask students to explain “informed choice in their own words and give examples.	15
A comprehensive approach to prevention of mother-to-child transmission of HIV (PMTCT)	Participatory lecture	Present an overview of a comprehensive approach to PMTCT.	5
		Ask students to discuss where the suggested entry points for PMTCT are found in the healthy system in their country.	20

	Role-play	Facilitate a counseling role-play on managing drug-food interactions using the case study in **Handout 5.3** and class discussion.	20
Conclusions		Explore students' ideas about the need for future research, as well as programming and policy needs in PMTCT and infant feeding, in their country.	10
Conclusions			5
Review			5
Total time			180

Required materials

- Flipchart paper and stand
- Writing pens
- Blackboard and chalk or whiteboard and markers
- Overhead projector or LCD projector

Materials provided

- PowerPoint 6
- **Handout 6.1. AFASS Criteria for Replacement Feeding**

Preparation

1. Review Lecture Notes and PowerPoint 6.
2. Review the handout to identify questions that can help students master the concepts.
3. Modify the names and any other aspects (e.g., foods described) of the case studies as appropriate for the students' context.

Suggested reading

Coutsoudis, A., et al. 2001. Method of Feeding and Transmission of HIV-1 from Mothers to Children by 15 Months of Age: Prospective Cohort Study from Durban, South Africa. *AIDS* 15:379–87.

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_____. 2001. New Data on PMTCT of HIV and Their Policy Implications: Conclusions and Recommendations. Geneva.

Introduction (slide 5)

By the end of 2005 an estimated 2.3 million children worldwide were HIV positive, and almost 90 percent of them were in sub-Saharan Africa (UNAIDS 2006). Each year 800,000 more children are infected with HIV, mainly through MTCT (Ross 2004).

HIV has also increased infant mortality in the most severely affected countries. UNICEF and UNAIDS report that approximately 500,000 HIV-infected children die each year from AIDS-related causes (IRIN 2005). An over 100 percent Increase in child deaths is projected from 2002 to 2010 in the most heavily affected regions of the world (UNAIDS 2002).

Timing of mother-to-child transmission of HIV (slide 6)

An HIV-positive mother can transmit HIV to her infant during pregnancy, labor and delivery, and breastfeeding. In the absence of any PMTCT interventions, between 20 and 50 percent of HIV-infected mothers will transmit HIV to their infants. Without interventions approximately 5–10 percent of HIV-infected mothers transmit the virus during pregnancy, 10–20 percent during labor and delivery, and 5–20 post-natally through breastfeeding up to 24 months. Labor and delivery is the single point of greatest risk, with as much infection occurring within 24 hours as occurs post-natally within 24 months of breastfeeding.

This session focuses primarily on infants who are infected by HIV through breastmilk. Breastfeeding is the basis of most infant nutrition in sub-Saharan Africa, regardless of the mothers' HIV status. PMTCT interventions are the subject of the second portion of the session.

Transmission risk factors during pregnancy (slide 7)

HIV transmission during pregnancy occurs when HIV crosses the placenta to the fetus. The following factors increase the risk of transmission during pregnancy:

- A viral, bacterial, or parasitic placental infection in the mother during pregnancy
- HIV infection of the mother during pregnancy
- A higher viral load (Shaffer et al 1999)
- Severe immune deficiency associated with advanced AIDS in the mother (WHO

Without treatment, the rate of transmission of HIV during pregnancy ranges from 5–10 percent. A child is considered to have been infected in utero if the HIV-1 genome is detected within 48 hours of delivery by a polymerase chain reaction test (DNA-PCR) or viral culture (UNICEF, UNAIDS, and WHO 1998a).

Transmission risk factors during labor and delivery (slide 8)

Labor and delivery is the time point of greatest risk. There is a 10–20 percent risk of transmission of HIV during this period.

During labor and delivery transmission most often occurs when infants suck, imbibe, or aspirate maternal blood or cervical secretions containing HIV. Higher risks of HIV transmission during labor and delivery are associated with duration of membrane

rupture, acute infection of the placental membranes (chorioamnionitis) resulting from untreated sexually transmitted infections (STIs) or other infections, and invasive delivery techniques that increase the infant's contact with the mother's blood, such as a caesarean section (WHO 1999). Additionally, research has shown that mothers with low CD4 counts near the time of delivery and mothers with severe clinical disease are about three times more likely to transmit HIV to their infants than women who are less severely affected (Leroy et al 2002; European Collaborative Study 2001).

UNICEF, WHO, and UNAIDS (1998) consider transmission to have occurred intrapartum if the results of the diagnostic tests were negative during the first 48 hours after delivery but became positive in subsequent samples taken within 7 to 90 days of delivery.

HIV transmission during breastfeeding (slide 9)

There is a 5–20 percent risk of transmission of HIV through breastfeeding. It is difficult to determine precisely when HIV transmission occurs following birth. The presence of maternal antibodies, combined with a period during which the infection is undetectable, makes it difficult to determine whether infection occurred during delivery or through breastfeeding.

How is HIV transmitted during breastfeeding?

The exact mechanisms for HIV transmission during breastfeeding are not yet completely known or understood. HIV appears to pass from the mother's circulatory systems into her breastmilk.

Studies that have examined breastmilk samples from HIV-positive mothers have shown that 25–35 percent of samples have no detectable virus present. This means either that the virus is not present or that it is present in levels below the limit of detection for the tests used. The HIV appears to be shed intermittently over time. Studies also show that the amount of virus in breastmilk varies between breasts in samples taken at the same time.

When an infant drinks breastmilk from an HIV-positive mother, the virus can enter or infect the infant through permeable mucosa, lymphoid tissues, or lesions in the gastro-intestinal tract. This can happen anywhere from the mouth to tonsil area to the intestine. Transmission is not necessarily a result of the presence of HIV in breastmilk, but rather a complex interaction between the anti-infective agents—macrophages, lymphocytes, and immunoglobulin— in breastmilk and HIV.

The most remarkable aspect of HIV transmission during breastfeeding is that although infants exposed to HIV may consume 300,000 or more virons and 25,000 HIV-infected cells each per day, most do not become infected (Lewis et al 2001). Immune factors in breastmilk and infant saliva are believed to play a role in preventing transmission. It has also been hypothesized that exposure through breastmilk may create a protective immunity for some infants.

The exact mechanisms of HIV transmission during breastfeeding are not yet known. Late post-natal transmission (after 3–6 months) can be estimated with the PCR test. A

meta-analysis of five studies concluded that the best available estimate of the risk of breastmilk transmission is 14 percent (Dunn et al 1992).

Transmission risk factors during breastfeeding

Post-natal transmission of HIV during breastfeeding can be influenced by a number of risk factors related to the mother's status, the infants, and breastfeeding practices. These risk factors are discussed below.

Mothers (slide 10)

Maternal immune system status. Maternal immune status appears to increase the risk of transmission of HIV. Immune deficiencies in the mother, including a low CD4 or high CD8 cell count, increase the risk of transmission. The ZVITAMBO study in Zimbabwe (Iliff et al 2005) found post-natal transmission at 33.7 percent in mothers who had baseline CD4 cell counts below 200, but only 6.3 percent among mothers with CD4 counts above 500. A study in Kenya (Richardson et al 2003) found that maternal immune status, as measured by CD4 cell count, was predictive of breastmilk infectivity. Increased breastmilk infectivity was also found in mothers with prenatal CD4 cell counts below the median of the cohort (median = 400).

Maternal plasma viral load. The same study in Kenya (Richardson et al 2003) found that maternal disease, as measured by HIV-1 RNA plasma level, was also predictive of breastmilk infectivity. Mothers with prenatal HIV-1 RNA plasma levels above the median in the cohort (43,120 copies/mL) had fourfold higher breastmilk infectivity.

Breastmilk viral load

Breastmilk viral loads have been found to correlate well with viral load in blood (plasma viral load) and to be associated with the risk of HIV transmission during breastfeeding (Rousseau et al 2002).

Data have also shown that the incidence of HIV transmission is significantly higher in mothers with higher viral loads in their breastmilk over time (Richardson at al 2003). The Kenya study collected multiple samples of breastmilk. Women who repeatedly had evidence of HIV in their breastmilk were significantly more likely to transmit HIV to their infants than those whose milk only sometimes or never had detectable virus levels.

Recent HIV infection. Maternal viral load is higher in mothers with recent HIV infection. The risk of MTCT during breastfeeding nearly doubles if the mother becomes infected while breastfeeding. An analysis of four studies in which mothers became infected post-natally found a 29 percent risk of transmission through breastfeeding, as compared to the expected 8–20 percent risk seen with most HIV-positive breastfeeding mothers (Dunn et al 1992). This increased risk provides a strong rationale for voluntary counseling and testing (VCT) and prevention measures during pregnancy and delivery.

Breast health. Breast health and problems such as mastitis, cracked and bloody nipples, and other indications of breast inflammation may affect transmission of HIV (John et al 2001; Semba et al 1999). The risk of transmission is also higher in an infant with oral lesions such as thrush (Hoffman et al 2003; Ekpini et al 1997; Semba et al 1999). Mastitis may be caused by infectious agents, poor positioning and attachment,

or weak suckling. Deficiencies in the antioxidants vitamin E and selenium also may increase the risk of mastitis. Mastitis causes junctions in the mammary epithelium to become “leaky,” allowing blood plasma constituents (HIV) to enter breastmilk. Cytokines and other immune reactions resulting from mastitis can damage the intestines of young babies.

Maternal nutritional status. The ZVITAMBO study in Zimbabwe (Iliff et al 2005) indicates that maternal nutritional status in Zimbabwe was associated independently with increased risk of post-natal transmission. The assessment of maternal nutritional status was based on measures of underweight (mid-upper arm circumference, or MUAC) and anemia (hemoglobin). Severe maternal anemia was a positive predictor of post-natal transmission of HIV, with the greatest risk in the first 6 months.

Infants (slide 11)

Infant age. While it is difficult to determine how important infant age is for transmission risk (because of the difficulty of determining precisely the timing of transmission in the first month of infancy), several studies report higher post-natal HIV transmission in the first month (4–6 weeks) of life (Moodley et al 2003; Nduati et al 2000; John et a, 2001). Possible explanations include a higher prevalence of mastitis and breastfeeding problems at this age, a more immature and permeable infant gut, and/or greater exposure to HIV because the infant takes in more milk or a higher concentration of cells**.**

Mucosal integrity (mouth, intestines). Studies show that disruption of the epithelial integrity of the mucous membranes of the intestine or mouth of the infant increases the risk of transmission of HIV (Ekpini et al 1997). Mixed feeding, allergic reactions to complementary foods, and infectious illness can damage the intestine and increase risk of transmission (Bobat et al 1997; Ryder et al 1991; Tess et al 1998b). Oral thrush in an infant may also be associated with MTCT.

Breastfeeding practices (slide 12)

Breastfeeding duration. A meta-analysis of nine studies in Africa (BHITS 2004) showed that the risk of HIV transmission is cumulative, meaning that the longer breastfeeding goes on, the greater the risk of transmission (Read et al 2003; Leroy et al 2002). The risk is about 0.8 percent per month of breastfeeding, or 8.9 infections per 100 child years of breastfeeding.

Pattern or mode of breastfeeding. The pattern or mode of breastfeeding also affects transmission. Infants who are exclusively breastfed have a lower risk of becoming infected than those who consume other liquids, milks, or solid foods in addition to breastmilk during the first months of life (Coutsoudis et al 1999, 2001; Smith and Kuhn 2000). For example, the ZVITAMBO study (Iliff et al 2005) showed that exclusive breastfeeding was associated with a lower risk of infection than mixed feeding. In this study, exclusive breastfeeding was associated with 5.1 HIV infections per 100 child-years of breastfeeding, whereas early mixed feeding was associated with a rate of 10.5 infections per 100 child years of breastfeeding. The twofold increase in the rate of infection remained statistically significant after adjusting for maternal baseline CD4 count and nutritional status, infant birth weight, and maternal death during the follow-up period.

Research conducted in South Africa (Coutsoudis et al 1999, 2001) showed that mothers who exclusively breastfed their infants for 3 months were less likely to transmit the virus than mothers who introduced other foods or fluids before 3 months. At 3 months, infants who were exclusively breastfed had significantly lower transmission rates (19.4 percent) than mixed-fed infants (26.1 percent) and the same transmission rate as formula-fed infants (19.4 percent).

HIV and infant feeding risk analysis (slide 13)

While there is ample evidence of the risks of HIV transmission through breastfeeding, the overwhelming benefits of breastfeeding and risks associated with replacement feeding have been known for a long time. Replacement feeding prevents breastmilk transmission of HIV, but in resource-limited settings and unhygienic conditions, the risk of death from other infections caused by artificial feeding must be weighed against the risk of HIV infection.

Mode of feeding and infant mortality as a result of diarrhea and acute respiratory infection (ARI) (slide 14*)*

To understand the risks involved in infant feeding choices, it is necessary to examine the evidence of the importance of breastfeeding in reducing risks of infant mortality from infectious diseases. One study (Victora 2000) did a pooled analysis of research on the relative risk of infant mortality by diarrhea and ARI by mode of feeding. The different modes of feeding examined included exclusive breastfeeding, breastfeeding and infant formula feeding, and infant formula feeding only. Differences in the relative risk of infant mortality resulting from the mode of infant feeding were seen most clearly in cases of diarrhea and ARI. After accounting for confounding variables, the study found the following:

- Infants who received powdered milk or cow milk in addition to breastmilk had a 4.2 times higher risk of death from diarrhea and 1.6 times the risk of death from ARI than infants who were exclusively breastfed.

- Infants who did not receive any breastmilk had a 14.2 times higher risk of death from diarrhea and 3.5 times higher risk of death from ARI than infants who were exclusively breastfed.

Similar results were obtained when infants who died from diarrhea were compared with infants who died from diseases that were presumed to be the result of noninfectious causes. The study also found that each additional daily breastfeed reduced the risk of diarrhea death by 20 percent.

Nutritional contributions of breastmilk in resource-limited settings (Slide 15)

Breastmilk provides all the nutrient needs of infants younger than 6 months old and contributes more than 50 percent of the nutrient intake of children 6–11 months old in developing countries. This nutritional contribution is not easy to replace with other foods available in these settings. This is an important point because undernutrition is a major underlying cause of child mortality, and poor infant feeding practices contribute to undernutrition.

Use of infant mortality rate (IMR) to determine infant feeding policy (slide 16*)*

Taking all of this information about the risks of infant mortality from HIV transmission and replacement feeding, Piwoz and Ross (2005) used mathematical simulation modeling to develop estimates to guide policy decisions about infant feeding in the HIV context using population-specific infant mortality rates. The estimates led to the following suggestions:

- In settings where IMR is < 25/1,000 live births, exclusive replacement feeding from birth by HIV-positive mothers is recommended.

- In settings where IMR is > 25/1,000 live births, exclusive breastfeeding up to 6 months followed by early breastfeeding cessation is recommended.

Informed choice *(*slide 17)

Given the risks associated with both breastfeeding and replacement feeding, HIV-positive mothers must be given all the information they need to make an informed choice, which is defined by UNAIDS, WHO, and UNICEF as follows:

> *HIV and breastfeeding policy supports breastfeeding for infants of women without HIV infection or of unknown status and the right of a woman infected with HIV who is informed of her serostatus to choose an infant feeding strategy based on full information about the risks and benefits of each alternative.*

WHO recommendations on infant feeding for HIV-positive women (slide 18)

In October 2006 the Inter-agency Task Team (IATT) on Prevention of HIV Infections in Pregnant Women, Mothers and their Infants convened by WHO released a Consensus Statement on HIV and Infant Feeding. The following recommendations from the Consensus Statement are intended for policymakers and program managers and should supplement, clarify, and update existing UN guidance but not replace it. A full report of the review of current evidence on HIV and infant feeding and the IATT recommendations is forthcoming.

- The most appropriate infant feeding option for an HIV-infected mother should continue to depend on her individual circumstances, including her health status and the local situation, but should take greater consideration of the health services available and the counseling and support she is likely to receive.

- Exclusive breastfeeding is recommended for HIV-infected women for the first 6 months of [infant] life unless replacement feeding is acceptable, feasible, affordable, sustainable, and safe (AFASS) for them and their infants before that time.

- When replacement feeding is AFASS, avoidance of all breastfeeding by HIV-infected women is recommended.

- At 6 months, if replacement feeding is still not AFASS, continuation of breastfeeding with additional complementary foods is recommended, while the mother and baby continue to be regularly assessed. All breastfeeding should

stop once a nutritionally adequate and safe diet without breastmilk can be provided.

- Whatever the feeding decision, health services should follow-up all HIV-exposed infants and continue to offer infant feeding counseling and support, particularly when feeding decisions may be reconsidered, such as the time of early infant diagnosis and at 6 months of age.

- Breastfeeding mothers who are known to be HIV infected should be strongly encouraged to continue breastfeeding.

- Governments and other stakeholders should revitalize breastfeeding protection, promotion, and support in the general population. They should also actively support HIV-infected mothers who choose to exclusively breastfeed and take measures to make replacement feeding safer for HIV-infected women who choose that option.

- National programs should provide all HIV-exposed infants and their mothers with a full package of child survival and reproductive health interventions (WHO 2004, 2005) with effective linkages to HIV prevention, treatment, and care services. In addition, health services should make special efforts to support primary prevention for women who test negative in antenatal and delivery settings, with particular attention to the breastfeeding period.

- Governments should ensure that the package of interventions referenced above, as well as the conditions described in current guidance, is available before any distribution of free commercial infant formula is considered.

- Governments and donors should greatly increase their commitment and resources for implementation of the Global Strategy for Infant and Young Child Feeding and the UN HIV and Infant Feeding Framework for Priority Action in order to effectively prevent postnatal HIV infections, improve HIV-free survival, and achieve relevant UNGASS goals.

Table 6.1. defines AFASS criteria for replacement feeding. This is also given in **Handout 6.1**.

Table 6.1. AFASS criteria for replacement feeding

Acceptable	The mother perceives no barrier to choosing replacement feeding for cultural or social reasons, or for fear of stigma and discrimination.
Feasible	The mother or family has adequate time, knowledge, skills, resources, and support to correctly prepare breastmilk substitutes and feed the infant 8–12 times in 24 hours.
Affordable	The mother and family, with available community and/or health system support, can pay the costs associated with the purchase/production, preparation, storage, and use of replacement feeds without compromising the health and nutrition of the family. Costs include ingredients/commodities, fuel, clean water, and medical expenses that may result from unsafe preparation and feeding practices.
Sustainable	A continuous, uninterrupted supply and a dependable system for distribution of all ingredients and products needed to safely practice replacement feeding are available for as long as needed.
Safe	Replacement foods are correctly and hygienically stored and prepared and fed with clean hands using clean cups and utensils, not bottles or teats.

Comprehensive PMTCT approach (slide 19)

A successful approach to PMTCT has to integrate several different programming areas. These areas include prevention of HIV infection; VCT; treatment; infant feeding; counseling on nutrition, safe pregnancy, and infant feeding choices; maternal and child health service delivery; and optimal obstetrical care. A comprehensive approach needs the support, involvement, and participation of the government, international and local organizations, the community, and the private sector in order to make all of these services accessible and affordable.

PMTCT entry points (slide 20)

PMTCT-related interventions can occur during pregnancy, labor and delivery, or the post-natal period. Each of these stages is an opportunity for nurses and midwives to support PMTCT, including infant feeding.

Pregnancy

During pregnancy women should be counseled on primary prevention and the risks of re-infection if they are already HIV positive. They should have access to treatment for STIs that can make them more vulnerable to HIV infection and have been associated with a higher risk of HIV transmission during labor and delivery. Women need access to VCT so that they are aware of their status and can make informed decisions about treatment, infant feeding, safe sex, and labor and delivery based on their status. While the benefits of HIV testing in pregnancy are easily recognized in terms of prevention and care for mother and child, the possible risks of stigmatization, discrimination, and violence also need to be taken into consideration. All testing must be voluntary and confidential.

All women should be encouraged to stay well nourished and hydrated during pregnancy, but this is especially important for HIV-infected pregnant women because 1) they are at increased risk of undernutrition, and 2) as discussed above, maternal nutritional status has been independently associated with an increased risk of transmission of the virus to the fetus.

A growing body of research finds a strong link between HIV and malaria. Studies show that malaria increases viral loads and decreases CD4 counts in pregnant women and that HIV and AIDS impair immunity to malaria in pregnant women (Grimwade et al, 2004; van Eijk et al, 2003). An analysis of data collected from HIV-positive pregnant women in Kigali, Rwanda (Ladner et al 2004) also supports an association between HIV infection and malaria in HIV-positive pregnant women.

Antiretroviral drugs (ARVs) play a key role in PMTCT. ARVs can reduce the risk of transmitting HIV to the infant and should be available when appropriate. Combination therapy in the last 8 weeks of pregnancy along with singe-dose Nevirapine during labor and delivery has been shown to reduce MTCT to less than 6 percent at 6 weeks (Lallemant et al 2004). During pregnancy, quality counseling should focus on helping women make decisions regarding treatment, infant feeding, safe sex, labor and delivery, and family planning.

Labor and delivery

Labor and delivery comprise the single biggest risk point for transmission of HIV, with more transmission occurring during a 24 hour period than occurs post-natally during 24 months of breastfeeding. Most ARV prophylaxis regimens aim to reduce HIV transmission during this time.

Women need a safe delivery plan and access to optimal obstetric practices that can prevent avoidable exposure to HIV at birth. For example, the artificial rupture of membranes to hasten labor should be avoided, as well as routine episiotomy for all primagravidas. After delivery the infant should be thoroughly dried, and any remaining maternal blood and amniotic fluid should be removed. Vigorous suctioning of the infant's mouth and pharynx right after delivery should be avoided, and the umbilical cord should be cut and handled carefully. Elective caesarean sections are used for PMTCT but may be risky in certain environments.

Post-natal period

ARVs continue to have a role in the reduction of MTCT during the post-natal period, which is the subject of several ongoing studies. Quality counseling and support for infant feeding decisions by HIV-positive women becomes increasingly important during this period. Whether women opt to exclusively breastfeed or use exclusive replacement feeding in the first months of their infants' lives, considerable challenges need to be addressed. Women who opt to breastfeed need to understand the importance of exclusive breastfeeding and the dangers posed by mixed feeding. They also need informed counseling on maintaining breast health and preventing problems such as mastitis and cracked nipples. All women can benefit from good counseling on complementary feeding.

Women also need to avoid re-infection with HIV for their own health and to reduce the risks of MTCT during breastfeeding. Practices to avoid-infection include abstinence from sexual intercourse or the use of condoms.

Conclusions (slide 21)

The future of PMTCT depends on service providers, programmers, policymakers, and researchers. While successful programs are now being implemented, an even greater investment is needed to address this problem, with particular emphasis on infant feeding.

At the policy level many governments have developed national guidelines on PMTCT. There is a need to share experiences among countries and ensure that guidelines are based on current research findings and programmatic experience. Finally, further research is needed on factors affecting PMTCT.

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Handout 6.1 AFASS Criteria for Replacement Feeding

Acceptable	The mother perceives no barrier to choosing replacement feeding for cultural or social reasons, or for fear of stigma and discrimination.
Feasible	The mother or family has adequate time, knowledge, skills, resources, and support to correctly prepare breastmilk substitutes and feed the infant 8–12 times in 24 hours.
Affordable	The mother and family, with available community and/or health system support, can pay the costs associated with the purchase/production, preparation, storage, and use of replacement feeds without compromising the health and nutrition of the family. Costs include ingredients/commodities, fuel, clean water, and medical expenses that may result from unsafe preparation and feeding practices.
Sustainable	A continuous, uninterrupted supply and a dependable system for distribution of all ingredients and products needed to safely practice replacement feeding are available for as long as needed.
Safe	Replacement foods are correctly and hygienically stored and prepared and fed with clean hands using clean cups and utensils, not bottles or teats.

Session Six: Infant Feeding and Prevention of Mother-to-Child Transmission of HIV

Purpose

Provide concepts and latest research findings related to prevention of mother-to-child transmission of HIV (PMTCT) for application in the workplace.

2

Learning Objectives

- Describe modes of HIV transmission from mother to child.
- Understand mother-to-child transmission (MTCT) risk analysis.
- Understand key MTCT research findings.
- Explain infant feeding challenges faced by HIV-positive mothers.
- Describe PMTCT interventions.

3

Session Outline

- Discussion of MTCT, including associated risk factors
- Risk analysis of infant feeding choices in the HIV context
- Overview of a comprehensive PMTCT approach

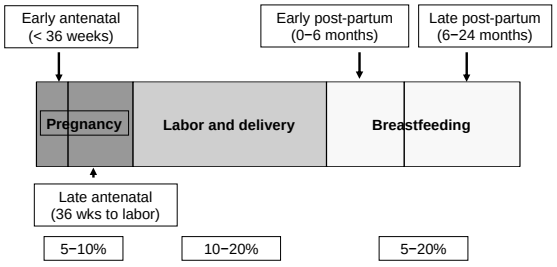
4

Magnitude of the MTCT Problem

- In 2005, 2.3 million children in the world were HIV positive; 87% of them were in sub-Saharan Africa.
- 800,000 children are infected with HIV every year, mainly through MTCT.
- The number of child deaths is expected to increase over 100% between 2002 and 2010.

5

Timing of MTCT with No Intervention



Adapted from CDC

6

Transmission Risk Factors during Pregnancy

- Viral, bacterial, or parasitic placental infection in the mother during pregnancy
- HIV infection of mother during pregnancy
- HIV viral load
- Severe immune deficiency associated with advanced AIDS in the mother

7

Transmission Risk Factors during Labor and Delivery

- Duration of membrane rupture
- Acute infection of the placental membranes (chorioamnionitis)
- Invasive delivery techniques
- CD4 count of mother
- Severe clinical disease of mother

8

HIV Transmission during Breastfeeding

- 5−20% risk
- Exact timing of transmission difficult to determine
- Exact mechanism unknown
- HIV in blood appears to pass to breastmilk
  - Virus shed intermittently (undetectable 25−35%)
  - Levels vary between breasts in samples taken at same time
- Virus may also come directly from infected cells in mammary gland, produced locally in mammary macrophages, lymphocytes, epithelial cells

9

Transmission Risk Factors during Breastfeeding: Mother

- Maternal immune system status (measured by CD4 count)
- Maternal plasma viral load
- Breastmilk viral load
- Recent HIV infection
- Breast health
- Maternal nutritional status

10

Transmission Risk Factors during Breastfeeding: Infant

- Infant age
- Mucosal integrity in the mouth and intestines

11

Transmission Risk Factors during Breastfeeding: Practices

- Duration of breastfeeding
- Pattern of breastfeeding (exclusive breastfeeding or mixed feeding)

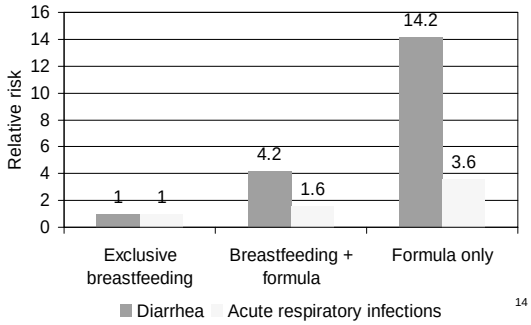
12

Risk Analysis of Infant Feeding Choices for an HIV-Positive Mother

- Replacement feeding prevents HIV transmission through breastmilk, but in resource-limited settings, infants risk dying of other infections if replacement feeding is not done properly.
- The benefits of breastfeeding, despite the risk of HIV transmission, outweigh the risk of replacement feeding.

13

Relative Risk of Mortality from Diarrhea and ARI by Mode of Feeding



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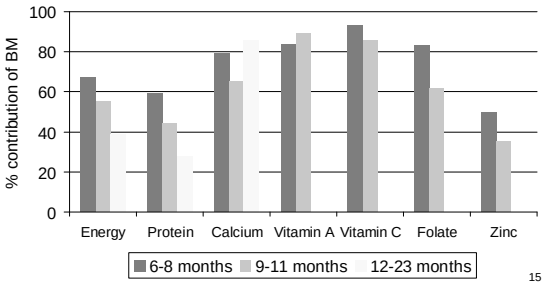
Nutrition Contribution of Breastmilk in Resource-Limited Settings



15

Determining Infant Feeding Policy by Infant Mortality Rate

Infant mortality rate	Infant feeding recommendation
< 25/1000 live births	Replacement feeding by HIV-positive mothers from birth
> 25/1000 live births	Exclusive breastfeeding to 6 months followed by early cessation

16

Informed Choice

"HIV and breastfeeding policy supports breastfeeding for infants of women without HIV infection or of unknown status and the right of a woman infected with HIV who is informed of her sero-status to choose an infant feeding strategy based on full information about the risks and benefits of each alternative."

UNAIDS, WHO, UNICEF

17

Infant Feeding Consensus Statement

- The most appropriate infant feeding option for HIV-infected mothers depends on their individual circumstances.
- Exclusive breastfeeding is recommended for HIV-infected women for the first 6 months of life unless replacement feeding is AFASS.
- When replacement feeding is AFASS, avoiding all breastfeeding by HIV-infected women is recommended.
- At 6 months, if replacement feeding is still not AFASS, continuing breastfeeding with additional complementary foods is recommended.

Source: Inter-agency Task Team (IATT) on Prevention of HIV Infections in Pregnant Women, Mothers, and Their Infants convened by WHO, October 2006

18

Comprehensive PMTCT Approach

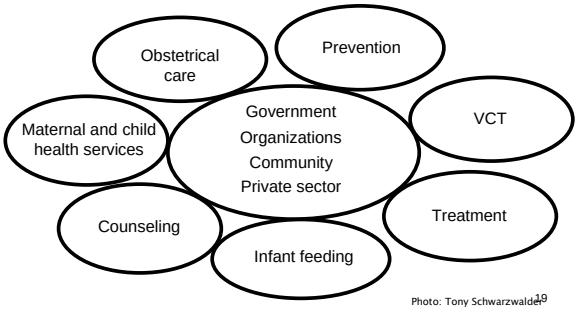


Photo: Tony Schwarzwalder

19

PMTCT Entry Points

Pregnancy	Labor & delivery	Post-natal
• Prevention • Treatment of STIs • VCT • Adequate nutrition • Treatment of malaria and other infections • ARVs • Counseling on safe sex, infant feeding, family planning, self-care, and preparing for the future	• ARVs • Safe delivery planning • Non-invasive procedures • Elective C-section • Vaginal cleansing • Minimal infant exposure to maternal fluids	• ARVs • Counseling and support for infant feeding option • Prevention and treatment of breast-feeding problems • Care of infant thrush and oral lesions • Counseling on complementary feeding/early weaning • Infection prevention

20

Conclusions

- HIV can be transmitted from mother to child during pregnancy, labor and delivery, and breastfeeding.
- A comprehensive package of services is needed to prevent transmission.
- HIV-positive mothers must weight the benefits and risks of breastfeeding before making infant feeding choices.
- Replacement feeding must be AFASS.

21

SESSION 7: FOOD SECURITY AND NUTRITION CARE AND SUPPORT OF PEOPLE LIVING WITH HIV

Purpose (slide 2)

The purpose of this session is to:

- Introduce students to the constraints posed by food insecurity for nutrition care and support for people living with HIV.
- Help students understand approaches to implementing nutrition care and support in food-insecure contexts.

Learning objectives (slide 3)

By the end of the session, students will be able to:

- Define food security and related concepts.
- Explain factors that influence food security.
- Describe the relationship between HIV and food insecurity.
- Explain the effects of food insecurity on nutrition care and support capacity.
- Describe interventions and approaches to optimize nutrition care and support in the context of food insecurity.

Prerequisite knowledge

- Session 1: Basic Facts about HIV/AIDS
- Session 4: Nutrition Management of HIV-Related Symptoms
- Counseling knowledge and skills
- Community support groups and structures

Estimated time: 140 minutes

Session guide (slide 4)

Content	**Methodology**	**Activities**	**Estimated time (minutes)**
Introduction	Participatory lecture		5
Components and dimensions of food security	Large group work	Ask students to brainstorm meanings of food security and then present food security components.	15
Factors that influence food security	Participatory lecture		10
	Group activity (optional)	Pass out cards with terms and definitions and ask students to match them and present each term and definition.	15
Food security and HIV	Participatory lecture		15
Implementation of nutrition care and support in the face of food security constraints		Pass out **Handout 7**. Present information about the three stages of nutrition care and support.	25
	Group exercises and role play	Ask groups to read case studies and exercises, perform role plays, and discuss.	25
Conclusions			5
Review			5
Total time			140

Required materials

- Flipchart paper and stand or blackboard
- Writing pens and chalk
- Overhead projector and transparencies or LCD projector and laptop

Materials provided

- PowerPoint 7
- **Handout 7.1. Steps to Address Food Security in Nutrition Care and Support**

Preparation

1. Review Lecture Notes and PowerPoint 7.
2. Review the handout and exercises to identify questions to help students master the concepts.

Suggested reading

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Related terms

Chronic food insecurity – Persistent shortage of food that often reflects the extent of poverty in a community

Food access – Resources people have to obtain a sufficient quantity and quality of food for a nutritious diet

Food availability – Availability of sufficient quantities of food in a country, region, or household through production, imports, or food assistance

Food insecurity – Failure to meet the conditions for food security defined above; can be transitory or chronic, depending on the duration of the insecurity

Food security – All people at all times having both physical and economic access to sufficient food to meet their dietary needs for a productive and healthy life USAID 1992)

Food utilization – Biological use of food by the body

Household food security – Ability of a household to acquire enough food through production or purchase to meet the nutritional and physiological needs of all its members at all times

National food security – Ability of a nation to acquire and store food sufficient to meet the food requirements of all its residents

Transitory food insecurity –Temporary shortage of food because of a particular event of short duration (e.g., season, temporary loss of employment or income)

Food security definitions (slide 5)

Food insecurity occurs when people do not have continued access to a sufficient quantity and quality of food to meet their physiological needs. USAID (1992) defines food security as a situation in which "…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."

This session focuses on the relationship between food security and HIV, the constraints that food insecurity places on care and support, and implementation of nutrition care and support in food-insecure contexts.

Components of food security (slide 6)

The USAID conceptual framework of food security involves three distinct but interrelated components: food availability, food access, and food utilization. Achieving food security requires sufficient physical supplies of food (availability), adequate household access to these food supplies (access), and appropriate use of food to meet people's specific dietary and physiological needs (utilization).

Food is **availability** is achieved when sufficient quantities of food are consistently available to all people in a country, region, or household through domestic production, commercial imports, and/or food assistance.

Food **access** is achieved when people have adequate resources to obtain sufficient quantity and quality of food for a nutritious diet. Food access depends on income available to the household, distribution of income in the household, and the price of food.

Food **utilization** is the proper biological use of food by the body, influenced by the efficiency of the body's physiological processes and affected by the availability of clean and safe water, adequate sanitation, a diet that provides sufficient levels of essential nutrients, proper child care and illness management, and knowledge of household food storage and preparation techniques.
Information in this session is organized according to these three components of food security. Similar conceptual frameworks have been developed by other agencies.[1]

Factors that affect food security (slide 7)

The factors that negatively affect food security can be divided into four categories:

[1] The United Nations Subcommittee on Nutrition (UN ACC/SCN) defines food security in the following way (1991): "A household is food secure when it has access to the food needed for a healthy life for all its members (adequate in terms of quality and quantity and culturally acceptable), and when it is not at undue risk of losing such access." The International Fund for Agricultural Development (IFAD) organizes household food security into the concepts of acquirement and utilization ("Food Security: A Conceptual Framework," available at http://www.ifad.org/hfs/thematic/rural/rural_2.htm).

- **Individual-level constraints:** Food habits, reduced capacity to eat because of infection symptoms, lack of knowledge of the benefits of proper feeding, and psychosocial factors such as depression

- **Household constraints:** Lack of production and purchasing power, inequitable intra-household distribution of food and income, lack of knowledge of nutritional needs and dietary practices, food taboos, and changes in prioritization among household members as a result of disease

- **Constraints external to the household:** Seasonal variation in production, price fluctuations, social stigma, market availability, legal issues, and social customs

- **External shocks**: Conflicts, drought, floods, earthquakes, macroeconomic crises, etc.

Factors that affect food security also can be grouped according to the three components of food security, as shown in table 1.

Table 1. Factors that affect food security

Availability	Access	Utilization
• Land availability • Land productivity • Quantity and quality of labor force • Availability of productive assets • Availability of inputs and production tools • Climate and climatic shocks • Food production infrastructure • Time for production • Roads and transport	• Income • Savings and assets • Market infrastructure • Social constraints, including stigma • Macroeconomic issues and terms of trade • Physical barriers and constraints • Culture and traditions • Conflict • Intra-household food distribution • Availability of food assistance	• Food quality and diversity • Knowledge of nutritional requirements • Knowledge, skills, time, and resources to prepare food • Water supply • Environmental sanitation • Disease and infections • Food habits • Care practices, including child care and care of sick

The exercises that follow will help students:

- Critically analyze specific food security situations and identify and assess constraints, enabling factors, and capacities.
- Identify practical options to address food security and solve problems.
- Practice interacting, counseling, and advising various types of clients about food security issues in different contexts.

- Think through ways that food security affects specific nutrition care and support needs and situations.

Facilitating a brief class discussion after each exercise can draw out lessons learned and ideas generated through the role-plays. This will allow the role-play participants and

observers to comment on what they learned from the activity and the instructor to emphasize key points from the lecture.

Facilitators may develop additional exercises (e.g., specific role-plays for doctors or nutritionists) that reflect the circumstances in their countries or situations commonly faced by members of the students' professions. Facilitators and participants may want to assign names to characters in the role-plays.

Exercise 1. Ask students to brainstorm food security constraints individually, in pairs, or in small groups. Select a specific nutrition care and support topic from this Training Manual (e.g., "Management of Drug-Food Interactions" or "Infant Feeding and PMTCT"). Ask the students to respond to the following questions from the point of view of a service provider planning nutrition care and support interventions on this topic:

1. How does poor food availability or access make it difficult for PLHIV and caregivers to follow the recommendations for this topic? What important foods or food groups do they lack access to?
2. Which recommendations from this topic may be especially difficult to follow because of food insecurity?
3. What alternative recommendations or changes in the recommendations for this topic could you make for food-insecure households?
4. What common types of food insecurity and underlying factors in your country particularly affect the recommendations for this topic? What do practitioners need to look for during assessment, counseling, and follow up?
5. What types of services and interventions can address food security constraints (e.g., less labor, depleted savings, and poorer agricultural output)? What steps are being taken in your country to address these constraints?

Food insecurity and HIV (slide 8)

HIV can cause and worsen food insecurity, and food insecurity can increase vulnerability to HIV and the impact of HIV. This section examines the reciprocal effects of HIV and food security. The food insecurity commonly faced by HIV-affected households can prevent people living with HIV (PLHIV) from meeting their nutritional requirements. Service providers can offer more effective nutrition care and support when they understand a household's specific food security situation, the constraints that insufficient food access places on recommended dietary practices, and mechanisms to reduce these constraints.

Scope of the problem (slide 9)

UNAIDS (2005) reports that approximately 40 million people are living with HIV worldwide, of which approximately 22.5 million live in sub-Saharan Africa. Prevalence in southern Africa is particularly high. HIV prevalence among pregnant women is 30 percent in South Africa (2004), 43 percent in Swaziland (2004), 32 percent in Botswana (2006), and 18 percent in Zimbabwe (2006).

Many of the most severely affected countries, communities, and households were already food insecure before the onset of HIV. HIV increases the severity and frequency of food insecurity within households and creates food insecurity among previously food-secure households and people.

Effect of death on crop production (slide 10)

Data from many countries show the negative impact of HIV on household food consumption and production. For example, a study in Zimbabwe (Kwaramba 1997) found that after a death in the household from HIV/AIDS, household crop production fell by 37–61 percent overall, with a 61 percent decrease for maize, 49 percent decrease for vegetables, 47 percent decrease for cotton, and 37 percent decrease for groundnuts.

A study in Kenya (Yamano and Jayne 2004, cited in Gillespie and Kadiyala 2005) found that the death of a male adult household head reduced the value of household crop production per household member by 68 percent. A study in Ethiopia (UNAIDS 2002) showed that HIV-affected households spent an average of 11.6–16.4 hours a week on agricultural work, compared with 33.6 hours spent by non-HIV-affected households.

Impact of HIV on income, Côte d'Ivoire (slide 11)

HIV influences food security not only by reducing household food production, but also by diminishing income and savings. Data from urban households in Côte d'Ivoire (UNAIDS 2000) show that the monthly per capita income in households with a member living with HIV is approximately 65 percent less than that of the general population, and that HIV - affected households have an average debt of nearly 5,000 francs CFA, compared with average *savings* of approximately 2,000 francs CFA for the general population.

In a 5-year study in Zambia (Nampanya-Serpell 2000, cited in Gillespie and Kadiyala 2005), two thirds of HIV-affected households studied experienced reductions in disposable income by more than 80 percent.

HIV affects food security not only by reducing food production and hence availability, but also by depleting human, financial, and physical capital, Depleted human, financial, and physical capital increase vulnerability to other shocks such as crop failure, drought, or conflict. Such shocks seriously impair the coping capacity of HIV-affected households because food and money reserves have already been depleted, productive assets may have been sold, and alternative earning capacity is limited by illness and care-giving responsibilities. UNAIDS (2002) reported that the impact of the 2002 drought in southern Africa was worsened by reduced household capacity to perform agricultural labor because of HIV. The drought's severe consequences are an example of how HIV worsens the impact of other shocks. In many cases the food security impact of HIV is broader than the direct effects of illness.

Dynamic between HIV and food security (slide 12)

In certain respects, HIV/AIDS pandemic's impact on food security is similar to that of other shocks such as conflict, drought, and floods, but the dynamic between HIV and food security is unique in the following ways:

Most food security shocks last for a single season or a single year, but HIV is a long-term phenomenon that continues to erode food security year after year (Bonnard 2002). Many countries have not yet experienced the peak of HIV prevalence and will be affected by this shock for decades to come.

HIV attacks both women and men during their most productive years, weakening and killing the strongest food and income producers (Haddad and Gillespie 2001).

HIV increases the nutritional needs of infected people, widening the gap between food needs and food access. As noted in other sessions of this manual, HIV infection can increase the energy needs of PLHIV from 30 to 100 percent.

Stigma attached to HIV may inhibit people or households from seeking assistance and hinder community efforts to address the impacts or prevent further spread of the disease (UNAIDS 2002).

The scale of the pandemic is larger and more widespread than many other types of food security shocks, as it can affect entire countries and regions.

Food insecurity itself can cause people to adopt risky behavior or livelihoods (e.g., transactional sex, migrant labor that keeps household members away from home for extended periods of time), which may increase the risk of HIV exposure.

Effects of HIV on food availability and access (slide 13)

HIV significantly impedes the food security of affected people, households, countries, and entire regions by decreasing—often drastically—the labor, income, assets, food reserves, savings, information exchange, institutional support, and community safety nets available to affected households. In summary, HIV effects food availability and access in the following ways:

- **Reducing labor availability** as a result of illness and death of infected people and increased time demands on caregivers

- **Decreasing income and depleting savings** because of reduced production, lost labor and death of household members, health and funeral expenses, sale of assets, and loans to other affected households

- **Depleting food reserves** for entire communities as some households reduce production

- **Interrupting knowledge transfers,** particularly agricultural and livelihood knowledge, between generations and decreasing knowledge and opportunities gained through education as children become increasingly unable to attend school because of care giving or other household responsibilities

- **Weakening safety nets and support systems** through reduced access to formal and informal networks and support systems because of stigma, overburdened support systems, declines in institution membership because of

illness and death, and diminished incentives to cooperate for future benefits because of impending illness or death

Barnett and Blaikie (1992), Hunter et al (1993), Rugalema (1999), and Barnett and Halswimmer (1995) have shown that HIV significantly damages farming systems. The results are “significant reduction in land use, declining crop yields, changes in cropping patterns, reduction in the range of crops and diminished crop enterprise diversity, which can result in a poorer diet, lower economic returns, loss of soil fertility and a decline in livestock activities” (CGIAR 2001). Gillespie and Kadiyala (2005) identify studies showing that HIV negatively affects agricultural extension by reducing the number of extensionists available.

In response to food security shocks, households often look to the community and other households to help meet consumption needs. But with more and more households affected and people infected during their most productive years, community safety nets weaken and community resources diminish. In many communities prevalence rates are significantly higher than the already high national rates, and existing coping mechanisms often fail. Orphans and vulnerable children (OVC), who under other circumstances would be supported by communities or extended families, are often left to fend for themselves and are particularly vulnerable to food insecurity.

Communities often have developed copies strategies to deal with other food security shocks in the past. They can use some of these coping strategies in the face of HIV, but the distinct nature of the disease may make them ineffective. In many communities HIV has only recently been recognized as a threat to food security, and specific coping strategies are not yet in place to deal with the disease’s impact. Intra-household food distribution may favor healthy members at the expense of HIV-infected people who are no longer productive or dying. In some cases, PLHIV may deliberately reduce their food intake so other household members can eat more. Stigma can also contribute to uneven allocation of food or other resources within or among households, further reducing PLHIV’s access to food.

As mentioned above, HIV can also make communities more vulnerable to external shocks and further aggravate their impact. HIV -affected households have diminished food and financial reserves, less effective coping strategies, and less earning capacity than other households. Therefore, they may be a burden to the community rather than contributing in times of general shocks.

PLHIV need additional nutrients to mitigate the physical impacts of the disease, but HIV reduces their access to food. Efforts to provide nutrition care and support must account for and, where possible, directly address these access constraints.

Table 2 shows examples of how HIV can negatively affect the productive factors that underlie food security.

Table 2. Effects of HIV on rural livelihoods and productive resources underlying food security

Type of resource	Effects of HIV on resources
Labor	• Morbidity interrupts work and reduces productivity. • Morbidity reduces other important household and care activities. • Available labor is not consistent with needs based on traditional division of labor. • Seasonal fluctuations in labor and production are exacerbated. • Caregiving requirements escalate and become overwhelming. • An increase in the dependency ratio increases laborers' burden. • Migration for alternative work opportunities increases. • Risky behaviors (e.g., transactional sex, prostitution, and child labor) increase. • Mortality permanently reduces the size of the labor force and the earning capacity of households.
Cash	• Purchased inputs (e.g., seed, fertilizer) decrease. • HIV -related health care expenditures replace household basic needs expenditures. • Less hired labor or animal traction rental reduces productivity. • School fees are unpaid, and children are withdrawn from school. • Cash demands mean more time devoted to earning cash income at the expense of other activities. • More agricultural output is sold than stored for future consumption. • Poorer-quality foods are substituted for better-quality foods. • Some or all household members reduce their food consumption. • Inadequate diets increase vulnerability to other food-security shocks.
Assets	• HIV-related expenses deplete savings and liquid assets. • Household assets (e.g., roofing, household items) are not maintained or replaced when needed. • Productive assets (e.g., irrigation system and grain storage) are not maintained. • Household assets are sold. • Productive assets (e.g., draught animals, plows) are sold. • Asset divestment increases vulnerability to other food-security shocks such as drought. ▪ Asset divestment constrains recovery from food-security shocks (e.g., drought, conflict).
Knowledge	• Children have less opportunity to learn from their parents. • School absenteeism increases as children assume more responsibilities. • Children are forced to leave school because of non-payment of fees and new demands on their time. • Survivors assume new responsibilities but lack appropriate skills, and social norms hinder change. • Traditional agricultural practices and knowledge are not appropriate to the HIV context. • Current livelihood is no longer feasible or lucrative, but alternative skills are limited. • Migration increases as people look for new livelihood opportunities.

Type of resource	Effects of HIV on resources
Local institutions	• Traditional safety nets (e.g., community grain storage) become overburdened. • Savings club and group lending scheme defaults stress and devastate local credit options. • Traditional customs governing remittances are overburdened or break down. • Traditional child adoption customs are overburdened. • People cannot fulfill customary roles related to other food-security shocks such as drought or fires. • Traditions are adjusted or transformed (e.g., elimination of funeral rights). • Land tenure is inadequate to address needs (e.g., of women, orphans, and other survivors). • Households dissolve.

Source: Bonnard 2002.

Effects of food insecurity on HIV (slide 14)

Food insecurity has the following effects on HIV:

- Can limit the quantity and quality of food available and accessible to the household
- Can increase vulnerability to illness and infection
- Can lead people to adopt livelihood strategies that increase risk of HIV infection. For example, commercial or transactional sex to earn money for food and basic necessities increase the risk of infection to the individuals, their spouses, and future children. Members of food-insecure households may be more likely to work as migrant laborers to increase income, which may lead to situations where risky behavior is more prevalent.

Care and support in a food-insecure context (slide 15)

Nutrition care and support through counseling can be organized into **assessment**, **actions**, and **follow-up**. Nutrition care and support in a food- insecure context is contains the same three components but may have unique aspects, as outlined in the next three slides.

Handout 7.1. Steps to Address Food Security in Nutrition Care and Support outlines steps to integrate food security issues into nutrition care and support counseling.

Exercise 2. This two-person role-play addresses household food security. Ask one student to play the client and another to role-play the counselor. A 35-year-old HIV-positive widow has received nutrition care and support counseling from a health center for the past 3 months. She shows knowledge and awareness of her nutrition needs, but her health and nutritional status has shown no improvement during this time; in fact, she has lost 2 kg. The woman explains that she has not been able to follow most of the recommendations because of her family situation. She and her three children live with her brother, his wife, and their four children. She has not been well enough to work, and her brother's income barely covers basic necessities for the 10 of them. Her sister-in-law has suggested that the woman and her children are a burden and has favored her own family at mealtimes. Ask students to help the woman identify options to improve her nutritional status by discussing the following questions.

1. What options does the woman have? How can she be supported to pursue them?
2. Do psychosocial factors affect the woman's dietary habits?
3. What should be recommended for her children's diet and nutrition? If she gives most of the food available to her to her children, eating very little herself, how should a counselor deal with this?
4. Can the counselor help ease the family constraints?
5. What can the community do in this situation? Are any specific community services feasible?

What types of further education may be needed? For whom?

Exercise 3. This three-person role-play addresses food security and managing drug-food interactions. Students play the roles of a doctor, a father, and his daughter. The doctor is checking the status of a man with HIV who has recently begun antiretroviral therapy (ART). The man's 13-year-old daughter, who is his primary caregiver, indicates that he has taken the medicines irregularly because of the side effects, including diarrhea and nausea. The doctor makes dietary recommendations to address the side effects, but the father and daughter say they do not have regular access to the foods the doctor recommends. The doctor tries to understand the constraints they face and discusses other dietary and food preparation options to deal with the side effects. Students should discuss the following questions.

1. What specific food constraints does the patient face? Are there alternative dietary recommendations?
2. What information (e.g., hygiene, eating habits, cooking techniques) would be useful for the doctor?
3. Can meal planning alleviate some of these constraints? By adjusting food expenditures? By referrals?
4. What role can the daughter play in this process?
5. What information should the doctor give the man? The daughter?
6. What system would help ensure that the man does not miss any doses?
7. What other factors (e.g., local acceptability, energy needs, food preparation, dietary behaviors) should be considered in designing the food package?
2. What system can be established for referrals?
3. Will referrals and targeting of PLHIV increase stigma? How can this be addressed?
4. Can nutrition care and support counseling or follow-up be integrated into the program? How?

Assessment of food insecurity factors (slide 16)

The first step in nutrition care and support is assessment. In a food insecure context assessment includes the following:

- **Assess nutritional status and practices**. Determine the client's nutrition needs based on nutritional status, progression of the disease, opportunistic infections, symptoms, and medication and assess current food and nutrition practices and the factors influencing these practices.

- **Assess factors that prevent adoption of improved practices, including food access and availability and knowledge**. Lack of financial or physical capacity to purchase or produce sufficient quantities of required foods, intra-household food distribution that favors non-HIV-infected people, and food taboos such as those for pregnant women can keep people from adopting improved practices. Identifying these constraints requires discussing general household issues such as food provisions from all sources, kitchen gardens, employment and sources of income, intra-household food sharing, and nutritional status of other household members. Information on factors underlying the client's food and nutrition choices

should be used to target counseling and identify other needed services. Education and counseling can address gaps in knowledge.

- **Identify coping strategies and assess their negative effects, if any**.

  Understanding a household's coping strategies can give a clearer picture of the client's situation, identify gaps, tailor further counseling, and advise against strategies with more negative than positive effects. Coping strategies can be identified through questions such as the following:
  - Have you changed the types of foods you eat daily (e.g., less preferred foods)?
  - Have you reduced your food intake recently?
  - Do you skip meals because there isn't enough food available or so others in the household have more to eat?
  - Have you been getting food from family or neighbors or other sources outside your household?
  - What support networks exist and how adequate are they?
  - Have you reduced spending on other items to buy enough food for the household?

Clients may be able to improve existing coping strategies to better address nutrition needs. Households that produce tubers and cereals can allocate space to grow vegetables rich in micronutrients that can complement high-energy foods to meet specific micronutrient needs. For example, orange-fleshed sweet potatoes, green leafy vegetables, and various indigenous vegetables can prevent or reduce vitamin A deficiency. Eating foods rich in vitamin C iron enhances the bioavailability of iron from other foods. Legumes can help meet protein needs.

Understanding nutrition needs and food security constraints should make it possible to identify foods and nutrients clients are not eating in sufficient quantities because of poor access and availability. An effective assessment identifies gaps and causes of sub-optimal consumption. When low consumption is caused by lack of knowledge or difficulty eating as a result of HIV-related symptoms, education and suggestions of new dietary practices to ease symptoms may help improved intake. In other situations poor food availability or access may be the cause.

Assessments should be client specific. Individual nutrition needs vary to some extent depending on the stage of disease, medications taken, and opportunistic infections and symptoms. Reasons for failing to meet nutritional needs also vary. For example, an HIV-infected person or a caregiver may have access to relatively plentiful quantities of energy- and nutrient-rich food but be unaware of the need to eat more of it. PLHIV may not be able to afford greater quantities of energy- and nutrient-rich food, which may be more expensive than less nutrient-dense staple foods. They may not have the status in the household to demand these foods. A good assessment allows the counselor to understand a client's specific situation and constraints.

Actions to improve food security (slide 17)

The results of the assessment should help service providers determine the most appropriate course of action for the individual client. Good nutrition care and support should use the results of the assessment to select actions to promote and guide

adoption of recommendations within a household's food security constraints. Above all, recommendations need to be practical and feasible.

- **Counsel on doable actions to improve food consumption and dietary choices at the household level**. Identifying optimal feasible alternatives requires knowing the client's specific nutrition needs and food security constraints, as well as what foods are locally available. When recommended foods are not available or accessible for economic, seasonal, or other reasons, locally available substitutes should be found. In some cases this means choosing second-best or third-best options that do not provide optimal levels of nutrients but still provide more than the existing diet.

- **Address illnesses and infections that lead to poor nutritional status**. Other sessions in this manual address the vicious cycle of the relationship between HIV and nutrition. Addressing illnesses and infections can affect food security by increasing food consumption and the ability to continue productive activities that result in better food security.

- **Counsel on how to improve food and water safety and sanitation**.

- **Provide referrals to therapeutic feeding as needed**.

- **Link with and refer to organizations that provide food assistance, micronutrient supplementation, etc.** Service providers should be aware of food assistance, micronutrient supplementation, and other nutrition programs and services in their catchment areas and refer clients to these programs as appropriate. The eligibility criteria for these other programs must be clear so that the service provider can make accurate referrals. Sometimes a formal link must be established between health services and other programs to facilitate uptake of referrals; in other cases, informal information exchange may suffice.

- **Link with and refer to organizations that support food security and livelihood programming**. Another way to help clients improve food availability and access is to link them with services that address household livelihoods and food security.

The interaction between HIV and food security has been recognized relatively recently, and interventions to address this issue continue to emerge. While data on the outcomes of these interventions is still being collected and analyzed, much can be learned from general food security interventions for programming in the HIV context. The following interventions that can be considered:

- **Livelihood training,** especially for non-traditional workers and older OVC, can improve long-term household food security. This might include teaching a young adult a trade such as carpentry or baking that will help them augment household resources. The Food and Agricultural Organization (FAO) has experience implementing Junior Farmer Field Schools, which teach OVC about agriculture and livestock production, equip them with business entrepreneurial skills, and promote life skills and gender equality.

- **Labor-saving practices and technology** are appropriate program responses where morbidity, mortality, and care-giving related to HIV cause labor shortages and place excess burdens on time. Labor-saving practices may include cultivating less labor-intensive crops (e.g., crops that do not require tillage), using fuel-efficient stoves, installing water pumps, and sharing child care. A USAID project in Zimbabwe has developed a drip irrigation system for HIV-affected households that reduces the labor needed for irrigation by 50 percent.

- **Agricultural extension** may need strengthening to ensure that new agricultural practices and technologies are adequately introduced and reach non-traditional groups such as women and OVC.

- **Microfinance** can help households maintain or purchase productive assets, smooth income flow, and meet key food, health care, and other basic expenditures. Small loans can enable affected households to increase income, savings, and food access, but microfinance interventions may need to be designed with special features in the context of HIV to deal with challenges such as ill borrowers. A microfinance program in Zimbabwe instituted a mandatory insurance fee to cover the cost of outstanding loans from borrowers who die (Horizons 2002).

- **Food assistance** can help address food insecurity caused by HIV, but it must be programmed so it does not create disincentives for local food production or dependency on food assistance. Planners of food assistance interventions should use food resources to build community and household coping capacities in addition to meeting short-term food needs. Food assistance can directly increase food-insecure households' access to food through safety net programs, support agricultural activities through food-for-work programs, support vocational training and income-generating activities, and encourage OVC school attendance, which can strengthen long-term food security.

- **Building the capacity of networks** and community support organizations can help address the erosion of institutions, support linkages with services, and maintain knowledge. Often networks and organizations exist but are weakened by the spread of HIV in communities. Capacity building may involve training, strengthening the support that groups offer to HIV-affected households, developing coordination mechanisms between groups and services, and providing outreach to new community members and population groups.

Exercise 4. This task involves a case study of working with food security programs and can be conducted as a small group discussion and brainstorming or a two-person role–play, or both. Ask students to brainstorm key issues and then ask one student to role-play the manager of the counseling program and another to role-play the food aid manager.

As manager of a health and nutrition counseling program, you hear that a food assistance program will open soon for HIV-affected families. Realizing that many of your clients drastically need this kind of support, you make an appointment with the food aid program manager to discuss referring clients from your program for food assistance. You also want to discuss the types of food assistance the program provides to encourage foods most needed by HIV-infected people. Discuss the following questions and issues.

5. What results and points of agreement should you leave the meeting with?
6. What are the criteria for admission to the program? Can the criteria incorporate nutritional status? If so, how?
7. Can the foods offered by the food aid program be modified to better address the nutrition needs of PLHIV? How can this be done given the foods available? What other factors (e.g., local acceptability, energy needs, food preparation, dietary behaviors) should be considered in designing the food package?
8. What system can be established for referrals?
9. Will referrals and targeting of PLHIV increase stigma? How can this be addressed?
10. Can nutrition care and support counseling or follow-up be integrated into the program? How?

Follow-up (slide 18)

Follow-up to nutrition counseling includes assessing how many recommended practices the client followed, what changes are evident in health and nutritional status, and what further support is needed. Follow-up sessions should also assess whether food security constraints have been addressed, what remaining or new food security issues impede nutrition care and support, and what further measures are needed to address these issues and strengthen the capacity for nutrition care and support.

Follow-up may indicate a need for new approaches. For example, if a client shows strong knowledge of nutrition needs but is unable to follow them because of the household's declining earnings, further nutrition education may be less useful than other approaches focused on food access, such as household budgeting, prioritizing food needs to facilitate optimal food expenditure and diet within the household budget, or referral to safety net resources or services to strengthen livelihoods.

Conclusions (slide 19)

The capacity to implement effective nutrition care and support depends heavily on household food security. Information on optimal nutrition practices is often not enough to enable PLHIV to improve their health and nutritional status. Service providers need to

assess clients' food security situations and underlying factors, identify feasible dietary options within the food security constraints, and where possible help address the sources of food insecurity through referrals or linkages to programs and through improved household practices and strategies.

The other sessions of this manual focus on specific dimensions of nutrition care and support. Food insecurity undermines successful implementation of each of these dimensions. Each nutrition recommendation and intervention requires consideration of specific food security constraints and options to address these constraints. Considering the food security issues laid out in this session will enable stronger practical application of each topic's information and recommendations and thus improved nutrition care and support for PLHIV.

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Handout 7.1. Steps to Address Food Security in Nutrition Care and Support Counseling

Students can use this handout to help them integrate food security issues into nutritional care and support counseling. For information on nutritional care and support counseling, refer to Session 9.

During ASSESSMENT

1. Understand the sources of food insecurity for the client and household.
   a. What factors prevent the client from adopting recommended dietary practices?
   b. What is the status of food supply, production, income, and employment?
   c. What coping strategies are used?
   d. What strategies or support mechanisms need support?

2. Identify key food and nutrient access gaps.
   a. What foods and nutrients does the client need more of?
   b. What causes these gaps?

3. Identify capacities and options.
   a. What capacities (e.g., support from household members, coping strategies) do households have to reduce food security constraints?
   b. What options are there for strengthening nutritional practices?

During OPTION SELECTION

1. Identify feasible dietary practices and options. Which dietary options can meet client's nutritional requirements and are feasible within the food security constraints?
2. Identify ways to help increase food security.

   a. Can households link or be referred to services supporting food security and livelihoods?
   b. Can households adjust expenditures to increase purchase of foods rich in nutrients required by people living with HIV/AIDS?
   c. How can changes in intra-household food allocation and behaviors be facilitated?

During FOLLOW-UP

1. Assess how food security constraints have been addressed and what further food security issues require attention.
2. Determine whether additional approaches are required.

Throughout the process, involve client, caregivers, and household members**.**

Session 7: Food Security and Nutrition Care and Support of People Living with HIV

Purpose

To introduce the constraints posed by food insecurity on nutrition care and support for PLHIV and discuss approaches to nutrition care and support in food-insecure contexts

2

Learning Objectives

- Define food security.
- Explain factors that influence food security.
- Describe the relationship between HIV and food security.
- Describe approaches to optimize nutrition care in food-insecure contexts.

3

Session Outline

- Components of food security
- Food insecurity and HIV/AIDS
- Food security constraints for nutrition care and support
- Implementation of nutrition care and support in food-insecure contexts

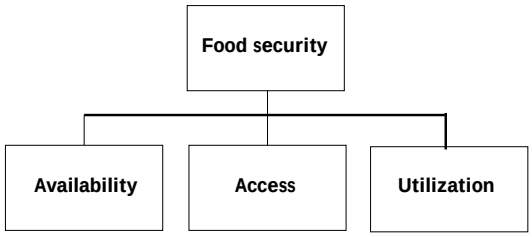
4

Definition of Food Security

- Food insecurity occurs when people lack continued access to sufficient quantity and quality of food.
- USAID definition: 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.

5

Components of Food Security



6

Factors That Affect Food Security

- Individual constraints (knowledge, habits, symptoms)
- Household constraints (production, purchasing power, intra-household distribution)
- External constraints (stigma, price, market fluctuations)
- External shocks (droughts, floods, conflict)

7

Food Insecurity and HIV/AIDS

- Food insecurity often prevents PLHIV from meeting their nutritional requirements.
- HIV can cause and worsen food insecurity.
- Food insecurity can increase vulnerability to HIV infection and the impact of HIV.
- Service providers can offer more effective nutrition care and support when they understand the food and nutrition situation.

8

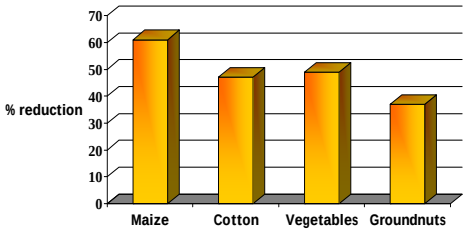
Scope of the Problem

- Over 22.5 million PLHIV in sub-Saharan Africa at the end of 2007 (UNAIDS)
- HIV prevalence of > 10% in 16 countries
- Many worst-affected countries are already food insecure.

9

Effect of Death on Crop Production

Crop reduction in households after AIDS deaths, Kwaramba, Zimbabwe, 1997



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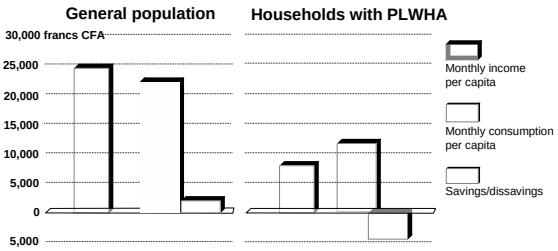
Source UNAIDS 2000 Data from Kwaramba 1997

Impact of HIV/AIDS on Income, Côte d'Ivoire



Source: UNAIDS, Alban and Guiness, ADF 2000. Simulation based on data from Bechu, Delcroix, and Guillame 1997.

11

Dynamic between HIV and Food Security

- HIV/AIDS is a long-term phenomenon.
- HIV mainly infects people in their most productive years.
- HIV creates additional nutritional needs.
- Stigma is associated with HIV.
- HIV occurs on a larger scale (national, regional, continental) than other shocks.
- Food insecurity may increase risky behaviors.

12

Effects of HIV/AIDS on Food Availability and Access

- Reduces labor availability
- Decreases income, depletes savings, and leads to sale or loss of productive assets
- Depletes food reserves
- Interrupts knowledge transfers
- Weakens safety nets and support systems

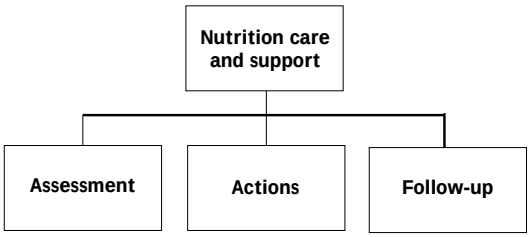
13

Effects of Food Insecurity on HIV/AIDS

- Limits quantity and quality of food available and accessible to households
- Increases vulnerability to illness and infection
- May lead to livelihood strategies that increase risk of infection

14

Care and Support in a Food-Insecure Context



15

Assessment of Food Insecurity Factors

- Assess nutritional status and practices.
- Assess factors that prevent adoption of improved practices, including food access, availability, and knowledge.
- Identify coping strategies and assess negative effects, if any, of these strategies.

16

Actions to Improve Food Security

- Counsel on doable actions to improve household food consumption and dietary choices.
- Address illnesses and infections that worsen nutritional status.
- Counsel on improving food and water safety and sanitation.
- Refer to therapeutic feeding as needed.
- Link with and refer to organizations that provide food assistance, micronutrient supplementation, food security, and livelihood programming.

17

Follow-up

- Reassess the client's situation.
- Modify or adjust services as needed.
- Determine whether further measures are needed to enable nutrition care and support.
- Continue to identify new approaches and opportunities for linkages and referrals.

18

Conclusions

- Information and knowledge are not enough for effective nutrition care and support without household food security.
- Service providers need to assess client food security, identify feasible options, and help address food insecurity.
- Food insecurity affects recommendations and options for all other topics in this manual.

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Part III. Client Services: A Life Cycle Approach

SESSION 8. NUTRITION CARE AND SUPPORT OF ADULTS LIVING WITH HIV

Purpose (slide 2)

The purpose of this session is to equip students with the knowledge and skills to provide dietary guidance and nutrition counseling and care to adults living with HIV.

Learning objectives (slide 3)

By the end of the session, students will be able to:

- Describe the nutrient requirements of PLHIV.
- Describe the concept of nutrition care and support of PLHIV.
- Demonstrate how to do nutrition assessment of PLHIV.
- Demonstrate how to provide nutrition guidance and counseling to HIV-infected adults.
- Describe the use of locally available foods to meet PLHIV nutritional needs.
- Describe the special nutritional needs of older people.

Prerequisite knowledge

Basic nutrition
Principles of nutrition throughout the life cycle
Nutritional value of indigenous locally available foods
Basics of HIV/AIDS, nutrition, and infection
Link between nutrition and HIV

Estimated time: 120 minutes

Session guide (slide 4)

Content	Methodology	Activities	Estimated time (minutes)
Nutrition care and support of HIV-infected adults Nutrient requirements of HIV-infected people Goals and components of nutritional care and support of HIV-infected people Nutrition assessment of HIV-infected people Nutrition-related actions for HIV-infected people	Participatory lecture	Review the nutrient requirements of HIV-infected people, the effects of HIV on nutritional status, the goals and components of nutrition care and support, and the steps in nutrition assessment and counseling of HIV-infected people.	45
Management of severe malnutrition in adults	Participatory lecture	Summarize the main principles of managing severe malnutrition in adults and preparing specialized foods for treatment.	20
Nutritional needs of older people Factors that affect their nutritional needs Using indigenous locally available foods to meet their nutritional needs. Steps to follow when providing nutrition guidance and counseling to older people	Participatory lecture	Review the nutritional needs of older people and factors that affect their nutritional needs.	25
Nutrition counseling and guidance on menus using locally available foods for adult PLHIV	Group work and role plays	Pass out role plays and group work activities. Assign roles for role plays and questions for group work. After each activity, reconvene to discuss main points.	20
Conclusions			5
Review			5
Total time			120

Required materials

- Flipchart paper and stand
- Writing pens
- Blackboard and chalk or whiteboard and markers
- Overhead projector and transparencies or LCD projector and laptop
- Food composition tables for local foods or foods eaten in east, central, and southern Africa
- Locally available foods
- Cups and food containers commonly used in the country

Materials provided

- PowerPoint 8
- **Handout 8.1. Observation Checklist for Nutrition Assessment of Adult PLHIV**
- **Handout 8.2. Observation Checklist for Nutrition Counseling of Adult PLHIV**
- **Handout 8.3. Sample Menu for a PLHIV**
- **Handout 8.4. Food Sources of Vitamins**

Preparation

1. Review Lecture Notes and PowerPoint 8.
2. Review the handouts and exercises to identify questions to help students master the concepts.

Suggested reading

Charney, P., and A. Malone. 2004. Nutrition Assessment. Chicago: American Dietetic Association.

Commonwealth Regional Health Community Secretariat. 2002. Report on Traditional and Indigenous Foods. Arusha, Tanzania.

Food and Nutrition Technical Assistance (FANTA) Project. 2004. HIV/AIDS: A Guide for Nutritional Care and Support. Washington, DC: Academy for Educational Development.

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Gasparis, A. P., and A. K. Tassiopoulos. 2001. Nutritional Support in the Patient with HIV Infection. *Nutrition* 17 (11–12): 981–82.

Hennessy, Kathryn A., and Marsha E. Orr. 1996. Nutrition Support Nursing: Core Curriculum. Silver Spring, MD: American Society for Parenteral and Enteral Nutrition.

World Health Organization (WHO). 2003. Nutrient Requirements for People Living with HIV/AIDS. Report of a Technical Consultation. Geneva.

_____. WHO. 1999. Management of Severe Malnutrition: A Manual for Physicians and Other Senior Health Workers. Geneva.

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

Introduction (5 and 6)

The effects of HIV infection on nutritional status and needs vary according to the stage of the disease. Detailed information about these effects at each stage is given in Session 4. WHO recommendations are different for the two distinct phases of HIV infection: asymptomatic and symptomatic.

During the **asymptomatic phase**, energy requirements of PLHIV increase by 10 percent over the level of energy intake recommended for healthy, non-HIV-infected people of the same age, sex, and physical activity level. For example, the energy requirements of a 35-year-old moderately active asymptomatic male PLHIV are 3,152 kcal/day, compared with 2,865 kcal/day for a 35-year-old moderately active male who is not infected with HIV (2865 + 287 [10 percent] = 3,152). The energy requirements of a 35-year-old moderately active asymptomatic female PLHIV are 2,360 kcal/day, compared with 2,145 kcal/day for a 35-year-old moderately active female who is not infected with HIV (2,145 + 215 [10 percent] = 2,360).

During the **symptomatic phase**, energy requirements of PLHIV increase by 20–30 percent over the level of energy intake recommended for healthy, non-HIV-infected people of the same age, sex, and physical activity level. The range in the requirement reflects the fact that people with more frequent and more severe symptoms need up to 30 percent more energy. For example, the energy requirement of a 35-year-old moderately active male PLHIV is 3,438 kcal/day (2,865 + 573 [20 percent] = 3,438) during the early symptomatic stage and 3,734 kcal/day (2,865 + 860 [30 percent] = 3,725) during the late symptomatic stage. The energy requirement of a 35-year-old moderately active woman is 3,438 kcal/day (2,145 + 429 [20 percent] = 2,574) during the early symptomatic stage and 3,734 kcal/day (2,145 + 644 [30 percent] = 2,789) during the late symptomatic stage.

Data are not sufficient to recommend an increase in protein or micronutrients for PLHIV. WHO recommends that both PLHIV and non-infected people get 12–15 percent of their energy from protein and take micronutrients at 1 RDA. However, people with pre-existing or concurrent protein and micronutrient deficiencies may require higher intake.

These recommendations are for all PLHIV, whether they are taking antiretroviral drugs or not.

Exercise 1. Divide the students into two groups to do an exercise on dietary guidance for PLHIW. Give each group foods to use for a sample daily menu for an asymptomatic adult living with HIV. Ask each group to:

- Use the foods to design a sample daily menu for an asymptomatic and symptomatic PLHIV. Explain the characteristic of the menu.
- Explain the difference between the menus for the asymptomatic PLHIV and symptomatic PLHIV.
- Describe additional guidance to give to asymptomatic and symptomatic PLHIV.

Ask each group to report back after 30 minutes. Summarize the answers of the two groups.

Contact points for nutrition care and support of PLHIV (slide 7)

Nutrition care and support for PLHIV should be provided at the following contact points:

- Voluntary counseling and testing sites
- Antiretroviral treatment (ART) sites
- Health care facilities
- Home visits and community support groups

Goals of nutrition care and support for PLHIV (slide 8)

Nutrition care and support helps PLHIV do the following:

Improve nutritional status by maintaining weight and preventing loss of weight and muscle mass.

Ensure adequate nutrient intake by improving eating habits and building stores of essential nutrients, including carbohydrates, protein, and vitamins and minerals including antioxidant nutrients necessary for the functioning of the immune system.

Prevent food-borne illnesses by promoting good hygiene and food safety.

Provide palliative care during the advanced stages of HIV disease.

Enhance quality of life by managing symptoms that affect food intake.

Components of nutrition care and support of PLHIV (slide 9)

Nutrition care and support for PLHIV is a package that should include the following;

- Nutrition assessment
- Nutrition counseling
- Micronutrient supplementation (if needed)
- Food provision (if needed)
- Food safety and hygiene
- Physical activity

- Psychosocial support
- Referral to other services

Nutrition assessment (slide 10)

Nutrition assessment gathers information about the client to help guide decisions on their nutrition care and support and referrals to other services to improve their well-being. Nutrition assessment can include the following:

- Anthropometric measurement (body mass index [BMI], weight, and changes in weight)
- Biochemical information (laboratory tests)
- Clinical information (appetite change, nausea, vomiting, alcohol intake)
- Dietary information (24-hour food recall, quality of diet)
- Food security status (food availability and access (See **Session 7: Food Security and Nutrition Care and Support of People Living with HIV** for more information.)

Exercise 2. Ask for two volunteers to role-play nutrition assessment of a person with HIV. One volunteer will play Martha, a 28-year-old asymptomatic PLHIV. The other will play Clara, and HIV/AIDS counselor. Ask Clara to carry out Martha's nutrition assessment.

Distribute **Handout 8.1. Checklist for Observing Nutrition Assessment of PLHIV** to the other students. After the role-play, ask "Martha" and "Clara" to explain what went well and what did not go well. Ask the students to provide additional comments using the checklist. Summarize the main points that came from the assessment. If time allows, ask two other volunteers to do a nutrition assessment of a symptomatic PLHIV.

Nutrition counseling (slide 11)

Health service providers can use information collected during nutrition assessments to fine-tune counseling and determine what other interventions are needed. Nutrition counseling for PLHIV should focus on the following messages:

Increasing food intake. A nutritious diet will help PLHIV maintain proper functioning of the immune system and provide the extra energy needed to carry out daily activities. The health service provider should encourage PLHIV to snack regularly throughout the day and eat small but regular meals. Soft foods may be tolerated better during illness. Eating small but frequent meals will help ensure sufficient food intake to prevent weight loss and wasting.

Eating a variety of foods. The best way for PLHIV to improve their diets and avoid deficiencies is to eat a variety of foods including the following:

- Dried legumes (beans, peas, beans, lentils, cowpeas, pigeon peas, groundnuts and nuts)

- Meat, fish, milk products, or egg, if available
- Fruits and vegetables
- Fats in moderation
- Plenty of water

Managing symptoms and food/drug interactions. PLHIV may suffer from symptoms that can make it difficult to maintain a nutritious diet. Many also take drugs that can have side effects such as taste changes, loss of appetite, diarrhea, nausea, and vomiting. These side effects can affect food intake and nutrient absorption and negatively affect nutritional status. If medications cause taste changes, PLHIV can add flavor enhancers such as salt, sugar, spices, vinegar, or lemon to stimulate the taste buds, increase taste acuity, and mask unpleasant flavors. Eating energy- and nutrient-dense foods such as maize, groundnuts, and carrots and drinking plenty of fluids may help replace nutrient losses and prevent dehydration during fever or diarrhea. (See Session 5.)

Exercise 3. Ask for two other volunteers to play the same roles as in Exercise 2. This time "Clara" should role-play counseling "Martha." Ask "Clara" to explain how she used the information collected during the nutrition assessment in the counseling session.

Distribute **Handout 8.2. Checklist for Observing Nutrition Counseling of PLHIV** to the other students. After the role-play, ask "Martha" and "Clara" to explain what went well and what did not go well. Ask students to provide additional comments using the checklist. Summarize the main points from the counseling session. If time allows, ask two other volunteers to carry out nutritional counseling of a symptomatic PLHIV.

Exercise 4. Ask the students to divide into two groups to do an exercise on helping adult clients use indigenous and locally available foods to meet their energy and nutrient needs.

Distribute copies of **Handout 8.3. Sample Daily Menu for a PLHIV and Handout 8.4. Food Sources of Vitamins** to each student. Ask students to review the frequency of meals, the quantity of food for each meal, the nutrient content of each food, and the contribution of each food to the nutritional needs of adult men and women.

Ask group 1 to answer the following questions, referring to the sample menu:

- Why is the proposed menu suitable for a moderately active asymptomatic 35-year-old man living with HIV?
- Is the frequency of meals realistic? If not, what alternative options do you need to consider?
- How can the proposed quantity of foods be adapted using the local system of measurements?
- How can you adapt this menu to your area or country?
- How can this menu be adjusted if the man becomes less or more active?

Ask group 2 to answer the following question:

- How can you adapt the proposed menu to make it suitable for a 35-year-old *symptomatic* male PLHIV who is recovering at home from severe malnutrition?

Give the groups 1 hour. When the time is up, ask each group to report back. Ask a student to summarize the major points that came out of each group presentation.

Micronutrient supplementation (slide 12)

PLHIV can best meet their micronutrient needs by eating a diverse diet that includes fortified foods. However, pre-existing micronutrient deficiencies and deficiencies resulting from HIV need to be addressed. This may include providing micronutrient supplements at 1 RDA to PLHIV whose diets are not sufficient.

Health service providers should collect clinical and dietary information from PLHIV as a part of nutrition assessment to determine whether their diets are diverse enough to provide the necessary micronutrients. If not, micronutrient supplements can be prescribed. Where available, biochemical tests should be carried out for more accurate testing of micronutrient status.

Food provision (slide 13)

Studies have shown that malnutrition significantly increases mortality risk for PLHIV. Specialized food products help malnourished clients manage and address malnutrition.

Severely malnourished clients should receive therapeutic food. Management of severe malnutrition in PLHIV is discussed in more detail below.

Service providers should follow national policies and protocols when determining whether PLHIV need food provision.

Food safety and hygiene messages (slide 14)

Proper food safety and hygiene are important for PLHIV because their immune systems have already been weakened. Preventing water- and food-borne disease is crucial. Contaminated food and water can cause diseases that involve diarrhea and vomiting, which can deplete nutrients and decrease absorption. The following messages encourage PLHIV to maintain healthy hygiene levels:

General

- Drink only clean water that has been brought to a rolling boil to kill germs or treated with a chlorination product such as Water Guard and stored in a clean container with a lid.
- Wash hands with soap before and after touching foods and using the latrine.

Animal products

- Thoroughly cook all animal products (meat, chicken, pork, fish, and eggs).
- Avoid raw or soft-boiled eggs or undercooked meat.
- Thoroughly clean utensils and surfaces that have been in contact with uncooked foods.
- Cover meat, poultry, and fish with a clear cover or cloth and keep separate from other foods to avoid contamination.

Fruits and vegetables

- Use clean water to thoroughly wash all fruits and vegetables.
- If it is not possible to wash fruits and vegetables properly, remove the skin to avoid contamination.
- Cut out bruises on fruits and vegetables to remove any mold or bacteria that may be growing there.
- Avoid eating groundnuts and maize that are moldy, shriveled, or spotted with spots.

Food storage and handling

- Keep areas where food is prepared free of flies and other insects.
- Cover uneaten food to avoid contamination.
- Keep hot foods hot and cold foods cold before eating.
- If food products have expiration labels, do not eat after the “best before” date has expired.
- Store cooked food at most for one day and reheat before eating.
- If you have a refrigerator, put all leftover foods in it.

Physical activity (slide 15)

Being active helps stimulate appetite, develop muscles, reduce stress, and maintain physical and mental health. Health service providers should encourage PLHIV to stay as active as possible. Physical activity can also have a positive effect on mental health.

Psychosocial support (slide 16)

PLHIV may suffer from depression, which can reduce appetite and motivation to maintain their health. During the clinical assessment, the health service provider can focus on the client's emotional state and how this affects diet. Questions related to alcohol consumption may reveal a need for support and counseling.

PLHIV usually can benefit from extra emotional care and psychosocial support. Health service providers should provide such support and refer clients to community groups where available.

Referral to other services (slide 17)

Health service providers can help PLHIV determine which services in addition to typical HIV-related services they are eligible for. Such services might include food aid, livelihood strengthening, and microfinance opportunities. PLHIV support groups and associations are becoming more common in many countries. Aside from offering psychosocial support, these groups can link people to HIV-related services and other programs that can improve quality of life.

Management of severe malnutrition in adults (slide 18)

Malnutrition in adults is often associated with other illness such as infections, intestinal malabsorption, alcoholism, liver disease, or HIV. Both malnutrition and the underlying illnesses should be treated. Health service providers should follow the 1999 WHO guidelines for management of severe malnutrition of adults.

Classification of severe malnutrition in adults (slide 19)

Nutrition assessment is necessary to identify severe malnutrition in adults. For adults, BMI is the preferred index for determining nutritional status. BMI is the ratio of weight in kilograms to height in meters squared (kg/m^2).

$$\text{BMI} = \frac{\text{weight (kg)}}{\text{height (m)}^2}$$

To calculate BMI, divide weight in kilograms by the square of height in meters (kg/m^2). For example, a 50-kg woman with a height of 155 cm (1.55 m) would have a BMI of 20.83 (50/[1.55*1.55]).

Treatment of severe malnutrition in adults (slides 20 and 21)

Severely malnourished adults often have infections, impaired liver and intestinal function, and problems related to electrolyte imbalance. Some adults are so

anorexic they require nasogastric feeding, which as a last resort because it can increase the risk of infection.

During the **initial phase of treatment** (usually 1–7 days), life-threatening illnesses and infections are treated and therapeutic food is provided. Non-pregnant severely malnourished adults should also be given a single dose of vitamin A (200,000 IU).

Therapeutic food products such as F-75 and F-100 therapeutic milks are commonly used to treat and rehabilitate severely malnourished people in a clinical setting. There is growing experience with the use of ready-to-use therapeutic foods (RUTF) for PLHIV, especially for community-based approaches to therapeutic care.

F-75 is used during the initial treatment phase, and F-100 or RUTF during the rehabilitation phase. Both formulas can be purchased commercially as a powder that requires adding clean water. They can also be made from dried skimmed milk, sugar, cereal flour, oil, mineral mix, and vitamin mix. Table 2 lists the amounts of ingredients to prepare both F-75 and F-100.

Table 2. Preparation of F-75 and F-100 diets

Ingredient	Amount	
	F-75	**F-100**
Dried skimmed milk	25 g	100 g
Sugar	70 g	50 g
Cereal flour	35 g	–
Vegetable oil	27 g	60 g
Mineral mix	20 ml	20 ml
Vitamin mix	140 ml	140 ml
Water to make	1,000 ml	1,000 ml

To prepare the F-75 diet, add the dried skimmed milk, sugar, cereal flour, and oil to some water and mix. Boil for 5–7 minutes. Allow to cool and then add the vitamin and mineral mix and mix again. Make up the volume to 1,000 ml of water.

A comparable formula can be made from 35 g of whole died milk, 70 g of sugar, 35 g of cereal flour, 17 g of oil, 20 ml of mineral mix, 140 mg of vitamin mix, and water to make 1,000 ml.

If cereal flour or cooking facilities are not available, a comparable formula can be made from 25 mg of dried skimmed milk, 100 g of sugar, 27 g of oil, 20 ml of mineral mix, 140 mg of vitamin mix, and water to make 1,000 ml. This formula has high osmolarity and may not be tolerated by patients with diarrhea.

To prepare the F-100 diet, add the dried skimmed milk, sugar, and oil to some warm boiled water and mix. Add the mineral and vitamin mix and mix again. Make up the volume to 1,000 ml with water.

A comparable formula can be made from 110 g of whole dried milk, 50 g of sugar, 30 g of oil, 20 ml of mineral mix, 140 mg of vitamin mix, and water to make 1,000 ml. Alternatively, use 880 ml of fresh cow milk, 75 g of sugar, 20 g of oil, 20 ml of mineral mix, 140 mg of vitamin mix, and water to make 1,000 ml.

Hygiene: Everyone who prepares the therapeutic milk and serves patients should wash hands with soap and water beforehand. Once prepared, the liquid milk must be used within 3 hours or discarded.

Table 3 shows the daily dietary and volume requirements to treat severely malnourished adults in the initial stage.

Table 3. Dietary requirements for initial treatment of severely malnourished adults

Age (years)	**Daily energy requirement****	**Volume of diet required (ml/kg per hour)**	
	Kcal/kg	F-75	F-100
19–75	40	2.2	1.7
> 75	35	2.0	1.5

During the **rehabilitation phase**, severely malnourished adults should be given traditional foods with added oil and mineral and vitamin mix. Severely malnourished adults become very hungry as their appetites improve and often ask for food. Health service providers should give a variety of food and allow the adult patient to eat as desired. F-100 should be given between meals. Patients can be discharged when they are eating well and gaining weight (e.g., BMI > 18.5), and have a reliable source of foods at home. Failure to respond to the treatment is often a result of unrecognized underlying illness, micronutrient deficiency, or refusal to follow the treatment regimen.

Follow-up

Before discharge, the health service provider should meet with the patient and caregiver to counsel on how to use foods available at home to improve and maintain good health and nutritional status. Regular follow-up visits should be scheduled with the patient and caregiver after discharge to assess improvement in health and nutritional status and counsel on how to solve medical and nutrition problems encountered during the recovery period.

Nutrient requirements of older adults (slide 22)

As people age their nutritional needs change. Adults > 55 years old need fewer calories but more vitamins and minerals than younger adults. Health service providers who work with older PLHIV need to consider these factors.

Energy needs. Older adults have lower baseline caloric requirements than younger adults. For example, a 60-year-old moderately active man needs 2,371 kcal/day.

Micronutrient needs. Older adults need more vitamins and minerals than younger adults. Table 4 shows the recommended daily vitamin intake for older people.

Table 4. Recommended daily vitamin intake for older people

Vitamin	Males	Females
Vitamin A μg	900	700
Vitamin C Mg	80	75
Vitamin D μg	15+	15+
Vitamin E mg	15	15
Vitamin K μg	120+	90+
Thiamin mg	1.2	1.1
Riboflavin mg	1.3	1.1
Niacin mg	16	14
Vitamin B6 mg	17	1.5
Folate μg	400	400
Vitamin B12 μg	2.4	2.4
Pantothenic acid Mg/d	5+	5+
Biotin μg	30	30+
Choline mg	550	425+

Factors that affect the nutritional status of older adults (slide 23)

The following factors affect the nutritional status of older adults:

- **Reduced muscle mass and physical activity** reduce the calories needed.
- **Sensory changes** reduce the ability to taste and smell food and reduce appetite and affect eating patterns.
- **Oral health problems** such as tooth loss and gum disease often prevent older adults from eating foods such as meat, fresh fruit, and vegetables that require biting and chewing and might make eating less pleasurable overall.
- **Digestive problems** including gastritis, decline in enzyme production, and changes in the size of the intestine can lead to poor appetite, poor nutrient absorption, and constipation.
- **General health problems** can affect appetite and the ability to prepare food.
- **Degenerative diseases** such as arthritis can make chopping food and collecting firewood more difficult.
- **Side effects of medications** can cause dry mouth, nausea, abdominal pain, bloating, and taste changes, which might change eating habits. Some medications can also affect nutrient absorption and utilization.

Conclusions (slide 24)

Proper nutritional care and support of PLHIV helps strengthen the immune system, reduce the severity of opportunistic infections, alleviate HIV-related symptoms, manage the effects of food-drug interactions on nutritional status, and contribute to the efficacy of and adherence to medications and may slow the progression of the disease to AIDS.

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Handout 8.1. Observation Checklist for Nutrition Assessment of PLHIV

Modify and adapt this tool as needed.

Did the health service provider …	Yes	No	Comments
Review the results of the laboratory tests?			
Take anthropometric measurements (weight, height, BMI)?			
Review dietary intake?			
Types and variety of foods eaten?			
Amount of foods eaten?			
Frequency of meals?			
Use of nutrition supplements?			
Fluid intake?			
Assess food access and availability?			
Assess HIV-related symptoms and illnesses?			
Kinds of symptoms?			
Frequency?			
Food used to address each symptom?			
Strategies to deal with each symptom?			
Review food-drug interactions?			
Medications taken?			
Medication side-effects that affect food Intake?			
Effects of medications on nutrient absorption and utilization?			
Effects of food on drug efficacy?			
Unhealthy food-drug effects?			
Assess hygiene and food safety?			
For fruits and vegetables?			
For meat?			
Food access and availability?			
Food grown?			
Food purchased regularly?			
Periods of food shortage?			

Did the health service provider …	Yes	No	Comments
Foods affected by shortages?			
Strategies to cope with food shortages?			
Assess physical activity?			
Review lifestyle practices such as smoking and drinking alcohol and caffeine?			
Assess psychosocial factors including stress, depression, and stigma?			

Handout 8.2. Observation Checklist for Nutrition Counseling of PLHIV

Modify and adapt this tool as needed.

Did the counselor …	Yes	No	Comments
Review the results of the laboratory tests?			
Greet the client?			
Introduce himself or herself to the client?			
Treat the client with respect and acceptance?			
Listen carefully and actively and show empathy to the client's needs and concerns?			
Make eye contact when talking with the client?			
Ask open-ended questions?			
Counsel on food intake?			
Counsel to eat small and frequent meals?			
Counsel to eat a variety of foods?			
Counsel on nutritional management of HIV-related symptoms?			
Counsel on nutritional management of food-drug interactions?			
Counsel on meal and drug time table?			
Counsel on foods to avoid?			
Counsel on recommended foods?			
Counsel on nutrient supplements required?			
Counsel on food safety and hygiene?			
Counsel on water?			
Counsel on food handling?			
Give psychosocial support?			
Praise and reaffirm the things the client is doing right?			
Suggest interventions that were acceptable, affordable, and feasible for the client?			
Communicate the nutrition information based on the client's level of knowledge and cultural values and beliefs?			
Maintain professional conduct during counseling?			
Discuss and schedule a follow-up meeting?			

Handout 8.3. Sample Daily Menu for PLHIV

The menu below provides 3,152 kcal/day for a 35-year-old moderately active, asymptomatic male PLHIV.

Meal	Type and quantity of foods
Breakfast	1 bowl of maize porridge with milk and groundnut paste 1 orange Water
Snack	1 serving of paw paw 1 chapati
Lunch	2 bowls of *ugali* 1 cup of spinach stew with dried fish 1 banana Water
Snack	1 bowl of maize porridge with milk and groundnut paste
Dinner	1 bowl of *matoke* 1 cup of beans with crayfish Water

Handout 8.4. Food Sources of Vitamins

Vitamins	Food sources
Vitamin A	All yellow and orange fruit and vegetables, dark green leafy vegetables, liver, oil fish, dairy products, and egg yolks
Vitamin C	Citrus fruits (orange, lemon, guava)
Vitamin D	Milk, meat, fish, liver
Vitamin E	Leafy vegetables, vegetable oils, peanuts, egg yolks, dark green vegetables, nuts and seeds, whole-grain cereals
Vitamin K	Fish, liver, spinach, egg
Vitamin B1 Thiamin	Whole grain cereals, beans, meat and poultry, and fish
Vitamin B2 riboflavin	Milk, yogurt, meat, green leaves, and whole-grain cereals
Vitamin B3 niacin	Milk, fish, eggs, meat, poultry, peanuts, and whole-grain cereals
Vitamin B6	White beans, maize, avocados, whole-grain cereals, seeds, eggs, leafy vegetables, bananas, legumes, meat, and fish
Folate	Liver, red meat, green leafy vegetables, fish, legumes, groundnuts, oilseeds, whole-grain cereals, egg yolks, and avocados
Vitamin B12	Red meat, fish, poultry, seafood, sardines, eggs, milk, and whole-grain cereals
Pantothenic acid	Foods of animal and vegetable origin
Biotin	Liver, kidney, soy flour, egg yolk, cereal, and yeast
Choline	Egg yolk, beef, peanut, and soybeans

Source: Adapted from Network of African People Living with HIV/AIDS (NAP+), 1996.

Session 8: Nutrition Care and Support of Adults Living with HIV

Purpose

To equip students with the knowledge and skills to provide dietary guidance and nutrition counseling and care to adults living with HIV

2

Learning Objectives

- Describe the nutrient requirements of adult PLHIV.
- Demonstrate how to assess the nutritional status of adult PLHIV.
- Demonstrate how to provide nutrition counseling to adult PLHIV.
- Describe the use of locally available foods.
- Describe the nutritional needs of older people.

3

Session Outline

- Goals and components of nutrition care and support of PLHIV
- Dietary guidance to meet the nutritional needs of PLHIV.
- Management of severe malnutrition in PLHIV
- Nutritional needs of older adults

4

Nutrient Requirements of PLHIV

During the ***asymptomatic phase:***

- PLHIV energy requirements increase by 10% over those of healthy non-HIV-infected people of the same age, sex, and physical activity.
- Protein and micronutrient requirements remain the same.

5

Nutrient Requirements of PLHIV

During the ***symptomatic phase:***

- PLHIV energy requirements increase by 20–30% over those of healthy non-HIV-infected people of the same age, sex, and physical activity.
- Protein and micronutrient requirements remain the same.

6

Contact Points for Nutrition Care and Support of PLHIV

- Voluntary counseling and testing sites
- ART sites
- Health care facilities
- Home visits and community support groups

7

Goals of Nutrition Care and Support of PLHIV

- Prevent malnutrition and wasting.
- Achieve or maintain body weight and strength.
- Enhance ability to fight opportunistic infections.
- Possibly delay disease progression.
- Promote effectiveness of drug treatment.
- Improve quality of life.

8

Components of Nutrition Care and Support of PLHIV

- Nutrition assessment
- Nutrition counseling
- Micronutrient supplementation (if needed)
- Food provision (if needed)
- Food safety and hygiene
- Physical activity
- Psychosocial support
- Referral to other services

9

Nutrition Assessment

- Anthropometric measurement (BMI, weight, weight changes)
- Biochemical information (lab data)
- Clinical information (appetite changes, nausea, vomiting, alcohol intake)
- Dietary information (24-hour recall, quality of diet)
- Food security status (food availability and access)

10

Nutrition Counseling Focus

- Increase food intake
- Eat a variety of foods
- Manage symptoms and drug-food interactions

11

Micronutrient Supplementation

- A varied diet is the best way to avoid micronutrient deficiencies
- Micronutrient supplementation should be at 1 RDA
- Clinical and dietary information determines the need for micronutrient supplements
- Biochemical tests (e.g., hemoglobin, serum retinol) should be done where available.

12

Food Provision

- Malnutrition significantly increases mortality risk for PLHIV.
- Specialized food products can help PLHIV manage undernutrition.
- Service providers should follow national policy and protocols to determine whether PLHIV need food supplements.

13

Food Safety and Hygiene Messages

- Drink only clean water brought to a rolling boil.
- Wash hands with soap.
- Thoroughly cook animal products.
- Wash all fruits and vegetables.
- Cover uneaten food.

14

Physical Activity

- PLHIV should be encouraged to be as active as possible.
- Physical activity helps stimulate appetite, develop muscles, reduce stress, and maintain physical and mental health.

15

Psychosocial Support

- Health service providers should give PLHIV psychosocial support and refer them to community groups where possible.
- Depression can decrease appetite.
- Nutrition assessment should collect information on the client's emotional state and how this affects diet.
- Questions about alcohol consumption may reveal a need for support and counseling.

16

Referral to Other Services

- Food aid
- Livelihood strengthening
- Microfinance opportunities
- PLHIV support groups and associations

17

Management of Severe Malnutrition in Adult PLHIV

- Malnutrition is often associated with other illnesses (e.g., infections, intestinal malabsorption, alcoholism, liver disease, HIV).
- Health service providers should follow 1999 WHO guidelines on managing severe malnutrition.

18

Adult Nutrition Classification by BMI

BMI	Classification
< 16.0	Severely malnourished
16.0—16.99	Moderately malnourished
17.0—18.49	Mildly malnourished
18.5—24.9	Normal
25.0—29.9	Overweight
≥ 30.0	Obese

19

Treatment of Severe Malnutrition in Adults

Initial phase (1–7 days)

- Treat life-threatening illnesses.
- Provide therapeutic food.
- Give a single dose (200,000 IU) of vitamin A if client is not pregnant.

20

Therapeutic Foods

- Therapeutic food products such as F-75 and F-100 to treat and rehabilitate severely malnourished PLHIV in clinical settings
- Growing experience with ready-to-use therapeutic foods (RUTF) for PLHIV, especially for community-based approaches

21

Nutrient Requirements of Older Adults

As people grow older, their nutritional needs change:

- Less energy
- More micronutrients

22

Physical Factors That Affect Nutrition in Older Adults

- Reduced muscle mass and physical activity reduce the need for calories.
- Sensory changes reduce taste and smell.
- Tooth loss and gum disease make it difficult to eat some foods.
- Digestive problems reduce enzyme production and change intestine size.
- General health problems affect appetite and ability to prepare food.
- Drugs can cause dry mouth, nausea, abdominal pain, bloating, and taste changes.

23

Conclusion

Proper nutrition care and support help strengthen the immune system, alleviate symptoms, reduce the severity of opportunistic infections, enhance the effectiveness of and adherence to medical treatment, and manage the negative effects of drug-food interactions on nutritional status and may slow disease progression for PLHIV.

24

SESSION 9: NUTRITION CARE AND SUPPORT OF PREGNANT AND LACTATING WOMEN AND ADOLESCENTS LIVING WITH HIV

Purpose (slide 2)

The purpose of this session is to give students an understanding and knowledge of the special considerations for nutrition care and support for HIV-infected pregnant or lactating women and adolescent girls.

Learning objectives (slide 3)

By the end of the session, students will be able to:

- Explain how HIV infection increases the risk of malnutrition in HIV-infected pregnant or lactating women and adolescents in resource-limited settings.
- Describe the dietary requirements of HIV-infected pregnant or lactating women and adolescents.
- Describe the essential components of nutrition care of HIV-infected pregnant or lactating women and adolescents.
- Make appropriate recommendations for nutrition care and support of HIV-infected pregnant or lactating women and adolescents.
- Carry out a nutrition assessment and counsel on appropriate interventions based on the nutrition assessment for HIV-infected pregnant or lactating women and adolescents.
- Explain the challenges HIV-infected pregnant and lactating women face that increase their risk for malnutrition.

Prerequisite knowledge

- Session 1: Basic Facts about HIV/AIDS
- Session 4: Nutrition Management of HIV-Related Symptoms
- Counseling knowledge and skills
- Community support groups and structures

Estimated time: 140 minutes

Session guide (slide 4)

Content	Methodology	Activities	Estimated time (minutes)
Reasons to focus on women, nutrition, and HIV	Participatory lecture	Introduce the session and rationale.	10
Links between HIV and nutrition during pregnancy and lactation	Participatory lecture	Present and discuss the cycle of poor nutrition and infection.	15
Nutritional requirements of HIV-infected pregnant and lactating women and adolescents	Participatory lecture	Review the dietary needs of HIV-infected pregnant and lactating women and adolescents	15
Recommendations for nutrition care and support of HIV-infected pregnant or lactating women or adolescents	Participatory lecture	Present dietary recommendations for HIV-infected pregnant and lactating women and adolescents.	15
Goals and objectives of nutrition care and support for HIV-infected pregnant and lactating women and adolescents	Participatory lecture	Review the goals and objectives of nutrition care and support for pregnant and lactating women in the context of HIV.	15
Components of nutrition care and support for HIV-infected pregnant and lactating women	Participatory lecture Role-plays	Divide participants into groups and facilitate role-plays on counseling pregnant and lactating women on nutrition and HIV.	20
Issues and challenges in nutrition care and support of HIV-infected pregnant and lactating women and adolescents	Questions and answers	Facilitate discussion on issues and challenges in providing nutrition care and support for HIV-infected pregnant and lactating women and adolescents.	30
Discussion points	Questions and answers	Facilitate discussion on concepts in Session 9.	10
Conclusions			5
Review			5
Total time			140

Required materials

- Flipchart paper and stand
- Writing pens
- Overhead projector and transparencies or LCD projector and laptop

Materials provided

- PowerPoint 9
- **Handout 9.1. Guide to Nutrition Assessment of Pregnant and Lactating Women with HIV**
- **Handout 9.2. Checklist for Nutrition Assessment of Pregnant or Lactating HIV-infected Woman and Adolescents**
- **Handout 9.3. Practical Considerations for Nutrition Counseling**
- **Handout 9.4. Checklist for Assessing the Quality of Counseling of Pregnant or Lactating PLHIV**
- **Handout 9.5. Dietary Management of Common Problems in HIV Infection**
- **Handout 9.6. Essential Health Sector Actions to Improve Maternal Nutrition in Africa**
- Discussion Points 9

Preparation

1. Review Lecture Notes and PowerPoint 9.
2. Review the handouts, exercises, and Discussion Points to identify questions to help students master the concepts.

Suggested reading

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Introduction

Good maternal nutrition during both pregnancy and lactation is vital for the survival and well-being of the developing infant. Well-nourished mothers have healthier babies and a lower risk of maternal mortality and morbidity. Undernourished women have higher reproductive risks and subsequently poorer pregnancy outcomes. In sub-Saharan Africa, where malnutrition is endemic, many women are malnourished even before pregnancy, and over 50 percent of women are HIV infected (UNAIDS 2004).

Undernutrition and HIV work in tandem, with undernutrition weakening the immune system and increasing vulnerability to infection and HIV compromising nutritional status and increasing vulnerability to infection. Improving nutritional status and food security for all, including HIV-infected pregnant and lactating women and adolescents, is a challenge for policymakers and health service providers.

Reasons to focus on nutrition and HIV in women (slides 5, 6, and 7)

HIV has been described as having the face of a woman: 13 African women are infected for every 10 African men (UNAIDS 2004), and 57 percent of adults in their most productive years (15–49 years old) living with HIV in sub-Saharan Africa are women. In sub-Saharan Africa a woman is 1.2 times more likely to be infected with HIV than a man, and young women 15–24 years old are 2.5 times more likely to be infected with HIV than young men of the same age. Biological, economic, social, and cultural factors increase women's vulnerability to HIV, and the burden of caring for HIV-infected children or other family members usually rests on women.

Good maternal nutrition is important to improve the health status of mothers and the survival and development of their children. However, for many African women, the reproductive years are periods of nutritional stress. Pregnancy-related health and nutrition problems can affect the quality of women's lives and the lives of their newborns. Undernourished women have high reproductive risks and poorer pregnancy outcomes than well-nourished women (Institute of Medicine 1990). The physiological changes that occur during pregnancy require extra nutrients and energy to meet the demand of an expanding blood supply, the growth of maternal tissue, the developing fetus, loss of maternal tissue at birth, and preparation for lactation.

Well-nourished women have healthier babies and a lower risk of maternal morbidity and mortality. For HIV-infected women, the effects of undernutrition and HIV increase poor clinical and birth outcomes. The nutritional status of an HIV-infected woman before, during, and after pregnancy may influence her own health and transmission of HIV to her infant. Nutrition care and support of HIV-infected pregnant or lactating women and adolescents promotes adequate gestational weight gain and aims to improve or maintain nutritional status, reduce maternal mortality, and delay HIV disease progression.

Links between HIV and nutrition during pregnancy (slides 8 and 9)

In all women, undernutrition during pregnancy increases maternal morbidity and mortality and affects birth outcomes. For HIV-infected pregnant women, as for all HIV-infected adults, HIV n increases both energy requirements and the risk of undernutrition (see Session 3: Links between Nutrition and HIV). The increased energy needs as well the negative effects of common HIV-related infections increase the nutrition risk of HIV-infected pregnant and lactating woman. Studies in Africa have shown that an HIV-infected mother's nutritional status as

measured by body mass index (BMI), mid-upper arm circumference (MUAC) and/or weight loss is a strong predictor of post-natal mortality (Nduati et al 2001).

Iron deficiency anemia is a common micronutrient deficiency affecting more than half of all pregnant women in Africa. Anemia during pregnancy, regardless of the woman's HIV status, is a risk factor for pre-term delivery and low birth weight. Anemia is also common and more severe for HIV-infected people (Levine et al 2001) and is an independent predictor of rapid disease progression, increased risk of mortality, and mother-to-child transmission of HIV. The causes of anemia in HIV infection are many and complex. In developing countries anemia in pregnant or lactating women may result from poor dietary intake, poor absorption of iron or other vitamins such as folate and vitamin B_{12}, and co-infections such as malaria and hookworm. For HIV-infected pregnant women, prolonged use of some antiretroviral drugs (ARVs) such as AZT (Zidovudine) can cause anemia that presents as megaloblastic anemia like that seen with folate or vitamin B_{12} deficiency. A study of multivitamins plus iron and folic acid given during pregnancy to HIV-infected mothers resulted in increased weight gain during pregnancy, lower risk of low birth weight and pre-term delivery, and other positive related outcomes.

Links between HIV and nutrition during lactation (slide 10)

Increased energy demands during lactation also may accelerate weight loss, a risk factor for reduced survival in HIV infection. The HIV-infected lactating woman is at increased risk for undernutrition and may be at increased risk for mortality, although results are not substantiated.

Although it has been suggested that that breastfeeding may be harmful to the health of the HIV-infected woman, there have been few studies on the impact of breastfeeding on maternal HIV disease progression. Two published studies that contain such evidence were not originally designed to address this issue. One study in Kenya (Nduati 2001) found that HIV-infected mothers who breastfed were more likely to die in the 2 years after delivery than mothers who did not breastfeed. However, studies in South Africa (Coutsoudis et al 2001) and Tanzania (Sedgh et al 2004) found no increased morbidity or mortality in women who breastfed. According to WHO, there is no conclusive evidence to suggest that HIV-1-infected women who breastfeed are at increased risk of mortality. More research is required before changing policy to advise against breastfeeding by HIV-infected mothers can be considered.

Links between HIV and nutrition for pregnant or lactating adolescents (slide 11)

Pregnancy increases nutrient requirements over the already elevated levels required by adolescents. The high nutrient needs of adolescents are due in part to adolescent growth. HIV increases energy requirements further. The HIV-infected pregnant or lactating adolescent is therefore at higher risk of undernutrition and should be monitored closely.

Improving nutrition before pregnancy should be a priority to achieve optimal birth outcomes and safeguard the health of the mother. This is a challenge because many adolescent girls do not use or have access to health services. This is also one of the reasons adolescents don't know they are infected with HIV until the disease is advanced.

Nutritional requirements of HIV–infected pregnant or lactating women and adolescent girls (slide 12)

For all women during pregnancy and lactation, energy, protein, and various micronutrient requirements increase to meet the demands for adequate gestational weight gain, growth and

development of the fetus, and milk production. For the HIV-infected pregnant and lactating woman, HIV can cause nutrient loss, malabsorption, and increased energy needs, further jeopardizing nutritional status.

Energy requirements (slide 13)

People living with HIV (PLHIV) should increase their energy consumption to help maintain body weight and physical activity. Energy needs increase further for pregnancy and lactation. An HIV-infected adult (pregnant or non-pregnant) requires **10 percent** more energy during the asymptomatic phase and **20–30 percent** more energy during the symptomatic phase (WHO 2003). Table 1 shows the energy requirements of non-HIV-infected women during pregnancy and lactation. The additional energy requirement for a HIV-infected woman should be calculated based on the energy needs of a non-pregnant, non-lactating woman, and then the additional energy requirement needed for pregnancy or lactation should be added.

Table 1. Additional energy requirements of non-HIV-infected women during pregnancy and lactation

Pregnancy	Lactation
285 kcal/day above non-pregnant level if physical activity is maintained **200 kcal/day** above non-pregnant level if physical activity is reduced	Extra **500 kcal/day** above non-lactating levels (increase if the mother is breastfeeding more than one child)

Source: FAO/WHO 1985. The FAO/WHO recommendations are commonly used in developing countries.

Example of energy requirements (slide 14)

If a 25-year-old moderately active 55-kg woman needs 2,140 kcal daily, an **asymptomatic** HIV-infected moderately active pregnant woman of the same age and weight will need approximately 2,140 kcal + 214 kcal (10 percent increase because of HIV) + 285 kcal (because of pregnancy) = 2,639 kcal daily. If she is **symptomatic** (e.g., has fever or diarrhea), then she will need 20–30 percent more energy (428 kcal-642 kcal) because to HIV, plus the 285 kcal because of pregnancy.

Protein requirements (slide 15)

Because no studies have demonstrated increased protein needs for PLHIV, WHO does not currently recommend that HIV-infected pregnant or lactating women increase their protein intake beyond the level for non-HIV-infected pregnant and lactating women. Further research is needed on this subject. Table 2 shows the protein requirements of non-HIV-infected women during pregnancy and lactation.

Table 2. Additional energy requirements of non-HIV-infected women during pregnancy and lactation

Pregnancy	Lactation
Average 6 g/day above non-pregnant levels throughout pregnancy	Extra **16g/day** for the first 6 months of lactation, 12 g/day for the second 6 months, and 11 g/day thereafter

Source: FAO/WHO 1985. The FAO/WHO recommendations are commonly used in developing countries.

Fat requirements (slide 16)

The current recommendations for fat intake for PLHIV are the same as for non-HIV positive people. However, PLHIV experiencing chronic diarrhea may benefit from counseling to reduce their fat intake.

Micronutrient supplementation: Iron and folic acid (slide 17)

In many developing countries iron supplementation is recommended during pregnancy and lactation to prevent anemia and build fetal iron stores (table 3).

Table 3 Recommended iron and folic acid supplementation for pregnant women to prevent anemia (slide 18)

Local prevalence of anemia in pregnant women	**Dose**	**Duration**
< 40%	60 mg iron + 400 mcg folic acid daily *(where iron supplements containing 400 mcg folic acid are not available, an iron supplement with a lower level of folic acid may be used)*	6 months in pregnancy *(or if started late, extend to post-natal period for a total of 6 months. If this is not possible, increase the dose to 120 mg iron in pregnancy)*
>40 %	60 mg iron + 400 mcg folic acid daily *(where iron supplements containing 400 mcg folic acid are not available, an iron supplement with a lower level of folic acid may be used)*	6 months in pregnancy plus 3 months post-partum (for a total of 9 months)

Source: WHO, UNICEF, and BASICS 1999.

There have been some concerns about giving iron supplements to PLHIV because some studies have shown that excessive amounts of iron may contribute to HIV disease progression (Clark and Semba 2001; Gorduek et al 2001; Semba et al 2001). However, Clark and Semba (2001) concluded that the available data did not contraindicate the current practice of iron supplementation in countries with a high prevalence of both anemia and HIV.

Currently iron and folic acid supplements are recommended for all HIV-infected pregnant women as per national antenatal standards for pregnant (and sometimes lactating) women to reduce the risk of morbidity and mortality associated with iron deficiency anemia. However, HIV-infected women should not be given iron dosages above those recommended by WHO because high dosages of iron may contribute to HIV disease progression.

Micronutrient supplementation: Vitamin A (slide 19)

Vitamin A deficiency is common among African populations, including women. Several studies have looked at daily antenatal and post-natal vitamin A supplementation for HIV-infected

women, but none has shown a benefit in reducing vertical HIV transmission during pregnancy or during the post-partum period. Results of one study indicated an increased risk of vertical transmission by mothers receiving vitamin A supplements (Fawzi et al 2002).

The current WHO recommendation for vitamin A intake by HIV-infected women in endemic vitamin A-deficient areas is the same as that for non-HIV-infected women: a single high dose of vitamin A (200,000 µg) after delivery and no later than 6–8 weeks after delivery. The daily vitamin A intake of HIV-infected women during pregnancy and lactation should not exceed the RDA (770 µg/day).

Multiple micronutrient supplementation (slide 20)

Data are limited on other micronutrient intake for HIV-infected pregnant and lactating women. Fawzi et al (1998) studied the effects of multi-micronutrient intake on morbidity and survival among pregnant and lactating HIV-infected women in Tanzania. In this randomly assigned placebo-controlled trial, HIV-infected pregnant women at 12–27 weeks gestation received either a daily prenatal supplement of vitamin A (1,667 µg RE, or 5,000 IU, preformed vitamin A plus 30 mg or 5,000 µg RE of beta-carotene); a multivitamin containing folic acid, thiamin, riboflavin, niacin, and vitamins C, B_6, B_{12}, and E; both the vitamin A and multivitamin; or neither (placebo group). The study showed that the multivitamin supplements, not the vitamin A, decreased the risk of fetal mortality. The researchers concluded that multivitamin supplementation is a low-cost way to reduce adverse pregnancy outcomes in HIV-1-infected women. Almost all the studies mentioned have shown that multivitamin supplementation is associated with health benefits for both HIV-infected mothers and their infants and should therefore be provided where available.

HIV-infected pregnant women experience more frequent micronutrient deficiencies. Nonetheless, high levels of supplements (usually greater than 10 times the recommended daily allowance) is not recommended because they can lead to nutrient toxicity that can be harmful to the body. Nutrients that may become toxic if taken in large amounts include iron, zinc, selenium, and vitamins A, B, C, and D. For HIV-infected pregnant or lactating women, a high intake of these nutrients could do more harm. For example, studies have shown that high intakes of iron may contribute to HIV-disease progression (Semba and Gary 2001) and that vitamin A supplementation may increase the risk of HIV-1 transmission for the lactating HIV-infected mother (Fawzi et al 2002).

WHO recommends that micronutrient supplementation for HIV-infected women during pregnancy and lactation not exceed RDA levels. An adequate diet is the best way to achieve adequate micronutrient intake. However, where an adequate diet is not possible, a micronutrient supplement my be needed during pregnancy or lactation.

Nutrient requirements of HIV–infected pregnant or lactating adolescents (slide 21)

The risk of malnutrition increases in teenage pregnancies because of the combined needs of the growing adolescent and the growing fetus, especially if the pregnancy occurs less than 2 years after the start of menses.

The energy needs of a pregnant adolescent include energy needed for normal growth of the adolescent and weight gain needed for the pregnancy. Healthy pregnant adolescents need an extra 300 kcal/day in the second and third trimesters. Likewise, the American Dietetic Association and Dietitians of Canada (2000) recommend that pregnant adolescents eat at least 2,000 kcal/day. However, in many developing countries adolescent girls may not get adequate energy to meet their own growth and development needs, especially where food security is a significant concern. Therefore, many are already undernourished when they become pregnant. Consequently, it may be difficult for them to get more than the recommended 2,000 kcal/day to meet the demands of adolescent pregnancy.

Currently there is no separate energy recommendation for pregnant or lactating HIV-infected adolescents. The recommendation for pregnant and lactating women applies to adolescents (**10 percent** during asymptomatic infection and **20–30 percent** during symptomatic HIV infection) plus the additional energy required for pregnancy or lactation.

Adolescents require higher **protein** intakes during pregnancy because they themselves are continuing to grow. There are no current recommendations to increase protein intake for the HIV-infected pregnant or lactating adolescent girl beyond what a non-HIV-infected pregnant or lactating adolescent girl needs.

The RDA for protein for pregnant adolescents is 1.5 g/kg of body weight for girls 15–18 years old and 1.7 g/kg of body weight for girls 11–14 years old (Institute of Medicine 1990.)

The pregnant adolescent also has an increased need for **micronutrients** such as iron, folic acid, and zinc. If the diet is inadequate, the HIV-infected pregnant adolescent may benefit from a micronutrient supplement, where available, to help meet these increased needs. Micronutrient intakes should be at the RDA level according to WHO recommendations. Because anemia is also more prevalent among adolescent girls, iron and folic acid supplements should be provided to HIV-infected adolescents according to national standards for antenatal care to reduce the risk of morbidity and mortality associated with anemia. Likewise, vitamin A supplementation should follow current WHO guidelines, as previously noted.

Further research is needed to assess which nutrients are needed in what amounts for HIV-infected pregnant or lactating women or adolescents. Until there is clear guidance, the established nutritional requirements for normal pregnancy and lactation and the recommended increases in energy intake as a result of HIV infection should be followed. Additional requirements should be recommended based on individual nutrition assessments. Standard national guidelines for vitamin and mineral supplementation for pregnant and lactating women should be used in consultation with WHO recommendations for HIV-infected pregnant and lactating women for micronutrient supplementation.

Goals of nutrition care and support during pregnancy and lactation (slide 22)

The goals of nutrition care and support for pregnant or lactating women are to:

- Support the health and nutritional status of the mother
- Promote optimal birth outcomes
- Help reduce vertical transmission
- Strengthen immune systems
- Delay disease progression
- Enhance the quality of life

For all women, improving nutritional status before and during pregnancy can help ensure adequate gestational weight gain and decrease the risk of premature delivery and low birth weight. During pregnancy, nutrition care is needed to meet the demands of an expanded blood volume, growth of maternal tissues, a developing fetus, and loss of maternal tissues at birth, as well as to prepare for lactation. During lactation, nutrition care is needed to meet specific nutrient needs to optimize maternal post-natal nutritional status, the quality and quantity of breastmilk production, and infant growth and development. For HIV-infected women, research indicates that adequate nutritional status may reduce vertical transmission by affecting several maternal or fetal and infant risk factors for transmission. Nutrition care and support also play an important role in the overall care of the pregnant or lactating woman and adolescent living with HIV.

Nutrition care and support should be part of a comprehensive program that addresses health as well as providing emotional, psychological, and spiritual support for the HIV-infected mother and her family.

Objectives of nutrition care and support (slide 23)

Nutrition care and support for HIV-infected pregnant or lactating women and adolescents aims to:

- Maintain adequate weight: This includes ensuring adequate weight gain during pregnancy, preventing excessive weight loss during lactation, and preserving lean body mass. A pregnant woman should gain at least 1 kg per month during the second and third trimesters.
- Ensure adequate nutrient intake: Women should try to improve nutrient intake first through eating a diverse diet that includes fruits, vegetables, animal source products, and fortified foods to help build stores of essential nutrients (both macronutrients and micronutrients). When the diet is insufficient, nutrition care and support should include providing appropriate micronutrient supplements.
- Promote good hygiene and food safety: Preventing food-borne illnesses is especially important for people with compromised immune systems.
- Improve palliative care: For PLHIV in the advanced stages of the disease, nutrition care and support can provide greater comfort and lessen suffering.

Components of nutrition care and support (slide 24)

Nutrition care and support for HIV-infected pregnant or lactating women and adolescents is a package that should include the following;

- Nutrition assessment
- Nutrition counseling
- Micronutrient supplementation
- Food provision (if needed)
- Food safety and hygiene
- Psychosocial support
- Referral to other services

Nutrition assessment (slide 25)

Nutrition assessment gathers information about the client to help guide decisions on nutrition care and support and referrals to other services to improve well-being. Nutrition assessment for pregnant and lactating women and adolescent girls should include the following:

- Anthropometric measurement (weight, weight gain, MUAC)
- Biochemical information (laboratory tests)
- Clinical information (appetite change, nausea, vomiting)
- Dietary information (24-hour food recall, quality of diet)
- Food security status (food availability and access)

Refer to **Handout 9.1. Guide to Nutrition Assessment of Pregnant and Lactating Women with HIV** and **Handout 9.2. Checklist for Nutrition Assessment of Pregnant or Lactating HIV-infected Woman and Adolescents**.

If the client is not gaining adequate weight (based on the information collected from the anthropometric assessment), the health service provider should determine the root causes, such as inadequate food intake because of HIV-related symptoms, an opportunistic infection, intra-household food distribution that excludes the woman, or household food insecurity. The information gathered during nutrition assessment helps determine the type of counseling or other services needed, including medical management of symptoms or food provision.

Nutrition counseling (slide 26)

Nutrition education and counseling should be an integral part of nutrition care and support of HIV-infected pregnant or lactating woman or adolescents. Health service providers can use information collected during nutrition assessments to fine-tune counseling and determine what other interventions are needed. Nutrition counseling and support can also be provided in the form of group educational talks. Topics for group talks may include food safety and hygiene, the importance of maintaining physical activity, the importance of fluids and hydration during lactation, and information on locally available nutrient-dense foods and food choices. Refer to **Handout 9.3. Practical Considerations for Nutrition Counseling** and
Handout 9.4. Checklist for Assessing the Quality of Counseling of Pregnant or Lactating PLHIV.
Nutrition counseling for HIV-infected pregnant and lactating women and adolescent girls should focus on the following messages:

Increase food intake. A nutritious diet will help maintain proper functioning of the immune system and provide the extra energy needed for daily activities and gestational weight gain. The health service provider should encourage HIV-infected pregnant or lactating women or adolescent to snack regularly throughout the day and eat small but regular meals. Soft foods may be tolerated better during illness or nausea. Small but frequent meals will help ensure sufficient food intake to prevent weight loss and wasting.

Eat a variety of foods. The best way to improve diet and avoid deficiencies is to eat a variety of foods including the following:

- Dried legumes (beans, peas, beans, lentils, cowpeas, pigeon peas, groundnuts, and nuts)
- Meat, fish, milk products, or egg, if available
- Fruits and vegetables
- Fats in moderation
- Plenty of water

Manage symptoms and drug-food interactions. HIV-infected pregnant or lactating women and adolescents may suffer from symptoms that can make it difficult to maintain a nutritious diet. Many also take drugs that can have side effects such as taste changes, loss of appetite, diarrhea, nausea, and vomiting. These side effects can affect food intake, nutrient absorption, and nutritional status. If medications cause taste changes, HIV-infected pregnant and lactating women and adolescents can add flavor enhancers such as salt, sugar, spices, vinegar, or lemon to stimulate the taste buds, increase taste acuity, and mask unpleasant flavors. Eating energy- and nutrient-dense foods such as maize, groundnuts, and carrots and drinking plenty of fluids may help replace nutrient losses and prevent dehydration during fever or diarrhea. (Refer to **Handout 9.5. Dietary Management of Common Problems in HIV Infection** and **Session 5. Managing Drug and Food Interactions in HIV/AIDS Therapy**.)

Health service providers and counselors should be sensitive and try to remain objective and non-judgmental. The HIV-infected pregnant or lactating woman or adolescent may be in shock, depressed, or fatigued by the chronic disease. Making the mother feel comfortable by first finding out her needs and wants and working with her to make a feasible plan are essential for successful nutrition education and counseling.

Many people think counseling is giving information and advice. But counseling an HIV-infected pregnant woman or adolescent may involve more than providing information and advice on diet, nutrition, and healthy eating. The counselor may also help the mother address her feelings about having HIV. A counselor who understands how clients react to HIV can provide nutrition counseling to help them examine their options and make the best choices. This way, clients are more likely to comply with nutrition advice (ADA and DOC 2000; Field-Gardner et al 1997). An effective counselor must do the following:

- Build a trusting relationship with the client.
- Maintain professionalism and confidentiality at all times.
- Treat the client with respect and acceptance, avoiding being judgmental.
- Respect the client even if his/her attitudes, beliefs, and life choices do not agree with the counselor's.
- Listen carefully, empathize, and respond to the clients' needs and concerns.

- Remember that every client is unique and may respond differently to information.
- Be aware of harmful cultural foods, herbal remedies, traditional therapies, and practices and counsel and educate the mother.
- Be aware of community services and programs (e.g., food distribution programs, women's groups for psychosocial support) that may help nutritionally vulnerable women and establish links with these services and programs for future referral.

For the following exercises, students can use **Handout 9.4 Checklist for Assessing the Quality of Counseling of Pregnant or Lactating PLHIV** and **Handout 9.5. Dietary Management of Common Problems in HIV Infection**. The exercises will help them conduct a thorough nutrition assessment and analysis and make appropriate recommendations based on the assessment.

Exercise 1. Ask students to role-play nutrition care and support of an HIV-infected pregnant woman. Ask one student to role-play the pregnant women, Rachel, and another to role-play the nutrition counselor.

Rachael is a 30-year-old teacher in the 2nd trimester of her pregnancy with her first child. At her antenatal visit she tested positive for HIV. She lives with her husband, who has not been tested. She has not disclosed her status to him or anyone else. Her husband was recently laid off work, and Rachael says that her income is just enough to cover their basic needs. She usually eats one main meal and may have one or two snacks a day. Rachael is asymptomatic now, but her hemoglobin is on the low end.

Ask students to discuss the following questions about counseling Rachael (answers are provided in italics):

1. How could HIV infection affect Rachael's nutritional status?

   HIV infection adds energy requirements on top of the extra energy and protein requirements caused by pregnancy. HIV also affects the immune system, making the infected person susceptible to infection and at high risk for morbidity and mortality.

2. What are the nutrition goals for Rachael?

   - *Maintain or improve nutritional status.*
   - *Ensure adequate weight gain during pregnancy.*
   - *Ensure adequate nutrient intake.*
   - *Prevent food-borne illness.*
   - *Enhance quality of life.*

3. During counseling and education, what information and advice would you give Rachel about her nutrition?

   - *Regularly eat a variety of locally available and affordable foods, including fruits and vegetables, and take a multivitamin, if possible.*
   - *Eat more food than normal.*
   - *Increase the amount of food you eat in relation to your pregnancy and HIV status.*
   - *Pay particular attention to food safety and hygiene.*
   - *Consult a PMTCT clinic for counseling on infant feeding choices.*
   - *Take iron and folate supplements as per national protocol and use iodized salt.*
   - *Take antimalarial and antihelminthics as per national protocols.*

Exercise 1. Role-play, cont.

4. What additional information would you need to help Rachael with appropriate interventions?

- *Her pre-pregnancy weight, if available*
- *Adequacy of the gestational weight she has gained*
- *Her dietary intake and food habits*
- *Medications or dietary or herbal supplements she is taking*
- *Problems affecting her food intake*
- *Support systems at home or at work*
- *Any other concurrent medical problems, e.g., diabetes, hypertension, fever, or malaria*
- *Her feelings about the interventions and which she thinks that she can and cannot do*

Exercise 2. Ask students to role-play providing nutrition care and support to an HIV-infected adolescent. Ask one student to role-play the pregnant adolescent and the other to role-play the counselor.

Jennifer is a 15-year-old girl who just learned that she was HIV positive during her visit to the antenatal clinic. Her parents are aware of her pregnancy, but she has not told them that she is HIV positive. Jennifer was attending school but recently had to drop out because she was not feeling well. Her parents have three younger children, and their combined income is just enough to cover the family's needs. Jennifer does not know how much support her parents will give her to take care of the baby. She is in her 1st trimester of pregnancy when she comes to see you and admits to feeling frightened, alone, and depressed. She tells you that she smokes, has little appetite, and feels nauseated.

Ask students to discuss the following questions about the appropriate counseling for Jennifer. Answers are provided.

1. What nutrition care and support issues should you focus on for Jennifer?

- *Nutritional status, dietary intake, and food habits, multivitamin supplementation and use of iodized salt*
- *Reduction of malaria and hookworm infection- provide anti malarial and antihelminthics as per national protocols*
- *Communication with her partner about her HIV status and pregnancy*
- *Support from her parents, other family members, or partner*
- *Pre-pregnancy weight and height*
- *Lack of appetite and nausea*
- *Food security issues*
- *Knowledge of food and nutrition and HIV*
- *Referral systems to compliment the nutritional care and support*

Exercise 2. Role-play, cont.

2. What factors put Jennifer at high nutritional risk and why?

- *Young adolescent age increases nutritional requirements for adolescent and fetal growth*
- *HIV-infected status increases nutrient requirements*
- *Depression and fear can lead to decreased appetite and premature delivery*
- *Lack of appetite can result in inadequate gestational weight gain*
- *Nausea can decrease food intake, leading to inadequate nutrient intake*
- *Lack of income causes food security issues*
- *Smoking contributes to low birth weight, premature delivery, decreased appetite, and inadequate pregnancy weight gain*

3. What goals would you consider while counseling Jennifer and how would you achieve them?

- ***Adequate gestational weight gain***
  Assess and monitor weight gain.
- ***Adequate nutrient intake***
  Counsel on dietary management of nausea and ways to increase appetite to help improve intake.
  Carry out a detailed nutrition assessment,
  Counsel on healthy eating habits and intake of essential nutrients to promote growth and development of the fetus.
  Counsel on avoiding cigarette smoking, which can reduce appetite and contribute to poor health outcomes for the baby.
  Counsel on preventing food-borne illnesses.
  Counsel on safe food handling, hygiene, and water safety.

Exercise 3. Ask students to role-play nutrition care and support of an HIV-infected pregnant woman and her partner. Ask one student to role-play the pregnant woman, Rita, and another to role-play the nutrition counselor.

*A young couple, Jacob and Rita, come to the clinic. Rita is HIV positive and 5 months pregnant with her second child. Jacob's test results were negative. Rita is aware of her status but has not told Jacob. Both Rita and Jacob are employed. Rita has gained adequate gestational weight but tells you that she has diarrhea and nausea and finds it difficult to eat because she has sores in her mouth. She is also complaining of fatigue. In an earlier session, Rita revealed to you that she is afraid to tell Jacob her status because of her fear of being rejected by Jacob and her family and losing her job. She is not taking ARV*s.

Exercise 3. Role-play, cont.

1. What factors should you address when counseling Rita and Jacob and how?

- *Rita's dietary intake and eating habits, by reinforcing what she is doing right*
- *Rita's fatigue by doing a physical evaluation for anemia and measuring her hemoglobin. She may be iron deficient. Check if she has taken any iron supplements. Provide iron and folate supplementation as appropriate and encourage her to take a daily multivitamin.*
- *Her plans to disclose her status to her partner, by addressing her fears about stigma, discrimination, and possible abuse*
- *Her nausea, diarrhea, and mouth sores, which affect her food intake, by counseling on how to manage these HIV problems*
- *Her plans for feeding her baby, by counseling on infant feeding options*
- *Her overall well-being and delivery of a term baby, by counseling on the Importance of good nutrition in the context of HIV*
- *Her need for support, by discussing sources of support other than her partner and how to involve her partner*
- *The effect of ARVs on preventing mother-to-child transmission of HIV, by asking whether she discussed prenatal and post-natal prophylaxis with her doctor*
- *Fear of stigmatization, by referring to community support systems*
- *Maintenance of adequate gestational weight gain*

2. What are the main nutrition goals for Rita?

- *Adequate gestational weight gain (especially with nausea, diarrhea, mouth sores, and anxiety about disclosing her status, which can affect nutritional intake)*
- *Dietary management of her common HIV problems*

3. What are the main nutrition interventions for Rita?

- *Counseling on how to manage nausea, diarrhea, and mouth sores to maximize nutritional intake and promote adequate gestational weight gain*
- *Providing information on referral systems or referring her to psychosocial support to help her deal with disclosing her status and get general support during pregnancy and after delivery*

Exercise 4. Ask students to role-play providing nutrition care and support for an HIV-infected lactating woman. Ask one student to role-play the lactating woman, Brenda, and another to role-play the nutrition counselor.

Brenda, 25, comes to see you for the first time for counseling. She has a 2-month-old baby and tells you that she is breastfeeding. She has not had the courage to test for HIV, but her partner died 3 months earlier, and rumors suggest he died of AIDS. Brenda is living alone with her baby while on maternity leave. She tells you she is worried about how she will support herself and her baby on her small salary. She confides that she is worried about her health and has not been able to eat well. She feels she has lost weight because her clothes fit loosely. She does not have any nausea or vomiting, but does have diarrhea and fever. She also complains about being tired. She is very concerned about her weight loss and her inability to eat.

1. What are Brenda's nutrition care and support issues?

- *Food security because of her low income*
- *Her support systems*
- *Her pre-pregnancy weight, current weight and height, and calculation of her body mass index (BMI)*
- *Her knowledge of HIV and infant feeding, including her own nutrition*
- *Her eating habits and dietary intake*
- *Opportunistic infections that are causing fever*
- *Medications or dietary supplements*

2. What interventions would you suggest to help Brenda?

- *Eating smaller, more frequent energy- and protein-dense meals to help promote weight gain and improve appetite*
- *Managing diarrhea, fever, and fatigue through diet*
- *Drinking plenty of fluids to prevent dehydration*
- *Maintaining as much physical activity as possible, because exercise helps stimulate appetite, decrease fatigue, and build lean body mass*

3. What other support or referrals would you suggest?

- *VCT clinic to test her HIV status*
- *PMTCT clinic for infant feeding counseling*
- *A doctor if the fever and diarrhea persist*
- *Food assistance if available*
- *Help from her family or community to take care of her baby so she can get*

Micronutrient supplementation (slide 27)

HIV-infected pregnant and lactating women and adolescents can best meet their micronutrient needs by eating a diverse diet that includes fortified foods. However, pre-existing micronutrient deficiencies, deficiencies resulting from HIV, and the increased micronutrient demands of

pregnancy need to be addressed. This may include providing micronutrient supplements at 1 RDA to women whose diets are not sufficient.

Health service providers should collect clinical and dietary information from these women as a part of nutrition assessment to determine whether their diets are diverse enough to provide the necessary micronutrients. If not, micronutrient supplements should be prescribed following international or national guidelines. Where available, biochemical tests should be carried out for more accurate testing of micronutrient status.

Food provision (slide 28)

Studies have shown that undernutrition significantly increases mortality risk for PLHIV. Specialized food products help undernourished clients manage and address undernutrition. Severely malnourished clients should receive therapeutic food. (See Session 8: Nutrition Care and Support of Adults Living with HIV).

Many countries have programs for food provision for HIV-infected pregnant and lactating women and adolescents. Frequently these programs are linked to prevention of mother-to-child transmission of HIV (PMTCT) and antiretroviral treatment (ART) sites. Health service providers should be aware of food provision programs and know the eligibility criteria for these programs. They also should also be aware of national policies and protocols related to food provision.

Food safety and hygiene (slide 29)

Proper food safety and hygiene are important for HIV-infected pregnant and lactating women and adolescents because their immune systems are already weakened. Preventing water- and food-borne disease is crucial. Contaminated food and water can cause diseases that involve diarrhea and vomiting, which can deplete nutrients and decrease absorption. The following messages encourage women to maintain good hygiene:

General

- Drink only clean water that has been brought to a rolling boil to kill germs or treated with a chlorination product such as Water Guard and stored in a clean container with a lid.
- Wash hands with soap before and after touching foods and using the latrine.

Animal products

- Thoroughly cook all animal products (meat, chicken, pork, fish, and eggs).
- Avoid raw or soft-boiled eggs or undercooked meat.
- Thoroughly clean utensils and surfaces that have been in contact with uncooked foods.
- Cover meat, poultry, and fish with a clear cover or cloth and keep separate from other foods to avoid contamination.

Fruits and vegetables

- Use clean water to wash all fruits and vegetables thoroughly.
- If it is impossible to wash fruits and vegetables properly, remove the skin to avoid contamination.

- Cut out bruises on fruits and vegetables to remove any mold or bacteria that may be growing there.
- Avoid eating groundnuts and maize that are moldy, shriveled, or spotted.

Food storage and handling

- Keep areas where food is prepared free of flies and other insects.
- Cover uneaten food to avoid contamination.
- Keep hot foods hot and cold foods cold before eating.
- If food products have expiration labels, do not eat after the “best before” date has expired.
- Store cooked food at most for one day and reheat before eating.
- If you have a refrigerator, put all leftover foods in it.

Psychosocial support (slide 30)

HIV-infected women may suffer from depression, which can reduce their appetite and motivation to maintain their health. During the clinical assessment, the health service provider can focus on the client’s emotional state and how this affects diet.

HIV-infected women can benefit from extra emotional care and psychosocial support. They may face stigma in their homes and communities. Health service providers should provide such support and refer clients to community groups where available.

Referral (slide 31)

Health service providers can help HIV-infected pregnant or lactating women and adolescents determine what other services they need, such as food aid, group support, legal services, or livelihood skills training. Pregnant and lactating women must start making decisions about infant feeding options. This topic is addressed in detail in **Session 10: PMTCT and Infant Feeding**. If PMTCT services are not offered where the pregnant woman seeks care, the health service provider should make a referral. HIV-infected pregnant and lactating women should know where to access ART.

Contact points for nutrition care and support (slide 32)

HIV-infected pregnant or lactating woman or adolescents need regular nutrition assessment and early nutrition interventions. The following contact points with pregnant and lactating women in the health system provide an opportunity for nutrition care and support:

- Antenatal care
- Delivery and post-partum care
- Child health visits (both well-child and sick-child contacts)
- Family planning services
- HIV testing and counseling services

Each of these contact points provides an opportunity to provide nutrition assessment and counseling, care and support to help prevent malnutrition during pregnancy and improve reproductive health and child health outcomes.

Refer to **Handout 9.6. Essential Health Sector Actions to Improve Maternal Nutrition in Africa**.

Exercise 5. Organize field visits for students to enable them to:

- Conduct nutrition assessment, counseling, and education with HIV-infected pregnant and lactating women in various environments.
- Describe at least three challenges in working with HIV-infected pregnant or lactating women and adolescents in limited-resource settings.
- State at least two interventions to address the issues and challenges above.

Preparation

- Divide the students into groups and assign each group to visit a site that provides care for HIV-infected pregnant or lactating women and adolescents. Sites can include antenatal clinics, PMTCT clinics, health centers, or other appropriate settings.
- Inform the different sites of the objectives of this exercise and identify a contact person or people for the students when they go to visit.
- Arrange times for field visits.
- Review the objectives of the field visits with the students and direct them to the sites.
- Arrange for the students to observe health workers conducting nutrition assessment, counseling, and education. Allow each student to conduct at least one supervised nutrition assessment, counseling, and education session with an HIV-infected pregnant or lactating woman or adolescent. If there are too many students in the group for each to conduct a nutrition assessment and counseling session, use classroom role-plays or set up appointments for individuals or smaller, more manageable, groups of students. Students who are unable to practice conducting a nutritional assessment during the field visit should act as observers, using **Handout 9.2. Checklist for Nutrition Assessment of Pregnant or Lactating HIV-infected Woman and Adolescents** and **Handout 9.4. Checklist for Assessing the Quality of Counseling of Pregnant or Lactating PLHIV** to provide feedback to fellow students.

Follow up the field visits by asking each group to present its experience to the rest of the class by answering the following questions:

- What type of nutrition care and support was provided to the HIV-infected mothers in the places they visited?
- How was the nutrition assessment or counseling session different from what the students learned in class?
- What should be done differently and why?
- What challenges and issues did they observe in providing nutrition care and support, and how should they be addressed?
- How should the sites do nutrition assessment and counseling differently?
- What issues and challenges did they face when they conducted the nutrition assessment and counseling? What would they do differently next time?
- What other contact points can be used for nutrition assessment, counseling, and education of pregnant and lactating women?

Conclusions (slide 33)

Good maternal nutrition during pregnancy and lactation is important to improve the health status of mothers and the survival and development of their children. HIV increases the risk of undernutrition in HIV-infected pregnant and lactating women and adolescents.

Energy, protein, and various micronutrient requirements increase during pregnancy for gestational weight gain, fetal growth and development, and milk production. HIV can cause nutrient loss, malabsorption, and increased energy needs, further jeopardizing nutritional status. The goals of nutrition care and support for pregnant or lactating women are to support maternal health nutritional status, promote optimal birth outcomes, reduce vertical transmission, strengthen immunity, delay disease progression, and enhance quality of life. For all women, improving nutritional status before and during pregnancy can help ensure adequate gestational weight gain and decrease the risk of premature delivery and low birth weight. For HIV-infected women, adequate nutritional status may reduce vertical transmission by affecting several maternal or fetal and infant risk factors for transmission.

Components of nutrition care and support include nutrition assessment and counseling, micronutrient supplementation, food provision (if needed), food safety and hygiene, psychosocial support, and referral to other services. Contact points for nutrition care and support include antenatal care, delivery and post-partum care, child health visits, family planning, and HIV testing and counseling

Discussion points

1. What are the most important considerations for nutrition care and support for HIV-infected women pre-pregnancy, in the antenatal period, and during the post-partum period?
2. What nutrition considerations and interventions are important for the HIV-infected pregnant or lactating adolescent?
3. What are the most important practices for a health service provider to consider when providing nutrition care and support to an HIV-infected pregnant or lactating woman?
4. What challenges affect nutrition care and support of HIV-infected pregnant and lactating women in your country, community, and health facility?
5. What steps, if any, have been taken in your country, community, or health facility to address these challenges?
6. What is being done locally and nationally to address gender issues that exacerbate the impact of HIV on women?
7. What ideas do you have to address these issues?
8. Discuss the minimum a health service provider should do at each contact point to ensure good pre- and post-natal nutrition status for HIV-infected women.
9. Does your country have national nutrition care and support guidelines for PLHIV? If so, do they address the nutrition care of pregnant and lactating women?

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Handout 9.1. Guide to Nutrition Assessment of Pregnant and Lactating Women with HIV

This handout can be used to supplement the nutrition job aid for antenatal care in regions with high HIV prevalence for a more detailed nutritional assessment of the HIV-infected mother.

Diet, social and medical histories	Diet history • Dietary intake and adequacy (can be collected by 24-hour diet recall) • Eating habits and patterns • Food intolerance and aversions • Dietary problems (e.g., poor appetite, difficulty chewing and swallowing, gastrointestinal problems, pain in the mouth and gums) and other eating problems • Hygiene and safe food preparation and handling practices • Psychosocial factors contributing to inadequacy of intake, such as social isolation, depression, stigma, and inability to prepare food • Vitamin and mineral use Social history • Living environment and functional status (ability to take care of self and new baby) • Household food security (income, housing, amenities for cooking, access to food, attitude to nutrition and food preparation, age, family or support system, and educational level) • Physical activity level • For the lactating woman, information on family and breastfeeding patterns (exclusive breastfeeding, mixed feeding (breastmilk and formula), breastfeeding during pregnancy Medical history • Gastrointestinal problems (e.g., diarrhea, heartburn, abdominal pain, bloating, nausea, vomiting) • Pattern of bowel movements (constipation or diarrhea) • Presence of opportunistic infection • Concurrent medical conditions (e.g., tuberculosis, diabetes, hypertension, malaria) • Past obstetric history (infant birth weights, lactation experience)
Anthropometrics	• **Pregnant woman:** Height, pre-pregnancy weight, weight gain during pregnancy (at least 1 kg per month in the 2nd and 3rd trimesters) • **Lactating woman**: Height, current weight, pre-pregnancy weight, weight during pregnancy and 6 weeks post-partum

	(**BMI < 18.5 indicates nutrition risk**) • Mid-upper-arm circumference (MUAC) for crude estimation of muscle wasting (**< 23 cm indicates nutrition risk)**
Medication review	• Drug use (ARVs, alternative therapies, and other medications) • Medication side effects with nutrition implications
Biochemical data (where available)	• Evaluation of anemia (iron [hemoglobin], B_{12}, and folate status) • CD4 and viral load counts
Clinical evaluation	• Screening for pallor (inner eyelids and palms) to help screen for iron deficiency anemia • Screening for oral or pharyngeal inflammation or pain • Screening for evidence of muscle loss (wasting)

Source: Adapted from the American Dietetic Association and Dietitians of Canada 2000**.**

Handout 9.2 Checklist for Nutrition Assessment of Pregnant or Lactating HIV-Infected Women or Adolescents

Diet, social and medical histories	**Diet history**	**Yes**	**No**
	• Dietary intake and adequacy (can be collected by 24-hour diet recall) • Eating habits and patterns • Food intolerance and aversions • Dietary problems (e.g., poor appetite, difficulty chewing and swallowing, gastrointestinal problems, pain in the mouth and gums) and other eating problems • Hygiene and safe food preparation and handling practices • Psychosocial factors contributing to inadequacy of intake, such as social isolation, depression, stigma, and inability to prepare food • Vitamin and mineral use		
	Social history • Living environment and functional status (ability to take care of self and new baby) • Household food security (income, housing, amenities for cooking, access to food, attitude to nutrition and food preparation, age, family or support system, and educational level) • Physical activity level • For the lactating woman, information on family and breastfeeding patterns (exclusive breastfeeding, mixed feeding (breastmilk and formula), breastfeeding during pregnancy		
	Medical history • Gastrointestinal problems (e.g., diarrhea, heartburn, abdominal pain, bloating, nausea, vomiting) • Pattern of bowel movements (constipation or diarrhea) • Presence of opportunistic infection • Concurrent medical conditions (e.g., tuberculosis, diabetes, hypertension, malaria) • Past obstetric history (infant birth weights, lactation experience)		
Anthropometrics	• Height • Weight • Weight gain during pregnancy		
Medication review	• Medication review		

Biochemical data (where available)	• Evaluation for anemia • Hemoglobin measure		
Clinical evaluation	• Screening for pallor (inner eyelids and palms) • Screening for oral or pharyngeal inflammation or pain • Screening for evidence of muscle loss (wasting)		

Handout 9.3. Practical Considerations for Nutrition Counseling

1. Be aware and sensitive when counseling people living with HIV. Remember that they commonly feel HIV is controlling their lives. An HIV-infected mother may be shocked, depressed, or frightened by this chronic disease. If she is an adolescent, pay close attention to other fears she may have. Make the mother feel comfortable by first determining her needs and wants during counseling and then working together to make a feasible plan.
2. Listen carefully, empathize, and respond to the mother's needs and concerns. This can make the difference between effective and ineffective nutritional care and support.
3. Be an active listener, avoid judgment, and be aware of body language (both yours and your client's).
4. Conduct assessments and interviews in a nonjudgmental way to encourage more accurate responses from the mother and build rapport with her.
5. Maintain confidentiality and professional conduct during and after the counseling session.
6. Change is difficult, and living with HIV is stressful. Suggest one change at a time and make realistic recommendations. Remember that each woman has individual needs and a unique situation.
7. Communicate nutrition information based on the woman's own cultural values and beliefs. For example, be familiar with food taboos and help identify appropriate alternatives.
8. Provide practical suggestions, including a) a list of local, affordable, and accessible foods to show what kinds of foods the mother should eat or how much extra food she needs and b) ways to manage symptoms such as anorexia, diarrhea, nausea, vomiting, and weight loss.
9. Ask open-ended questions (what, why, and how) when counseling women about their diet.
10. Be aware of harmful traditional practices and practices that are not harmful and can be encouraged. Counsel and educate accordingly.
11. Praise and reaffirm what the mother is doing right to build self-confidence, self-esteem, and motivation.

Source: Adapted from Field-Gardner et al 1997.

Handout 9.4 Checklist for Assessing the Quality of Counseling of Pregnant or Lactating PLHIV

Did the counselor …	Yes	No
Greet the client?		
Introduce himself or herself to the client?		
Treat the client with respect and acceptance?		
Listen carefully and actively and show empathy with the client's needs and concerns?		
Make eye contact when talking with the client?		
Notice the verbal and non-verbal cues from the client?		
Ask open-ended questions?		
Praise and reaffirm the things the client is doing right?		
Suggest interventions that were acceptable, affordable, and feasible for the client?		
Communicate the nutrition information based on the client's level of knowledge and cultural values and beliefs?		
Provide practical and realistic suggestions and recommendations?		
Maintain professional conduct during the counseling session?		
Discuss appropriate follow up with the client?		

Handout 9.5. Dietary Management of Common Problems in HIV Infection

Dietary problem	Nutrition intervention
Anorexia or loss of appetite	• Eat small frequent meals throughout the day (5-6 meals/day). • Schedule regular eating times. • Include food-based proteins from either animal or plant sources, with snacks and meals whenever possible. • Drink plenty of liquids, preferably between meals. • Take walks before meals to stimulate appetite.
Sores in the mouth or throat	• Avoid citrus fruits, tomatoes, and spicy, salty, sweet, sticky foods. • Drink liquids with a straw to ease swallowing. • Eat foods at room temperature or cold. • Eat soft, pureed, moist foods such as porridge, mashed bananas, potatoes, carrots, or other non-acidic vegetables & fruits. • Avoid smoking, caffeine, and alcohol. • Rinse mouth daily to prevent thrush with 1 tsp baking soda mixed in a glass (250ml) of warm boiled water. **Do not** swallow the mixture.
Nausea and vomiting	• Avoid having an empty stomach, which makes the nausea worse. • Eat small, frequent meals. • Try dry, salty, bland foods, (dry bread/toast, or other plain dry foods and boiled foods. • Drink plenty of liquids between meals rather than with meals. • Avoid foods with strong or unpleasant odors, greasy or fried foods, alcohol, and coffee. • Do not lie down immediately after eating; wait 1-2 hours. • If **vomiting**, drink plenty of fluids to prevent dehydration.
Diarrhea	• Eat small, frequent meals. • Eat bananas, mashed fruit, soft, boiled white rice, or porridge to slow transit time and stimulate the bowel. • Avoid eating high-fat or fried foods and foods with insoluble fiber; remove the skin from fruits and vegetables. • Drink plenty of fluids (8–10 cups a day) at room temperature, especially fluids with calories, such as diluted fruit juices. • Avoid coffee and alcohol. • Eat food at room temperature; very hot or cold foods stimulate the bowels and diarrhea worsens. • Limit or eliminate milk and milk products to see whether symptoms improve; lactose intolerance may occur but for a short period. **If diarrhea is severe**: • Give oral rehydration solution to prevent dehydration. • Withhold food for 24 hours or restrict food to clear fluids (soups, soft foods, white rice, porridge, and mashed fruit and potatoes).

Dietary problem	Nutrition intervention
Constipation	• Drink plenty of fluids, especially water. • Increase fiber intake by eating vegetables and fruits. • Do not use laxatives or enemas.
Bloating	• Avoid foods associated with cramping and bloating (cabbage, beans, onions, green peppers, eggplant). • Eat slowly and try not to talk while chewing.
Altered taste	• Use a variety of flavor enhancers such as salt, spices, and herbs to increase taste and mask unpleasant tastes. • Try different textures of food. • Chew food well and move around mouth to stimulate taste receptors.
Fever	• Drink plenty of fluids throughout the day. • Eat smaller, more frequent meals at regularly scheduled intervals. • Add high-protein snacks between meals.
Fat malabsorption	• Eliminate oils, butter, ghee, margarine, and foods that contain or are prepared with these. • Trim all visible fat from meat and remove the skin from chicken. • Avoid deep fried, greasy, or high fat foods. • Eat smaller, more frequent meals spaced out evenly throughout the day. • Take a daily multivitamin, if available.
Lack of energy or fatigue	• If possible have someone pre-cook foods (ensure proper food safety of pre-cooked food). • Eat smaller, more frequent meals and snacks throughout the day. • Try to eat at the same time each day and exercise as much as possible to increase energy.

Source: Lwanga 2001.

Handout 9.6. Essential Health Sector Actions to Improve Maternal Nutrition in Africa

This handout can supplement the Nutrition Job Aid for antenatal care in regions with high HIV prevalence to improve nutrition for HIV-infected mothers.

Outcome	Essential health sector actions	Maternal actions
1. Adequate food intake during pregnancy and lactation	• Encourage increased food intake during pregnancy and lactation. • Monitor weight gain in pregnancy. • Counsel on reduced energy expenditure.	• Eat at least one extra serving of staple food per day during pregnancy and the equivalent of an extra meal per day during lactation. • Gain at least 1 kg per month in the 2nd and 3rd trimesters of pregnancy. • Rest more during pregnancy and lactation.
2. Adequate micronutrient intake during pregnancy and lactation	• Counsel on diet diversification. • Prescribe and make accessible iron and folic acid supplements. • Assess and treat severe anemia in women. • Distribute vitamin A to post-partum women.	• Increase daily consumption of fruits and vegetables, animal products, and fortified foods, especially during pregnancy and lactation. • Consume daily supplements (60 mg iron + 400 mg folic acid or multiple vitamin/mineral supplements) during pregnancy and the first 3 months post-partum. • **IF** anemic, take a daily dose of 120 mg iron + at least 400 mg folic acid for 3 months. • Take a high dose (200,000 IU) of vitamin A immediately after delivery or in the first 8 weeks after delivery if breastfeeding, and within 6 weeks after delivery if not breastfeeding.

Outcome	Essential health sector actions	Maternal actions
3. Reduced malaria infection in pregnant women in endemic areas	• Prescribe and make accessible anti-malaria curative or prophylactic drugs to pregnant women according to local recommendations • Treat clinical infections • Promote use of insecticide-treated materials	• In the 2nd and 3rd trimesters, take antimalarial drugs as a curative treatment regardless of symptoms OR take weekly anti-malarial prophylaxis starting at the 1st antenatal visit. • Seek treatment for fever during pregnancy; take drugs to treat malaria and reduce fever; take iron/folic acid supplements for anemia. • Use insecticide-treated materials.
4. Reduced hookworm infection in pregnant women in endemic areas	• Counsel on preventative measures (sanitation and footwear). • Prescribe and make accessible antihelminthics after 1st trimester of pregnancy.	• Wear shoes and dispose of feces carefully to prevent infection. • Take a single dose of Albendazole (400 mg) or Mebendazole (500 mg) in the 2nd trimester of pregnancy (> 50% prevalence).
5. Birth spacing of 3 years or longer	• Promote optimal breastfeeding practices. • Promote family planning as a health and nutrition intervention; counsel on the need for a recuperative period to build energy and micronutrient stores • Consider breastfeeding status when prescribing contraception. • Promote safer sex.	• Initiate breastfeeding in the 1st hour after birth, breastfeed exclusively for 6 months, and continue breastfeeding for 2 years or more. • Practice family planning to space births for at least 3 years; delay pregnancy so that there are at least 6 months between the period of breastfeeding and subsequent pregnancy. • Use contraceptives that protect breastfeeding.

Source: Adapted from Essential Health Sector Actions to Improve Maternal Nutrition in Africa, May 2001.

Session 9: Nutrition Care and Support for Pregnant and Lactating Women and Adolescents Living with HIV

Purpose

To provide understanding and knowledge of special considerations for nutrition care and support of HIV-infected pregnant and lactating women and adolescent girls

2

Learning Objectives

- Explain how HIV increases pregnant or lactating women's risk of malnutrition.
- Describe the dietary requirements of HIV-positive pregnant or lactating women.
- Describe the essential components of nutrition care and support for HIV-positive pregnant or lactating women.
- Make dietary recommendations for HIV-positive pregnant or lactating women.
- Carry out nutrition assessment and counseling for HIV-positive pregnant or lactating women.
- Explain challenges faced by HIV-positive pregnant or lactating women that increase the risk of malnutrition.

3

Session Outline

- Reason to focus on women, nutrition, and HIV
- Links between HIV and nutrition during pregnancy
- Nutritional requirements of HIV-positive pregnant and lactating women and adolescent girls
- Goal, objectives, and components of nutrition care and support
- Nutrition counseling in the context of HIV
- Ensuring adequate nutrition care and support
- Issues and challenges in nutrition care and support

4

Reasons to Focus on Women, Nutrition, and HIV

- 13 African women are infected with HIV for every 10 African men (UNAIDS 2004).
- Women 15–24 years old are 2.5 times more likely to be infected than men of the same age.
- 57% of adults living with HIV in sub-Saharan Africa are women 15–49 years old.
- 15 million women in sub-Saharan Africa are living with HIV.

5

Reasons to Focus on Women, Nutrition, and HIV (Cont.)

- Women and girls are more vulnerable to HIV because of biological factors, limited economic opportunities and health care, and low social status that limits their ability to choose healthier life strategies.
- Women bear the greatest impact of HIV: taking care of the sick, losing jobs and income, quitting school, and facing stigma and discrimination

6

Reasons to Focus on Women, Nutrition, and HIV (Cont.)

- Malnourished women have greater reproductive risk and poorer pregnancy outcomes than well-nourished women.
- In Africa HIV complicates endemic malnutrition.
- Effects of malnutrition and HIV increase poor clinical and birth outcomes for HIV-positive pregnant or lactating woman
- Nutritional status before, during, and after pregnancy may affect women's health and risk or transmitting HIV to their infants.

7

Links between HIV and Nutrition during Pregnancy

- In all women, malnutrition increases maternal morbidity and mortality and affects birth outcomes.
- HIV causes nutrient loss and increases energy requirements and the risk of malnutrition.
- Studies of HIV-positive mothers in Africa showed that nutrition status was a strong predictor of post-natal mortality (Nduati et al 2001).

8

Links between HIV and Nutrition during Pregnancy (Cont.)

- Pregnant women are most vulnerable to iron-deficiency anemia, which is:
  - A risk factor for pre-term delivery and low birthweight
  - Common and more severe with HIV
  - An independent predictor of rapid disease progression and higher risk of mortality and MTCT.
- HIV-infected pregnant women given multivitamins with iron and folic acid gained more weight during pregnancy and had lower risk of low birth weight and pre-term labor.

9

Links between HIV and Nutrition during Lactation

- The higher energy demands of lactation may increase weight loss, a risk factor for reduced HIV survival.
- HIV-infected woman have a higher risk of malnutrition and possibly mortality.
  - No conclusive evidence that HIV-1-infected women who breastfeed are at increased risk of mortality (WHO)
  - Further research needed on the impact of breastfeeding on maternal HIV progression

10

Links between HIV and Nutrition for Pregnant or Lactating Adolescents

- Young maternal age (11–18) increases nutrient needs above the demands of pregnancy because of adolescent and fetal growth.
- HIV further increases nutrient needs.
- Nutritional requirements increase overall to ensure
  - Continued growth of the adolescent mother
  - Growth and development of the fetus
  - Fulfillment of the increased demands on the body due to HIV infection

11

Nutritional Requirements of HIV-Positive Pregnant and Lactating Women and Adolescents

- In pregnancy lactation, energy, protein, and micronutrient requirements increase for:
  - Adequate gestational weight gain
  - Fetal growth and development
  - Milk production
- HIV causes nutrient loss and malabsorption, further increasing nutritional needs.
- Nutritional requirements for pregnancy and lactation are added to requirements for HIV.

12

Energy Requirements

- The increased energy requirement of HIV
  - 10% increase during asymptomatic HIV
  - 20–30% increase during symptomatic HIV
- Is added to the increased energy requirement of pregnancy or lactation
  - 200–285 kcal/day for pregnancy
  - 500 kcal/day for lactation

13

Examples of Energy Requirements

Non-pregnant, moderately active woman	25 yrs old, 55 kg	2,140 kcal/day
Kcal above non-pregnant level	If physical activity maintained	285 kcal/day (FAO/WHO)
Pregnant non-HIV-infected woman	2140 + 285 = 2,425 kcal/day	
HIV-infected pregnant woman Asymptomatic	10% increase in energy due to HIV = 214 kcal	2,140 + 285 + 214 = 2,639 kcal/day
HIV-infected pregnant woman Symptomatic	20–30% increase in energy due to HIV = 428–642 kcal	2,140 + 285 + (428 kcal – 642 kcal) = 2,853–3,067 kcal

14

Protein Requirements

- Protein intake for HIV-infected pregnant or lactating women should be the same as for non-infected pregnant or lactating women (WHO/FAO 1985).
  - 6 g/day above non-pregnant levels throughout pregnancy
  - 16 g/day above non-lactating levels during first 6 months of lactation, 12 g/day the next 6 months, then 11 g/day

15

Fat Requirements

- Fat intake for HIV-infected pregnant or lactating women should be the same as for non-infected pregnant or lactating women.
- PLHIV with chronic diarrhea may be counseled to lower fat intake.

16

Micronutrient Supplementation: Iron and Folic Acid

- Recommended as per national standards for antenatal care for all pregnant women
- Iron dosage should not exceed WHO recommended dosage.
- High dosage of iron may contribute to HIV disease progression.

17

Recommendations for Iron and Folic Acid Supplementation

Local prevalence of anemia in pregnant women	Dose	Duration
< 40%	60 mg iron + 400mcg folic acid daily	6 months in pregnancy (if started late, extend to post-natal period for 6 months. If not possible, increase dose to 120 mg in pregnancy)
> 40%	60 mg iron + 400 mcg folic acid daily	6 months in pregnancy plus 3 months post-partum (for a total of 9 months)

Source: WHO, BASICS, UNICEF 1999

18

Micronutrient Supplementation: Vitamin A

- Same for HIV infected women as for non-HIV infected women
  - Single dose (200,000 IU) given after delivery and no later than 6–8 weeks after delivery
  - Daily intake by HIV-infected women during pregnancy and lactation not to exceed RDA (770 µg/d)

19

Multiple Micronutrient Supplementation

- Limited data on multiple micronutrient supplementation of HIV-positive pregnant and lactating women
- Some evidence of an association with reductions in adverse pregnancy outcomes
- Toxicity possible from high levels of supplements (>10x RDA)
- Should not exceed RDA levels

20

Nutrient Requirements of HIV-Infected Pregnant or Lactating Adolescents

- Energy
  - Energy needs for normal growth of the adolescent plus weight gain needed for the pregnancy
  - Recommended energy increase due to HIV for pregnant and lactating women
- Higher protein intake (no current recommendation to increase protein due to HIV)
- Micronutrient supplementation at the RDA level

21

Goals of Nutrition Care and Support during Pregnancy and Lactation

- Support the health and nutritional status of the mother.
- Promote optimal birth outcomes.
- Help reduce vertical HIV transmission.
- Strengthen the immune system.
- Delay disease progression.
- Enhance quality of life.

22

Objectives of Nutrition Care and Support

Maintain adequate weight

- Promote 1 kg/month gain during 2nd and 3rd trimesters.
- Prevent excessive weight loss during lactation.
- Preserve lean body mass.

Ensure adequate nutrient intake

- Promote a diverse diet.
- Provide micronutrient supplements if needed.

Promote good hygiene and water and food safety

- Prevent food-borne illness.

Improve palliative care

- Lessen suffering in advanced stages of HIV disease.

23

Components of Nutrition Care and Support

- Nutrition assessment
- Nutrition counseling
- Micronutrient supplementation
- Food provision (if needed)
- Food safety and hygiene
- Psychosocial support
- Referral to other services

24

Nutrition Assessment

- Anthropometric measurement (weight, weight gain, MUAC)
- Biochemical information (lab data)
- Clinical information (appetite changes, nausea, vomiting)
- Dietary information (24-hour recall, quality of diet)
- Food security status (food availability and access)

25

Nutrition Counseling Messages

- Increase food intake.
- Eat a variety of foods.
- Manage symptoms and drug-food interactions.

26

Micronutrient Supplementation

- A varied diet is the best way to avoid micronutrient deficiencies.
- Micronutrient supplementation should be at 1 RDA.
- Iron/folic acid and vitamin A supplementation should follow international or national guidelines.

27

Food Provision

- Malnutrition significantly increases mortality risk for PLHIV.
- Specialized food products can help HIV-infected pregnant and lactating women manage undernutrition.
- Health service providers should know about local food provision programs and eligibility criteria and follow national policy and protocols.

28

Food Safety and Hygiene Messages

- Drink only clean water brought to a rolling boil.
- Wash hands with soap.
- Thoroughly cook animal products.
- Wash all fruits and vegetables.
- Cover uneaten food.

29

Psychosocial Support

- Health service providers should provide psychosocial support and refer clients to community groups where possible.
- Depression can decrease appetite.
- Nutrition assessment should collect information on the client's emotional state and how this affects diet.

30

Referral to Other Services

- PMTCT
- ART
- Food aid
- Support groups
- Legal services
- Livelihood skills training

31

Contact Points for Nutrition Care and Support

- Antenatal care
- Delivery and post-partum care
- Child health visits (well/sick child contacts)
- Family planning services
- HIV testing and counseling services

32

Conclusions

- Good nutrition is important during pregnancy and lactation to improve maternal health and infant survival and development.
- Energy, protein, and micronutrient requirements increase during pregnancy for gestational weight gain, fetal growth, and milk production.
- Nutrition care and support include assessment and counseling, micronutrient supplementation, food provision (if needed), food safety and hygiene, psychosocial support, and referral.
- Contact points for nutrition care and support are **a**ntenatal care, delivery and post-partum care, child health visits, family planning, and HIV testing and counseling.

33

SESSION 10. INFANT AND YOUNG CHILD FEEDING IN THE CONTEXT OF HIV

Purpose (slide 2)

The purpose of this session is to review optimal infant and young child feeding practices to improve counseling skills on infant feeding in the context of HIV.

Learning objectives (slide 3)

By the end of the session, students will be able to:

- Describe optimal infant and young child feeding practices.
- Explain infant feeding options for HIV-infected mothers.
- Know key components of counseling women, their partners, and their families on infant feeding in the context of HIV.

Prerequisite knowledge

- Basic nutrition (Session 1)
- Basics of HIV and AIDS (Session 2)
- Infant feeding and prevention of mother-to-child transmission of HIV (PMTCT (Session 6)
- Counseling skills
- Knowledge of lactation management
- Knowledge of human growth and development

Estimated time: 120 minutes

Session guide (slide 4)

Content	Methodology	Activities	Estimated time (minutes)
Introduction	Presentation	Introduce the session and rationale.	5
Comprehensive PMTCT approach and entry points	Participatory presentation	Review the material from Session 6 on the comprehensive PMTCT approach and PMTCT entry points.	10
Infant feeding counseling, informed choice, and AFASS criteria	Participatory presentation	Review the material from Session 6 on infant feeding informed choice and AFASS criteria for replacement feeding.	10
	Discussion	Ask students to compare the infant feeding recommendations in their national guidelines to those of WHO.	10
Infant feeding in the context of HIV: Breastfeeding, replacement feeding, and complementary feeding	Participatory presentation	Review infant feeding practices and discuss related cultural practices.	20
	Discussion	Ask students to discuss enforcement of the Code of Marketing of Breast-Milk Substitutes in their country.	10
	Role-play	Facilitate infant feeding counseling role-plays.	30
Feeding the non-breastfed child 6–24 months old	Participatory presentation	Present optimal replacement feeding of children under 2 years old.	10
Conclusions			10
Review			5
Total time			120

Required materials

- Flipchart paper and stand
- Writing pens
- Blackboard and chalk or whiteboard and markers
- Overhead projector or LCD projector

Materials provided

- PowerPoint 10
- **Handout 6.1. AFASS Criteria for Replacement Feeding**
- **Handout 10.1. Recommended Amounts of Ingredients for Replacement Feeds**
- **Handout 10.2. Algorithm on Infant Feeding Options and Actions**
- **Handout 10.3. Case Studies for Infant Feeding and PMTCT Counseling**

Preparation

1. Review Lecture Notes and PowerPoint 10.
2. Review Session 6. Infant Feeding and PMTCT.
3. Review handouts and exercises and identify questions to facilitate group discussion.
4. Prepare culturally appropriate topics for infant feeding role-plays to help participants apply the knowledge and skills in this session.
5. Modify the names and any other aspects (e.g., foods described) in the case studies in Handout 10.3 as appropriate for the local context.

Suggested reading

LINKAGES Project, 2005. Infant Feeding Options in the HIV Context. Washington, DC: Academy for Educational Development.

_____. 2004a. Breastfeeding and HIV/AIDS: Frequently Asked Questions. Washington, DC: Academy for Educational Development.

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Related terms

AFASS – Criteria for choosing an infant feeding method, which should be available, feasible, affordable, sustainable, and safe

Artificial feeding – Feeding an infant a breastmilk substitute

Breastmilk substitute – Any food marketed or otherwise represented as a partial or total replacement for breastmilk, whether or not it is suitable for that purpose

Cessation of breastfeeding – Stopping breastfeeding

Commercial infant formula – A breastmilk substitute formulated industrially in accordance with applicable Codex Alimentarius standards to satisfy the nutritional requirements of infants up to 6 months old

Complementary food – Any manufactured or locally prepared food suitable as a complement to breastmilk or infant formula when these are no longer sufficient to satisfy the infant's nutritional requirements (previously referred to as weaning food, supplementary foods, or breastmilk substitute)

Cup feeding – Feeding an infant from an open cup (as opposed to a bottle)

Demand feeding – Breastfeeding an infant whenever and as long as the infant wants to nurse

Exclusive breastfeeding – Feeding an infant no food or drink except breastmilk, not even water or breastmilk substitute (with the exception of drops or syrups containing vitamins, mineral supplements, or medicine)

Exclusive replacement feeding – Feeding an infant only a breastmilk substitute (commercial infant formula or home-prepared formula), with no breastmilk

Expressed breastmilk – Breastmilk removed from the breast either manually or with a pump to feed to an infant or child

HIV counseling and testing – Testing, usually antibody testing, for HIV that is voluntary, confidential, based on fully informed consent, and accompanied by pre- and post-test counseling; also known as voluntary counseling and testing (VCT)

HIV infected – Infected with the human immunodeficiency virus

HIV negative – Tested for HIV with a negative result

HIV positive – Tested for HIV with a positive result

Home-prepared formula – Infant formula prepared at home from fresh or processed suitable animal milk diluted with water and with sugar added

Infant – A child from birth through 12 months old

Mixed feeding – Feeding an infant some breastmilk and some other foods (e.g., water, milk, cereal)

Mother-to-child transmission of HIV (MTCT) – Transmission of HIV to an infant from an HIV-positive woman during pregnancy, labor and delivery, or breastfeeding (also called vertical transmission)

Of unknown HIV status – Not tested for HIV or unaware of the result

Replacement feeding – Feeding a child who is not receiving any breastmilk with a diet that provides all the needed nutrients (during the first 6 months, this should be a suitable commercial or home-prepared breastmilk substitute with micronutrient supplements)

Wet nursing – Breastfeeding of an infant by a woman other than the mother who is breastfeeding her own child

Introduction (slide 5)

As noted in Session 6, a comprehensive approach to PMTCT integrates prevention of HIV infection, voluntary counseling and testing, treatment, infant feeding, maternal and child health service delivery, and optimal obstetrical care. This approach needs the support, involvement, and participation of the government, the health sector, international and local organizations, the community, and the private sector to make all these services accessible and affordable. This session focuses on infant and young child feeding in the context of PMTCT.

PMTCT entry points (slide 6)

Pregnancy

All women should be encouraged to stay well nourished and hydrated during pregnancy, but this is especially important for women who have tested positive for HIV because 1) they are at higher risk of malnutrition and 2) maternal nutritional status is independently associated with an increased risk of HIV transmission to the fetus. Counseling during pregnancy should focus on helping women make the decisions about treatment, infant feeding, safe sex, labor and delivery, and family planning.

Post-natal period

Quality counseling and support for infant feeding decisions by HIV-positive women is increasingly important during this period. Whether women opt to breastfeed exclusively or use exclusive replacement feeding in the first months of their children's lives, they face considerable challenges. Women who opt to breastfeed need to understand the importance of exclusive breastfeeding and the dangers posed by mixed feeding. They also need informed counseling on maintaining breast health and preventing problems such as mastitis and cracked nipples. All women can benefit from good counseling on complementary feeding. Women also need to avoid re-infection with HIV for their own health and to reduce the risks of transmitting the virus to their infants during breastfeeding. Women may avoid re-infection by abstaining from sexual intercourse or making sure their partners use condoms.

Infant feeding counseling (slide 7)

Adherence to infant feeding practices that promote PMTCT starts with good counseling. It is challenging to counsel mothers adequately on infant feeding in the context of HIV because they may not know their serostatus. The best infant feeding practices for mothers to follow depend on whether they are HIV negative, HIV positive, or of unknown status.

For women who are HIV negative or of unknown status, exclusive breastfeeding for 6 months is the optimal practice because of the benefits of breastfeeding for improved infant growth and development and reduced incidence of childhood infections. Safe and appropriate complementary feeding and continued breastfeeding for 24 months and beyond are recommended for this group.

For HIV-positive mothers, exclusive breastfeeding should be supported when replacement feeding is not acceptable, feasible, affordable, sustainable, and safe

(AFASS). Mothers of HIV-positive infants are advised to continue breastfeeding to 24 months or beyond.

Informed choice *(*slide 8)

As we learned in Session 6, HIV and breastfeeding policy supports breastfeeding for infants of HIV-negative women or women of unknown status and the right of HIV-positive women who are informed of their serostatus to choose an infant feeding strategy based on full information about the risks and benefits of each alternative.

WHO recommendations on infant feeding for HIV-positive women (slide 9)

The 2006 Consensus Statement on HIV and Infant Feeding of the Inter-agency Task Team (IATT) on Prevention of HIV Infections in Pregnant Women, Mothers and their Infants, convened by WHO, made the following recommendations:

- The most appropriate infant feeding option for an HIV-infected mother should continue to depend on her individual circumstances, including her health status and the local situation, but should take greater consideration of the health services available and the counselling and support she is likely to receive.

- Exclusive breastfeeding is recommended for HIV-infected women for the first 6 months of life unless replacement feeding is acceptable, feasible, affordable, sustainable, and safe for them and their infants before that time.

- When replacement feeding is acceptable, feasible, affordable, sustainable, and safe, avoidance of all breastfeeding by HIV-infected women is recommended.

- At 6 months, if replacement feeding is still not acceptable, feasible, affordable, sustainable, and safe, continuation of breastfeeding with additional complementary foods is recommended, while the mother and baby continue to be regularly assessed. All breastfeeding should stop once a nutritionally adequate and safe diet without breastmilk can be provided.

- Whatever the feeding decision, health services should follow-up all HIV-exposed infants, and continue to offer infant feeding counselling and support, particularly at key points when feeding decisions may be reconsidered, such as the time of early infant diagnosis and at six months of age.

- Breastfeeding mothers of infants and young children who are known to be HIV-infected should be strongly encouraged to continue breastfeeding.

- Governments and other stakeholders should re-vitalize breastfeeding protection, promotion, and support in the general population. They

should also actively support HIV-infected mothers who choose to exclusively breastfeed, and take measures to make replacement feeding safer for HIV-infected women who choose that option.

- National programmes should provide all HIV-exposed infants and their mothers with a full package of child survival and reproductive health interventions (WHO 2005b, 2006) with effective linkages to HIV prevention, treatment and care services. In addition, health services should make special efforts to support primary prevention for women who test negative in antenatal and delivery settings, with particular attention to the breastfeeding period.

- Governments should ensure that the package of interventions referenced above, as well as the conditions described in current guidance (WHO 2005a), are available before any distribution of free commercial infant formula is considered.

- Governments and donors should greatly increase their commitment and resources for implementation of the Global Strategy for Infant and Young Child Feeding and the UN HIV and Infant Feeding Framework for Priority Action in order to effectively prevent postnatal HIV infections, improve HIV-free survival, and achieve relevant UNGASS goals.

Exercise 1. Discussion

Ask students whether their country has national guidelines on PMTCT and infant feeding or on nutrition care and support of PLHIV. If so, ask them to find the national recommendations for infant feeding for HIV-positive women.

Once the students have shared this recommendation, ask them to compare the recommendations in the national guidelines with the WHO recommendations.

Determining whether replacement feeding is AFASS (slide 10)

Ask students to take turns reading aloud **Handout 6.1. AFASS Criteria for Replacement Feeding**.

Explain that to determine whether replacement feeding is AFASS, health service providers should ask the questions below. The answers will determine whether HIV-positive mothers should practice exclusive breastfeeding or exclusive replacement feeding, given their situation and resources.

- Will you have a problem with your family or friends if you do NOT breastfeed?
- Do you have access to clean, safe water?
- Are you able to keep utensils clean?
- Can you use a cup and spoon to feed your infant?

- Can you buy enough infant formula or animal milk?
- Can you prepare feeds for the child every 3 hours, both day and night?

Box 1 shows when “yes” and “no” answers determinate whether replacement feeding is AFASS or a woman should be counseled to breastfeed exclusively.

Box 1. AFASS Criteria for Replacement Feeding

Acceptable: The mother sees no barrier to choosing replacement feeding for cultural or social reasons or for fear of stigma and discrimination.

Feasible: The mother (or family) has adequate time, knowledge, skills, resources, and support to prepare breastmilk substitutes correctly and feed the infant 8–12 times in 24 hours.

Affordable: The mother and family, with available community and/or health system support, can pay for the purchase/production, preparation, storage, and use of replacement feeds without compromising the health and nutrition of the family. Costs include ingredients/commodities, fuel, clean water, and medical expenses that may result from unsafe preparation and feeding practices.

Sustainable: There is a continuous, uninterrupted supply of replacement food and a dependable system for distributing all ingredients and products needed to safely practice replacement feeding for as long as needed.

Safe: Replacement foods are correctly and hygienically stored and prepared and fed with clean hands using clean cups and utensils, not bottles or teats.

Source: Adapted from WHO 2003.

Algorithm for infant feeding options and actions (slide 11)

Refer students to **Handout 10.2. Algorithm on Infant Feeding Actions and Options** and ask them to review the handout before proceeding.

HIV-positive pregnant women and mothers must be counseled on the risks of MTCT and the available infant feeding options. First, health service providers must help the women determine whether replacement feeding is AFASS or not. Once this determination is made, they should provide additional information to the mothers on their options. Health service providers must also be aware of the correct counseling messages for each infant feeding option. Handout 10.4 shows an algorithm that nurses can use to o guide health service providers on the type of additional information that needs to be provided to these women.

For example, an HIV-positive woman for whom replacement feeding is not AFASS needs to consider the exclusive breastfeeding options. These options include exclusive breastfeeding, feeding the infant heat-treated expressed breastmilk, or using a wet nurse. Counseling messages need to be tailored to support each of these options. When replacement feeding is AFASS, exclusive replacement feeding options include feeding the infant commercial infant formula or home-modified animal milk. In each of these cases, the counseling information and focus will be slightly different. Information on each of these infant feeding options is covered in the next few slides.

Exclusive breastfeeding (slide 12)

Nurses and midwives should encourage women who are HIV negative or do not know their status should to breastfeed exclusively. Women who are HIV positive should breastfeed exclusively if other feeding options are not AFASS.

Mothers who opt to breastfeed exclusively should follow the practices listed below to optimize their breastfeeding and avoid potential risks and challenges (LINKAGES 2005).

- **Feed the infant only breastmilk for the first 6 months.** Many positive factors associated with exclusive breastfeeding. It meets all of an infant's nutritional needs; results in fewer diarrheal, respiratory, and ear infections; and delays the return of fertility to help families space births.

- **Initiate breastfeeding within 1 hour of birth.** Breastfeeding within 1 hour of birth allows optimal stimulation of breastmilk production, helps expel the placenta faster, fosters bonding between infants and mothers, and gives infants extra protection against disease by providing colostrum.

- **Help the infant attach well to the breast.** Good attachment is important to allow the infant to suckle effectively and stimulate breastmilk production. Poor attachment may lead to sore breasts, cracked nipples, and mastitis, which can increase the risk of HIV transmission to the infant.

- **Breastfeed frequently.** Mothers should breastfeed on demand. Infants usually want to feed 8–12 times in 24 hours.

- **Continue to breastfeed when the infant is sick.** Mothers should continue to breastfeed when their infants are sick to help the infants recover faster. Breastmilk will replace the water and nutrients lost when an infant has diarrhea.

- **Express breastmilk if the infant is not directly breastfed,** If a mother is committed to exclusive breastfeeding, she must have a plan for providing her infant with her breastmilk when she is away for long periods, for example, at work, and cannot breastfeed her infant. Women can express milk into clean containers that can be stored for 8 hours in a cool place. Caretakers should feed the infants the expressed milk from a cup and not a bottle, which can become easily contaminated.

Exclusive breastfeeding for HIV-positive mothers (slide 13)

HIV-positive women who opt to breastfeed exclusively should follow the practices listed above as well as the following (LINKAGES 2005):

- **If breast problems occur, stop breastfeeding from the infected breast and seek treatment.** Mothers who have cracked nipples, mastitis, or yeast infection should either stop feeding from the infected breast or express the milk from this breast and heat-treat it before feeding.

- **Seek medical care when ill.** Mothers who develop symptoms of full-blown AIDS should seek care and consider stopping breastfeeding. Maternal viral load is higher in mothers with advanced disease, including the viral load in breastmilk.

- **Check the infant's mouth for sores and seek treatment if necessary**. Studies show that disruption of the epithelial integrity of the mucous membranes of an infant's mouth increases the risk of HIV transmission (Ekpini et al 1997).

- **Transition to replacement feeding when it becomes AFASS.** Little has been written about how to achieve early cessation of breastfeeding to minimize discomfort for mothers and infants. However, counselors should tell mothers to reduce the frequency of breastfeeding gradually (to once every 4–6 hours) and then stop breastfeeding over a period of a few days to a few weeks. During this period, mothers should teach their infants to drink feed heat-treated expressed milk from a cup in between feeds and should not breastfeed their infants to sleep.

Other infant feeding options for HIV-positive mothers (slide 14)

WHO and UNICEF recommend that HIV-infected mothers avoid breastfeeding when replacement feeding is AFASS. However, many mothers in sub-Saharan Africa cannot easily meet these conditions. The safety of infant feeding can be improved with adequate support. More work is needed to ensure that health systems and communities can provide this support. Frequently HIV-positive women who opt to use replacement feeding resort to occasional breastfeeding in public in order to hide their status from the community. This results in mixed feeding, which puts infants at a higher risk of becoming infected with HIV than exclusive breastfeeding does.

When preparing replacement feeds, mothers must be able to ensure hygienic conditions. This includes access to clean water and the ability to keep all necessary utensils clean. A steady supply of replacement foods is needed to meet all the infant's nutritional needs. Breaks or ruptures in this supply can endanger the infant's health.

Health service providers who counsel mothers on infant feeding and replacement feeding need to be aware of the International Code of Marketing of Breast-Milk Substitutes. The Code protects optimal breastfeeding for most infants but also protects artificially fed infants by ensuring that all products are clearly labeled for proper preparation and that the choice of replacement feeding is based on non-commercial information. Countries can buy infant formula and provide it free or at subsidized cost. Care must be taken to ensure this formula is used exclusively, not mixed with breastfeeding. Safe preparation and use instructions on labels should be in local languages whenever possible.

Exercise 2. Discussion

Ask students to discuss whether the Code of Marketing of Breast-Milk Substitutes is enforced in their country and if so, how.

This session will discuss the following infant feeding options:

- Expressed, heat-treated breastmilk
- Wet nursing by HIV-negative women
- Commercial infant formula
- Home-modified animal milk

Expressed, heat-treated breastmilk (slide 15)

Methods are being tested for treating expressed breastmilk to destroy HIV. These methods include pasteurizing the milk (heating it to 62.5 degrees Celsius for 30 minutes) or boiling it briefly. The treated breastmilk should be cooled immediately in the refrigerator or placed in a container in cool water. Once milk is heat treated, it should be used within an hour. Although these methods destroy HIV, they may be difficult to sustain. Heat-treated milk retains nutritional benefits but loses some anti-infective factors. Ideally, infants should be given the treated breastmilk from a cup. This option is most feasible in a hospital setting for sick and low birth weight infants.

Several studies have shown that expressing breastmilk and letting it stand for a half-hour inactivates HIV (Orloff et al 1993; Isaacs and Thormar 1990; Newburg et al 1992). During this time the naturally occurring anti-HIV factors in breastmilk are allowed to take effect.

Again, this option may not be feasible or sustainable. The mother needs to have time and be well enough to express and heat-treat her milk and then feed her child. She also needs to be able to afford the fuel to heat the breastmilk.

Wet nursing by an HIV-negative woman (slide 16)

Wet nursing means breastfeeding by a woman who is not the infant's mother. Mothers or caregivers must make sure that the women who offer to wet nurse are HIV negative (through testing) and receive primary HIV prevention counseling. Wet nurses need to follow all of the optimal breastfeeding practices that the mother normally would followed, such as ensuring that the infant is well attached and feeding frequently and on demand, including during the night. Wet nurses also should be able to access health services to treat problems such as mastitis and cracked and bleeding nipples.

Commercial infant formula (slide 17)

Commercial infant formula is made from modified cow milk or soy protein but lacks the long-chain essential fatty acids that are present in breastmilk. To feed an infant formula, the mother or caregiver needs access to clean water and utensils, fuel, skills, and time to prepare the feeds accurately and hygienically. Cup feeding is more hygienic than bottle feeding.

The average quantity needed to feed an infant for 6 months is 20 kilograms of powdered formula (40 tins containing 500 grams each) (LINKAGES 2005). Before a mother makes the decision to use infant formula, she needs to make sure she will have access to a steady supply of the product. Because stocks of formula from health facilities are frequently interrupted, mothers who depend on this source for formula put their infants at risk of undernutrition.

Mothers must be able to read and understand labels on the formula tins or have access to people who can read the labels to them.

It is important for HIV-positive mothers to understand that they should not mix breastfeeding and feeding commercial infant formula. Mixed feeding puts an infant at a significantly higher risk of infection with HIV. Mothers need adequate support from the health system and the community to feed their infants correctly with commercial infant formula.

Home-modified animal milk (slide 18)

Modified animal milks can be used for replacement feeding when commercial infant formula isn't available or is too expensive. However, animal milk can be difficult for infants to digest and will not provide them with all of the nutrients found in breastmilk. Animal milks must be modified before it can be given to an infant. Unmodified cow milk increases the risk of dehydration and stress on the infant's kidneys because of its high concentration of sodium, phosphorous, and other salts. As with infant formula, a mother must be able to prepare the animal milk in hygienic conditions that include access to clean water, and the household must have access to a steady supply of the milk. An infant will need 15 liters of milk per month for the first 6 months.

Animal milk (e.g., cow, goat, buffalo, or sheep). To modify cow milk, mix 100 milliliters of cow milk, 50 milliliters of boiled water, and 10 grams (2 teaspoons) of sugar. Because home-prepared formulas usually lack enough micronutrients such as iron, zinc, folate, and vitamins A and C, micronutrient supplements should be added where available.

Powdered full-cream milk and evaporated milk. Full-cream milk needs the addition of boiled water, as described on the package. Add 50 percent more water and 10 more grams of sugar for each 150 milliliters of feed. Again, add micronutrient supplements when available.

Skimmed milk, sweetened condensed milk, cereal feeds, juices, and teas are not suitable for replacement feeds either before 6 months or after 6 months.

Modifying animal milk at home, like using commercial infant formula, requires access to clean water and utensils, fuel, skills, and time to prepare the feeds accurately and hygienically. Cup feeding is more hygienic than bottle feeding. Support from the health system and community is essential for the success of this method.

Breastfeeding cessation (slide 19)

Women who exclusively breastfeed and decide to stop breastfeeding in the first few months of their infant's lives need help with breastfeeding cessation. They should be counseled on the following steps when making the transition from exclusive breastfeeding to replacement feeding:

- Gradually reduce the frequency of breastfeeding and increase the intervals between breastfeeds.
- One month before full weaning, cut out one or more night feeds.
- Increase the time between breastfeeds to once every 4–6 hours

- Teach the infant to drink breastmilk from a cup.
- Cup feed expressed milk in between feeds.
- Try not to breastfeed the infant to sleep; lay the infant down or pat, calm, carry, or rock the infant to sleep.

Feeding the non-breastfed child 6–24 months old (slide 20)

Replacement feeding should carefully follow WHO guidelines for feeding non-breastfed children 6–24 months old (WHO 2004). Mothers should increase food quantity, consistency, and variety as their infants get older, while giving frequent replacement feeds. Feeding frequency should also increase as the infant gets older, using a combination of meals and snacks.

The appropriate number of feeds for an average, healthy, non-breastfed infant 6–24 months old depends on the energy density and amounts of the foods they are eating. In general, infants should eat four to five meals and one or two snacks a day, as desired. "Meals" include milk-only feeds, other foods, and combinations of milk feeds and other foods. "Snacks" are foods eaten between meals, which are usually self-fed, convenient, and easy to prepare. The energy provided by these meals and snacks should increase from approximately 600 kilocalories per day for infants 6–8 months old, 700 kilocalories per day for infants 9–11 month olds, and 900 kilocalories per day for infants 12–24 months old (WHO 2005a). If infants regularly eat adequate amounts of other animal-source foods, they need approximately 200–400 milliliters of milk per day; otherwise, they need approximately 300–500 milliliters per day.

A diverse diet is important for a non-breastfed infant to improve macronutrient and micronutrient intake. The mother or caregiver should practice responsive feeding, frequent and responsive feeding during and after illness, and good hygiene and proper food handling (LINKAGES 2001). Session 12 provides more information on nutrition care and support for children with HIV, including care of severely malnourished children.

Exercise 3. Role-play

Divide the students into pairs. Refer students to **Handout 10.3. Case Studies for Infant Feeding and PMTCT Counseling**. Introduce the case studies with the following information: One out of every five people in Zambia between the ages of 15 and 49 is infected with HIV. Approximately 25,000 Zambian infants will become infected with HIV each year in utero, during labor and delivery, or through breastfeeding. Seroprevalence is 25.6 percent in Kabwe, 41 percent in Livingston, and 28 percent in Ndola.

Assign each pair one of the case studies. Explain that one student should role-play a health worker or counselor, and the other student should role-play the client. The questions provided are intended for guidance. Encourage students to ask additional questions to enhance the counseling session. Give a time limit of 15 minutes for the role-play.

After 15 minutes, ask the entire class to discuss each case study from the points of view of the health worker and the client.

Complementary feeding practices (slide 21)

Complementary feeding is feeding infants foods in addition to breastmilk or formula. The second half of an infant's first year is an especially vulnerable time because he/she is learning to eat and must be fed soft foods frequently and patiently. If nutritional intake is inadequate, the consequences persist throughout life.

- Introduce complementary foods at 6 months.
- Begin complementary feeding by adding local foods to staple foods.
- As the child gets older, increase the frequency of feeding and the quantity of food so that complementary foods meet more of the child's energy requirements.
- Make feeding young children a priority to ensure that they get enough food. One way to know if children are getting enough food is to put their portions in separate bowls and to help them eat (responsive feeding).
- Give young children small feeds frequently throughout the day because they have very small stomachs.
- Interact with the child during feeding to help him/her ingest the food and stimulate verbal and intellectual development. Talk to the child and make eye contact. Feeding times are periods of learning and love.
- Experiment with food combinations, tastes, textures, and ways to encourage children who refuse many foods.
- Minimize distractions during meals if the child loses interest easily.
- Be patient and encouraging—do not force the child to eat.
- Increase the thickness and variety of the food as the child gets older.
- Practice good hygiene and safe food preparation.
  - Feed liquids from a small cup or bowl. Bottles are difficult to keep clean, and contaminated bottles can cause diarrhea.
  - Before feeding the child, wash your hands and the child's hands with soap and water.
  - Use clean utensils and bowls or dishes to avoid introducing dirt and germs that might cause diarrhea and other infections.
  - Serve food immediately after preparation.

Feeding the sick child (slide 22)

The loss of body stores of micronutrients and energy, low absorption of food, poor appetite, and low nutritional intake associated with HIV put children at an increased risk of undernutrition. Mothers or caregivers should know that it can be harmful to a child who is feeling sick or who has diarrhea to withhold food. The following practices can prevent undernutrition and recurring infection in sick and malnourished children:

- Increase breastfeeding or replacement AND complementary feeding *during* and *after* illness. Continued breastfeeding should shorten the duration of diarrhea and help prevent dehydration and growth faltering. Frequent breastfeeding will reduce the need for oral rehydration solution (ORS) and is often preferred by sick infants to ORS.
- Feed the child more fluids, including breastmilk, *during* and *after* illness.
- For diarrhea, give the child zinc supplementation for 10–14 days, according to the WHO protocol. Provide low osmolarity ORS to children > 6 months old.

- Seek medical help if the illness continues or child is unable to eat after several days.

Conclusions (slide 23)

Because HIV can be transmitted from mother to child during pregnancy, labor and delivery, and breastfeeding, a comprehensive package of services is needed to prevent transmission. An HIV-positive mother must weigh the benefits and risks of breastfeeding before making an infant feeding choice. Alternatives to breastfeeding must be AFASS. Good counseling and support are critical to help women select the infant feeding options that are best for their situation and that follow optimal practices. Stigmatization and coercion can also play a role in how mothers choose to feed their infants.

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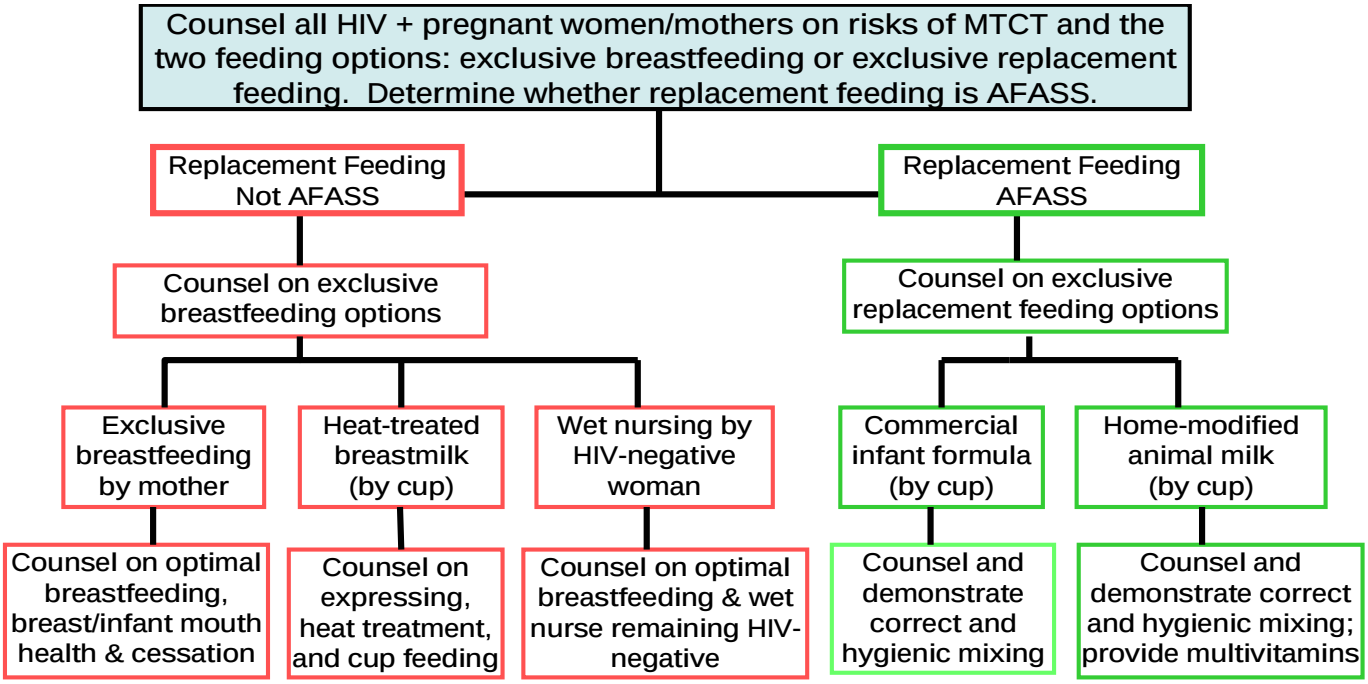
Handout 10.1. Recommended Amounts of Ingredients for Replacement Feeds

Age (months)	Number of feeds and daily milk requirements	Amount of cow (fresh or UHT), goat, or camel milk (per feeding)	Amount of evaporated milk (per feeding)	Amount of powdered full-cream milk (per feeding	Amount of commercial formula (per month)
0–< 1	8 feeds/day x 60 ml/feed Total: 480 ml/day	40 ml milk + 20 ml water + 4 g sugar	16 ml milk + 44 ml water + 4 g sugar	5 g milk + 60 ml water + 4 g 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	24 ml milk + 66 ml water + 6 g sugar	7.5 g milk + 90 ml water + 6 g 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	32 ml milk +88 ml water + 8 g sugar	10 g milk + 120 ml water + 8 g sugar	7 x 500-g tins
3–< 4	6 feeds/day x 120 ml/feed Total: 720 ml/day	80 ml milk + 40 ml water + 8 g sugar	32 ml milk + 88 ml water + 8 g sugar	10 g milk + 120 ml water + 8 g sugar	7 x 500-g tins
4–< 5	6 feeds/day x 150 ml/feed Total: 900 ml/day	100 ml milk + 50 ml water + 10 g sugar	40 ml milk +110 ml water + 10 g sugar	12.5 g milk + 150 ml water + 10 g sugar	8 x 500-g tins
5–< 6	6 feeds/day x 150 ml/feed Total: 900 l/day	100 ml milk + 0 ml water + 10 g sugar	40 ml milk +110 ml water + 10 g sugar	12.5 g milk + 50 ml water + 10 g sugar	8 x 500-g tins

Source: LINKAGES Project 2005.

Handout 10.2. Algorithm on Infant Feeding Options and Actions



Handout 10.3. Case Studies for Infant Feeding and PMTCT Counseling

These case studies can be used to practice counseling on infant feeding and PMTCT.

Case study 1

Regina, a teacher, comes into the clinic to discuss infant feeding options. She tested HIV positive earlier in her pregnancy. She is now 8 months pregnant. Regina has read and heard that feeding her infant formula instead of breastmilk will eliminate the risk of her transmitting HIV during breastfeeding. She tells you that she has just enough income to cover her basic needs.

Sample questions

- What additional information does Regina need to make an informed infant feeding choice and also manage her nutritional needs?
- Can she afford to replacement feed?
- Does she have community or household support for her infant feeding decision?
- How does she feel about the issue?
- What is her partner's HIV status?
- Has she gained adequate gestational weight?

Case study 2

A young couple, John and Jane, come to the clinic. You have already been seeing Jane, who is HIV positive. She is 6 months pregnant with her first child. John's test results showed that he is HIV negative. Jane knows about her HIV status but hasn't told John. Both John and Jane are unemployed. Jane has not gained adequate gestational weight and is complaining of diarrhea and nausea. She is not taking any ARVs.

Sample questions

- How does this information help you assess Jane's nutritional status? What additional questions might be appropriate? (e.g., What have you eaten today? What did you eat yesterday? What kind of food did you eat the past week?)
- What interventions would you propose to Jane?
- What issues should you explore with Jane to guide her on infant feeding once her child is born? What open-ended questions could you ask to find out what infant feeding options are available to her?
- What other help do John and Jane need with regards to their HIV status? What advice and support do John and Jane need from their community and from you as their counselor?

Case study 3

Gertrude is about to give birth. She has visited the clinic for other antenatal services but declined to be tested for HIV. Her husband recently died, and there are rumors that he died of AIDS. Gertrude has four children, two of them of school age. She and the children recently moved back home with her mother. Gertrude tells you she is anxious about how she is going to support her household. She does not have a formal job but

can grow some vegetables to sell in the market. She has gained adequate gestational weight. She says that she has breastfed all her children, but not exclusively, because she introduced them to other foods in the first or second months.

Sample questions

- What are the nutrition care and support issues for Gertrude, her unborn child, and her household?
- What other prevention messages would you give her?
- What infant feeding messages are appropriate in her case?

Case study 4

Harriet is 3 months pregnant and has tested HIV positive. She is a fairly successful entrepreneur who has built a small business selling beer in the city. She has two other children who have been healthy. Her partner has not been tested, and she has not yet told him she is HIV positive. She seems to have enough resources to afford some form of replacement feeding. She has breastfed her other children. Harriet has heard that some herbal products (garlic supplements) and micronutrient supplements (vitamins A and C) can help with HIV infection. She asks if you would recommend these products. She also asks about taking ARVs.

- How would you respond to Harriet's question about the supplements? What information should you give her?
- What other supplements would you recommend, and what pros and cons would you tell her about each supplement?
- What other information do you need from Harriet to assess her replacement feeding options?
- What advice would you her give about ARVs?

Session 10:
Infant and Young Child Feeding in the Context of HIV

Purpose

To review optimal infant and young child feeding practices to improve counseling skills on infant feeding in the context of HIV

2

Learning Objectives

- Describe optimal infant and young child feeding practices.
- Explain infant feeding options for HIV-infected mothers.
- Know key components of counseling women, their partners, and their families on infant feeding in the context of HIV.

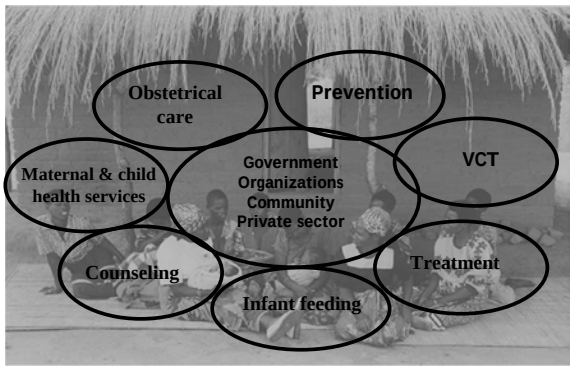
3

Session Outline

- Overview of a comprehensive PMTCT approach and entry points
- Review of informed choice and AFASS criteria
- Description of infant feeding practices

4

Comprehensive PMTCT Approach



PMTCT Entry Points for Infant Feeding

Pregnancy	Post-natal period
Counsel on infant feeding options and self-care including nutrition and preparing for the future.	Counsel on and support infant feeding options. Prevent and treat breastfeeding problems. Treat infant thrush and oral lesions. Counsel on complementary feeding and breastfeeding cessation. Counsel on preventing re-infection.

6

Infant Feeding Counseling

HIV negative	Unknown status	HIV positive
Exclusive breastfeeding	Exclusive breastfeeding	Exclusive breastfeeding or exclusive replacement feeding Early cessation Treatment of breastfeeding problems
Complementary feeding	Complementary feeding	Complementary feeding
Prevention	Prevention	Prevention ART

7

Informed Choice

HIV and breastfeeding policy supports breastfeeding for infants of women without HIV infection or of unknown status and the right of a woman infected with HIV who is informed of her serostatus to choose an infant feeding strategy based on full information about the risks and benefits of each alternative.

UNAIDS/WHO/UNICEF

8

WHO Recommendations on Infant Feeding for HIV-Positive Women

HIV-negative or of unknown HIV status

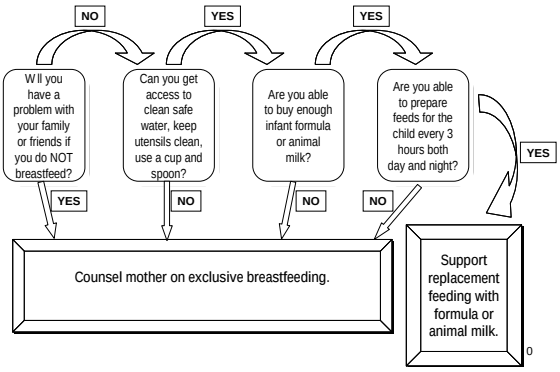
- Exclusive breastfeeding for 6 months and continued breastfeeding for 2 years or beyond

HIV-positive women

- Most appropriate infant feeding option for HIV-exposed infant depends on individual circumstances, including consideration of health services, counselling and support

9

Determination of AFASS



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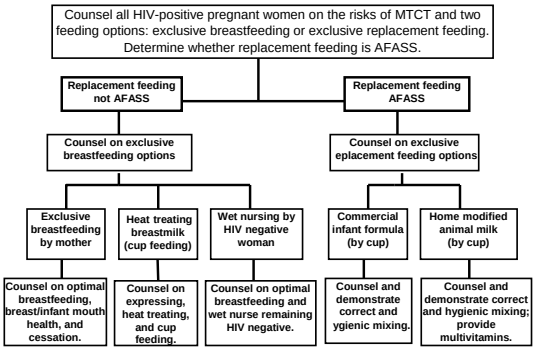
Algorithm on Infant Feeding Options and Actions



Exclusive Breastfeeding Practices

- Give the infant only breastmilk.
- Initiate breastfeeding within 1 hour of birth.
- Make sure the infant is attached and positioned correctly at the breast.
- Breastfeed frequently.
- Continue breastfeeding when the mother or infant is sick.
- Express breastmilk if not feeding the infant directly.

12

Additional Breastfeeding Practices for HIV-Positive Mothers

- Stop breastfeeding from the infected breast and seek treatment.
- Seek medical care when ill.
- Check the infant's mouth for sores and seek treatment if necessary.
- Transition to replacement feeding when it becomes AFASS.

13

Other Infant Feeding Options for HIV-Positive Mothers

- Expressing and heat-treating breastmilk.
- Wet nursing by an HIV-negative woman
- Feeding commercial infant formula
- Feeding home-modified animal milk

14

Expressing and Heat-Treating Breastmilk

- The breastmilk is heated to 62.5°C for 30 minutes or boiled briefly and cooled immediately.
- Heat destroys HIV.
- The milk retains some nutritional benefits but loses anti-infective factors.
- The milk should be stored in a cool place.
- The milk should be fed to the infant in a cup, not a bottle.
- This is time consuming and difficult to maintain.

15

Wet nursing by an HIV-Negative Woman

- The wet nurse must be confirmed HIV negative and understand the importance of safe sex.
- The wet nurse must follow optimal breastfeeding practices.
- The wet nurse must be able to feed the infant frequently, including at night.

16

Commercial Infant Formula

- Requires support from the health system and community
- Requires clean water, sterilized utensils, and correct hand washing
- Requires a steady supply of commercial or home-prepared formula—20 kg over 6 months
- Requires correct mixing

17

Home-Modified Animal Milk

- Requires support from the health system and community
- Requires clean water, sterilized utensils, and correct hand washing
- Requires a reliable and affordable supply of animal milk
- Requires correct mixing with clean water, boiling, adding sugar, etc.

18

Breastfeeding Cessation

- Gradually reduce the frequency of breastfeeding.
- Increase breastfeeding intervals to every 4–6 hours.
- Gradually cut out one or more night feeds.
- Teach the infant to drink expressed breastmilk from a cup.
- Cup feed expressed breastmilk in between breastfeeds.
- Try not to breastfeed the infant to sleep.

19

Feeding the Non-breastfed Child 6−24 Months Old

Age	Kcal	Feeding frequency
6−8 months	600/day	Meals: 4−5 times a day Snacks: 1−2 times a day
9−11 months	700/day	Meals: 4−5 times a day Snacks: 1−2 times a day
12−23 months	900/day	Meals: 4−5 times a day Snacks: 1−2 times a day

20

Complementary Feeding

- Feed the child in a separate bowl.
- Interact with the child during feeding (responsive feeding).
- Practice good hygiene and safe food preparation.

21

Feeding the Sick Child

- Increase breastfeeding or replacement AND complementary feeding <u>during</u> and <u>after</u> illness
- Increase fluids (including breastmilk) <u>during</u> and <u>after</u> illness.
- For diarrhea, give zinc supplementation for 10−14 days according to WHO protocol.
- For diarrhea, give provide low osmolarity ORS to children over 6 months old.
- Seek help if illness persists or if the child is unable to eat after several days.

22

Conclusions

- HIV-positive women must weigh the benefits and risks of breastfeeding before making infant feeding choices.
- Alternatives to breastfeeding must be AFASS.
- Women need good counseling and support to select the best feeding options and follow optimal practices.

23

SESSION 11. NUTRITION CARE FOR CHILDREN LIVING WITH HIV

Purpose (slide 2)

The purpose of this session is to equip students with current knowledge and a general understanding of nutrition care and support of children 2–9 years old who are living with HIV.

Learning objectives (slide 3)

By the end of the session students will be able to:

- Describe the nutritional needs of and dietary recommendations for children 2–9 years old.
- Explain how HIV increases the risk of undernutrition and the etiology and consequences of growth failure and development in children infected with HIV.
- Describe dietary recommendations for children infected with HIV.
- Explain factors to consider when planning nutrition care and support for children 2–9 years old infected with HIV.

Prerequisite knowledge

- Basic science (human biology and physiology)
- Basics of HIV and AIDS in Africa (Session 1)
- Basics of nutrition throughout the life cycle (Session 2)
- The link between nutrition and HIV (Session 3)
- Basic counseling skills

Estimated time: 120 minutes, excluding the field visit

Session guide (slide 4)

Content	Methodology	Activities	Estimated time (minutes)
HIV infection in young children	Participatory lecture	Summarize the HIV situation for young children.	10
Effects of HIV on the nutritional status of young children	Participatory lecture	Ask students to brainstorm effects of HIV in young children.	10
Purpose of nutrition care for young HIV-infected children	Participatory lecture	Discuss the purpose and role of nutrition care in HIV services for young children.	15
Components of nutrition care and support of young HIV-infected children	Participatory lecture	Present the main components of nutrition care for young HIV-infected children and elicit examples.	15
	Group work	Facilitate group work on incorporating nutrition care and support into contact points in their areas that see children 2–9 yeas old.	20
	Role-play	Facilitate a counseling role-play on nutrition care of young HIV-infected children, followed by brief commentary and discussion in plenary.	30
Challenges for nutrition care and support for young HIV-infected children	Participatory lecture	Ask students to brainstorm issues and challenges for nutrition care and support of young HIV-infected children and how to address these.	10
Conclusions			5
Review			5
Total time			120

Required materials

- Flipchart stand and paper
- Writing pens
- Blackboard and chalk or whiteboard and markers
- Overhead projector and transparencies or LCD projector and laptop

Materials provided

- PowerPoint 11
- **Handout 11.1. Nutrition Actions for the Care and Support of HIV-Infected Children**
- **Handout 11.2. Checklist for Nutrition Assessment**
- **Handout 11.3. Monitoring the HIV-Positive Child**
- **Handout 11.4. Job Aids for Nutrition Counseling and Education**
- **Handout 11.5. Assessing Child Growth**
- **Handout 11.6. Physical Characteristics of Normal Nutrition and Undernutrition with Possible Nutrient Deficiency**
- **Handout 11.7. Job Aid for Counseling on Management of Common HIV Symptoms that Affect Children's Dietary Intake**
- **Handout 11.8. Job Aids for Counseling on Management of Inadequate Intake in HIV-Infected Children**
- **Handout 11.9. Job Aids for Counseling on Management of Feeding Difficulties in HIV-Infected Children**
- **Handout 11.10. Job Aid for Counseling on Management of Opportunistic Infections or Fever in HIV-Infected Children**
- **Handout 11.11. Job Aid for Counseling on Management of Gastrointestinal Problems in HIV-Infected Children**
- **Handout 11.12. Job Aid for Counseling on Management of Altered Taste in HIV-Infected Children**
- **Handout 11.13. Job Aid for Counseling on Socioeconomic Factors That May Affect Nutrition in HIV-Infected Children**

Preparation

1. Be familiar with Lecture Notes and PowerPoint 11.
2. Review handouts and exercises to identify relevant questions to help students master the concepts.
3. Review the role-play and modify the details (e.g., foods described) as appropriate for country and community contexts.
4. Contact sites for the field visit and arrange the timing and content.

Suggested reading

American Dietetic Association. 1998. Pediatric Manual of Clinical Dietetics. Chicago.

American Dietetic Association and Dietitians of Canada. 2000. Manual of Clinical Dietetics, 6th edition. Chicago.

Regional Centre for Quality of Health Care (RCQHC), FANTA Project, LINKAGES Project, and SARA Project. 2003. Nutrition and HIV/AIDS: A Training Manual. Kampala. Uganda.

World Health Organization (WHO), United Nations Children's Fund (UNICEF), and BASICS Project. 1999. Nutrition Essentials: A Guide for Health Managers. Geneva.

Tindyebwa, D., et al., eds. 2004. Handbook on Paediatric AIDS in Africa. Kampala, Uganda: African Network for the Care of Children Affected by AIDS (ANECCA).

World Health Organization, 2003. Nutrition requirements for people living with HIV/AIDS. Report of a technical consultation. Geneva.

Introduction

In Africa undernutrition is a significant cause of morbidity and mortality in children under 5. Moreover, undernutrition is endemic in sub-Saharan Africa, with approximately 10 percent of children under 5 suffering from moderate and severe wasting, 40 percent with moderate and severe stunting, and 29 percent with moderate and severe underweight (UNICEF 2003). Malnutrition compromises children's health and makes them more susceptible to illness and death. Approximately 17 percent of children in sub-Saharan Africa die during the first five years of life, largely from infectious diseases including acute respiratory infections, diarrhea, and malaria.

The burden of undernutrition among young children has been compounded by HIV and AIDS. By the end of 2005, an estimated 2.3 million children worldwide were HIV positive, almost 90 percent of them in sub-Saharan Africa (UNAIDS 2006). The synergy between undernutrition and HIV is well documented. Undernutrition weakens the immune system, increasing vulnerability to HIV infection, and HIV compromises nutritional status and increases vulnerability to infection.

Children infected with HIV are more vulnerable to undernutrition and growth failure. Adequate nutrition can help delay the progression of HIV if it starts early in the disease stage when the child is asymptomatic. However, for many children, it is not possible to start the nutrition intervention early because their status is not usually known until the disease has advanced.

HIV in children 2–9 years old (slides 5–7)

Most children 2–9 years old who are infected with HIV were infected in utero, during labor and delivery, through breastfeeding, through contaminated needles or blood, or through sexual abuse. HIV-infected children have more frequent common childhood infections such as ear infections and pneumonia than non-infected children. Other common infections include gastroenteritis and tuberculosis. Diarrhea and fever are usually more persistent and severe in children with HIV. In addition to the opportunistic infections (OIs), such children also experience developmental delays.

Routine diagnosis for pediatric AIDS is not done in many developing countries, mainly because the tests used for adults cannot be used for children under 18 months old. Tests that can detect HIV in children under 18 months old are expensive and not readily available in resource-limited settings. This poses a problem because early diagnosis of HIV can help provide effective intervention to reduce morbidity and mortality.

The World Health Organization (WHO) therefore has provided some clinical signs and symptoms that can be used to make an HIV diagnosis. However, these signs and symptoms also overlap with those of other common childhood diseases. Nonetheless, the presence of these clinical signs and conditions may indicate HIV infection in a child and thus serve to alert the health worker to obtain further history on the child such as the mother's health status, and laboratory tests were available. The most common signs and symptoms found in HIV-infected children according to WHO include the following:

- Weight loss
- Chronic diarrhea
- Failure to thrive

- Oral thrush
- Fever

In Ethiopia, South Africa, and Uganda, the Integrated Management of Childhood Illnesses (IMCI) guidelines include symptoms indicative of HIV. A child is classified as having symptomatic HIV if they have any four of the following (Tindyebwa et al, eds. 2004):

- Recurrent pneumonia
- Oral thrush
- Present or past ear discharge
- Very low weight
- Persistent diarrhea
- Enlarged lymph nodes
- Parotid enlargement

Where available, laboratory tests are encouraged to provide an accurate diagnosis.

These common signs and symptoms noted in HIV-infected children are the same signs and symptoms and commonly seen in HIV-negative sick children and are a common cause of mortality if not managed. Many of these deaths may be preventable by early diagnosis and correct management and interventions.

Effects of HIV on the nutritional status of the young child (slides 8 and 9)

Children 2–9 years old have distinct nutritional needs. Although the rapid growth rate experienced in the first 2 years of life slows down, the body continues to increase steadily in size. Appetite declines, and protein, mineral, and vitamin requirements increase. HIV infection affects these nutritional needs. Undernutrition tends to increase in HIV-infected children, even more so in resource-limited settings where undernutrition is already an endemic problem. Moreover, the effects of undernutrition in the HIV-infected child are further compounded by repeated infections.

For the HIV-infected child, linear growth is usually the first parameter negatively affected by HIV disease progression. Failure to thrive is also a problem, with children being unable to gain weight. HIV-infected children born to HIV-positive women have early and sustained stunting or low height for age, although they are usually not wasted. Micronutrient deficiencies such as low serum levels of vitamin A, E, B_6, B_{12}, and C and minerals zinc and selenium are also common among HIV-infected children.

An HIV-infected child faces a number of problems with nutrition implications. The following problems need to be addressed immediately:

- Inadequate food intake because of poor appetite, early satiety, mouth ulcers and oral thrush, high selectivity around food choices, abdominal pain, and decreased interest in food
- Increased nutrient losses because of malabsorption, diarrhea, vomiting, and HIV enteropathy
- Increased nutrient needs because of the hyper-metabolic and hyper-catabolic effects of infections, OIs, and HIV itself

- Feeding difficulties in infants resulting from poor sucking and swallowing and in children resulting from food aversions, thrush, and food refusal. All these difficulties distort the feeding relationship between the caregiver and the child with HIV.
- Socioeconomic factors such as poverty, illness of the parent(s), and food insecurity

Frequent infections, mouth and throat sores, and decreased appetite all have a profound impact on a child's nutritional status. Consequently, feeding the HIV-infected child requires extra patience and supervision to encourage eating and ensure adequate food intake. Box 1 lists some clinical indicators of malnutrition in HIV-infected children that can be used for assessment.

Box 1. Clinical indicators of malnutrition in HIV-infected children

Moderate malnutrition

- Weight or weight for height < 90% of the National Center for Health Statistics (NCHS) median
- Weight for height < 5%
- Serum albumin < 3 g/dL

Severe malnutrition (requires admission to hospital for treatment if any one of these is present)

- Weight for height < 70% of the NCHS median
- Severe bilateral edema
- Visible wasting

Source: Tindyebwa et al., eds. 2004.

Purpose of nutrition care for children 2–9 years old in the context of HIV (slides 10 and 11)

Because of the many complications experienced by the HIV-infected child, nutrition care and support should be an integral component of treatment. Early nutrition intervention can help delay HIV disease progression or death in the HIV-positive child.

Nutrition interventions have the following objectives:

- Maintain and promote healthy weight, normal growth, and development.
- Preserve lean body mass.
- Prevent malnutrition and its effects on immunity.
- Provide adequate energy and nutrients.
- Minimize effects of gastrointestinal symptoms like diarrhea and vomiting.
- Prevent food and waterborne illness by promoting hygiene and food and water safety.
- Enhance response to therapy.
- Reduce morbidity and mortality.

Ongoing nutrition monitoring and intervention are necessary for all children with HIV, from the asymptomatic phase to AIDS. The earlier the monitoring in the better, as growth may be impaired even before symptomatic HIV disease. Nutrition intervention is crucial

as soon as growth—that is, height for age—appears to be suboptimal. This is important because successful weight gain is more likely before CD4 counts decrease. Any growth faltering should be followed up to determine the cause and identify the appropriate interventions. Health service providers should refer to local policies and practices on nutrition counseling and regular growth monitoring and promotion (monthly, if possible) to monitor the child's nutritional status and to make appropriate use of referral systems.

Nutrient requirements of the HIV-infected child 2−9 years old (slide 12–16)

Session 2 provides the recommended energy and nutrient intake for healthy non-infected children, including children 2−9 years old. This session discusses the nutrient requirements of the HIV-infected child 2−-9 years old, noting special considerations.

The HIV-infected child is at very high nutritional risk, as noted. HIV infection causes excess nutrient losses and malabsorption, further increasing nutritional requirements and the risk of undernutrition. Frequent infections increase energy needs as a result of the added metabolic stress of fever and often increased respiratory rates. The child may also have urinary losses of protein that increase protein requirements. HIV-related infections such as diarrhea have severe nutrition consequences that lead to appetite loss, weight loss, and wasting. Early diagnosis of HIV, prompt diagnosis and management of infections, and use of antiretroviral drugs (ARVs) where available can improve nutrition and health for the child.

Macronutrients

Energy (slide 12)

The estimated average daily energy requirements for healthy uninfected children are listed in table 1.

Table 1. Average daily energy requirements for children 2–9 years old

Age (years)	Energy requirement (kcal/day)	
	Girls	Boys
2–3	1,047	1,129
3–4	1,156	1,252
4–5	1,241	1,360
5–6	1,330	1,467
6–7	1,428	1,573
7–8	1,554	1,692
8–9	1,698	1,830

Source: FAO 2004.

The increased energy requirements of HIV-positive children 2–9 years old are explained in table 2.

Table 2. Summary of adjustments in energy requirements for HIV-infected children 2–9 years old

HIV phase	% of energy increase
Asymptomatic	10% increase to maintain growth
Symptomatic with no weight loss	20–30% increase
Symptomatic with weight loss	50–100% increase

For example, a 6-year-old boy who is HIV-positive and asymptomatic needs 10 percent more energy than non-infected boys his age.

Recommended normal intake = 1,428 kcal/day
10 percent more intake = 142 kcal
Total intake to maintain growth = 1,570 kcal/day

A 6-year-old boy who is HIV positive, symptomatic, and experiencing weight loss needs 50–100 percent more energy than the recommended intake for non-infected boys his age.

Recommended normal intake = 1,428 kcal/day
50–100 more intake = 714–1,428 kcal/day
Total intake to maintain growth = 2,142–2,856 kcal/day

Health care providers should follow the 1999 WHO *Management of Severe Malnutrition: A Manual for Physicians and Other Senior Health Workers* for management of severe malnutrition in children.

Translating calories to actual food intake (slides 13 and 14)

The increased energy requirement for HIV-infected children 2–9 years old needs to be translated into actual food intake. Caregivers should be counseled to increase children's energy intake by giving them an extra snack or meal every day. The kilocalories (kcal) in some common snack foods are listed below.

1 cooked egg = 77 kcal
1 banana = 109 kcal
1 tsp. margarine = 34 kcal
1 small−medium boiled potato = 116 kcal
1 tsp. peanut butter = 30 kcal

To increase energy intake in mashed boiled potatoes, for example, caregivers can add a boiled egg or 1 or 2 teaspoons of margarine. A snack of a cooked egg and a banana contain approximately 187 (77 + 109) kcal.

Dry maize flour has little water content and is high in energy, containing approximately 340 kcal per 100 g. When water is added to make porridge, the energy content per volume is reduced by more than two-thirds. The porridge is now mainly water, and the energy value is only approximately 115 kcal per 100 g.

High-fat foods such as vegetable oil, margarine, and peanut butter have very high energy content and can be fed to the HIV-positive child to meet increased energy requirements. Adding vegetable oil, margarine, or peanut butter to porridge increases the energy content. A teaspoon (5 g) of vegetable oil can add approximately 45 kcal to any food, and a teaspoon of peanut butter can add approximately 30 kcal. Because fats such as margarine and vegetable oil have higher energy content than carbohydrates, these fatty foods are usually recommended to improve the energy density of foods for young children. Caregivers can provide these goods to HIV-positive children, as long as the children are not suffering from fat malabsorption, diarrhea, nausea, or vomiting, conditions that fatty foods can worsen.

Protein (slide 15*)*

Protein is essential for growth and development, especially for the developing child. The recommended protein intake for healthy uninfected children is shown in table 3.

Table 3. Safe protein intake requirements for children, by age

Age (years)	Safe protein intake level (g/kg)
	Girls and boys combined
2–3	1.15
3–5	1.10
5–7	1.00
7–10	1.00

Source: FAO, WHO, and UNU 1985.

WHO (1985) recommends protein intake of approximately 1.1 grams per kilogram of weight per day for healthy non-infected children 2−9 years old. WHO currently does not recommend increasing protein intake for HIV-positive children over the normal requirements for health (12−15 percent of total energy intake). However, because energy requirements increase by 10 or 20−30 percent in HIV-positive children, protein requirements also increases, as protein is calculated as a percentage of total energy intake.

Fats (slide 15)

Fat restriction for children is not recommended, but fat intake should be no more than 30 percent of total calories in the diet. There is no recommendation to change fat intake in HIV-infected children above the recommendations for healthy non-infected children.

Micronutrients (slide 16)

WHO recommends that HIV-infected children eat healthy diets that meet the recommended daily allowance (RDA) of micronutrients. However, some HIV-infected children whose dietary intake is inadequate to meet their micronutrient needs may need

supplementation, especially if deficiencies exist. Micronutrient supplementation should follow WHO recommendations and should not exceed RDA levels.

Vitamin A

The WHO HIV/AIDS Technical Working Group recommends that children 6−59 months with HIV who live in resource-limited settings receive vitamin A supplements (200,000 IU for children > 12 months old) every 4−6 months. This level is consistent with current WHO recommendations for prevention of vitamin A deficiency in children. There is no recommended increased dose or frequency for vitamin A in HIV-infected children. Table 4 shows WHO's recommended schedule of high-dose vitamin A supplementation.

Table 4. WHO schedule of high-dose vitamin A supplementation

Age	Infant
0–5 months	**3 doses of 50,000 IU at 1-month intervals. Doses should be given at a health or immunization contact, in particular at each DTP (6, 10, and 14 weeks)**
6–11 months	**1 single dose of 100,000 IU given at any health or immunization contact, in particular at measles vaccination (9 months)**
12–59 months	**200,000 IU every 6 months at any health or immunization contact**

Zinc

Zinc losses occur with diarrhea, a common symptom of HIV disease. However, supplementation with zinc above the RDA level is not recommended because of the observed adverse effects of zinc on the immune system. Zinc supplementation of children with chronic diarrhea should follow IMCI or national guidelines. There is currently no recommendation for zinc supplementation in HIV-infected children different from the recommended levels for healthy non-infected children

Iron

HIV-infected children should be given iron supplements to prevent anemia, according to national protocols. WHO recommendations for iron supplementation in children to prevent anemia are shown in table 5.

Table 5. WHO recommendations for iron supplementation in children

Age (years)	Dosage
2–5*	20–30 mg/day
6–11	30–60 mg/day

*** Based on 2 mg iron/mg body weight/day**

Iodine

There is no recommendation to increase iodine intake for HIV-infected children above the RDA. However, it is important that all households use iodized salt to help prevent iodine deficiency.

Although HIV-infected children are often deficient in vitamin A and zinc, there are currently no recommendations to increase the dose or frequency of these micronutrients for these children. Where diet is inadequate to meet the RDA for micronutrients, children should receive a daily multivitamin supplement. The multivitamin supplement should not exceed the RDA levels for each nutrient. Supplementation with vitamin A, iron, and zinc should follow national guidelines or WHO recommendations for micronutrient supplementation for children of the same sex and age.

Components of nutrition care and support for young HIV-infected children (slide 17)

Nutrition care of children addresses issues of growth and development as well as tissue maintenance and repair and nutrient metabolism. The following key contact points are opportunities to support proper nutrition care and support for HIV-positive children:

- Well child and sick child visits (children over 2 years old do not routinely attend well child clinics)
- National Health Days
- Day care centers
- Community and nursery schools
- Primary schools

At each of these contact points, health service providers can provide nutrition advice, counseling, care, and support, and help to caregivers to help prevent undernutrition and promote optimal growth and development, especially for HIV-infected children.

Exercise 1. Group work

Ask the participants to identify the age group that would be served at each of the contact points listed above.

Divide the class into small groups. Ask each group to discuss the questions below:

- What contact points in your area would see HIV-infected children 2–9 years old?
- How can nutrition care and support of HIV-infected children be incorporated into services at these contact points?
- What components of nutrition care and support should be integrated into the job description of health service providers who come into contact with sick children 2–9 years old?

Ask each group to present its results in plenary.

The following components should be included in programs that provide nutrition care and support for HIV-infected children:

1. Nutrition screening and assessment
2. Management and treatment of common diet-related HIV symptoms
3. Improved diet to meet needs for growth and development
4. Promotion of good hygiene and food and water safety
5. Treatment of severe malnutrition
6. Provision of ARVs

1. **Nutrition screening and assessment** (slide 18)

Nutrition assessment provides valuable information about child growth and development. Nutrition assessment should be done at both well child and sick child visits to help identify risk factors that might restrict food intake and hinder proper child growth and development. A baseline nutrition screening should be done when a child is first seen or during a follow-up visit.

Children infected with HIV can be identified mainly by weight loss, failure to thrive, and medical history. Health service providers should do in-depth nutrition assessment for children identified as being at risk. The information collected includes the following:

- Anthropometrics (weight, height, and mid-upper arm circumference, or MUAC)
- Biochemical data
- Social history
- Clinical diagnosis and medical history
- Diet evaluation

Anthropometric measurements are important to monitor the health and nutritional status of children. Growth faltering is usually the first indication that there is something wrong nutritionally, medically, socially, or developmentally. In resource-limited settings where childhood undernutrition and HIV rates are high, growth monitoring and promotion are key child survival strategies. Children therefore should have their growth monitored at each visit regardless of their health and nutritional status. **Handout 11.5. Assessing Child Growth** provides guidance on child growth monitoring.

Growth is a sensitive indicator of HIV disease progression in children. Poor growth tends to precede a decline in CD4 count and development of OIs. Growth monitoring should be done every 3 months (monthly if the child's nutrition is altered). At each visit, health service providers should keep a record of the child's weight and height on a growth monitoring card so that any faltering can be caught quickly and early intervention or treatment provided. All health service providers working with children should be trained properly on the importance of taking accurate weight and height measurements in children, the techniques for doing so, and the interpretation of the results.

Health service providers should review the social history of the child because the following factors can affect nutritional status, development, and growth:

- Physical environment
- Caregiver's health and social history

- Role of food and rituals surrounding food preparation and consumption in the family and community
- School and social environment
- Psychosocial, mental health, and other social aspects related to care of orphans and vulnerable children (OVC), as these are major contributors to undernutrition in this group

Health service providers should make a clinical diagnosis and take a medical history of the following:

- Gastrointestinal problems (e.g., diarrhea, abdominal pain, nausea, vomiting)
- Pattern of bowel movements
- Presence of OIs
- Concurrent medical problems (e.g., diabetes, malaria, tuberculosis, ear infections, pneumonia)
- Medications the child is taking (ARVs, alternative therapies, other medications)
- Completion of primary health care actions such as immunizations, deworming, vitamin A supplementation, and Cotrimoxazole prophylaxis

Early nutrition intervention can help HIV-infected children preserve lean body mass and slow the progression of HIV disease to AIDS. It is important not to wait until the child shows signs of undernutrition to support nutrition in HIV-infected children.

Evaluating the child's dietary intake can show the adequacy or inadequacy of food intake and nutrition-related problems such as poor appetite, chewing and swallowing difficulties, and food intolerances and aversions. Health service providers should pay particular attention to age-related and developmental feeding capabilities, family cultural food preferences, and the caregiver-child feeding relationship. Conditions that affect appetite and food intake should be discussed with the caregiver and treated appropriately.

24-hour recall may be used to make a quick assessment of a child's dietary intake. This involves asking the mother what she gave her child to eat in the past 24 hours and what and how much the child actual ate. This method has the advantage of not requiring literacy or writing skills. However, 24-hour recall tends to underestimate the intake of most children and overestimate intake in undernourished children and does not give a good indication of day-to-day variability in diet.

When assessing children's diet and feeding problems, health service providers should collect information on the factors listed below (adapted from the American Dietetic Association and Dieticians of Canada 2000) to use to counsel parents or caregivers on how to prevent undernutrition and weight loss.

- Weight loss or gain (evaluate growth chart- no weight gain for 2–3 consecutive months)
- Appetite
- Environment in which the child is fed
- Caregiver involved in feeding the child
- Caregiver's access to food and preparation method
- Caregiver's health and social history

- Caregiver's ability to meet the child's calorie and nutrient needs financially (food security)
- Multivitamin or mineral supplements taken by the child
- Medications (e.g., Cotrimoxazole, ARVs) taken by the child
- Other co-morbidities, e.g., diabetes
- Frequency, type, amount, and variety of food and liquids taken by the child
- Food safety and hygiene (e.g., availability of clean drinking water)
- Food allergies and intolerances
- Chewing and swallowing difficulties
- Support and community resources available
- Alternative and traditional therapies used for the child
- Developmental and learning milestones according to the age of the child

Physical examination and observation are integral components of nutrition assessment of the child. A physical assessment can help identify protein or energy deficiencies, non-specific signs of nutrient deficiencies, growth anomalies, or signs of physical abuse. The following are common signs of problems in children:

- Poor muscle tone, development
- Nail, hair, or skin changes
- Pallor
- Easy bruising
- Edema
- Dehydration
- Red or bleeding gums
- Pale or dry mucous membranes

Health service providers should screen visually for severe wasting (**marasmus**). A child who looks very thin, has little fat or muscle, and looks like skin and bones is likely to be wasted. Wasting is also indicated by lack of muscle on the shoulder girdle, arms, buttocks, and legs and visibility of the outline of the child's rib cage. Marasmus requires urgent medical attention.

Edema or swelling of both feet resulting from retention of fluid in the child's tissues is known as **kwashiorkor**. Health service providers should press gently with their thumbs for a few seconds on the upper top of each foot to determine whether the swelling is a result of fluids. If a dent remains when the thumb is removed, the child has edema. Other signs of kwashiorkor include thin, sparse, and pale hair that falls out easily, dry scaly skin, especially on the arms and legs, and a puffy or moon face. See WHO, UNICEF, and BASICS 1999 for more information.

Handout 11.6. lists physical characteristics of normal and malnourished children with possible nutrient deficiency.

Exercise 2. Role-play

Ask three students volunteer to role-play a nurse, a caregiver, and a 5-year-old girl. Explain that the caregiver has brought her daughter for a sick child visit. The child has not been feeling well for the past week. She is lethargic, has a fever, and has been eating very poorly. She has also had diarrhea for the past 3 days. Give the volunteers 15 minutes for the role-play.

Ask the rest of the students to observe the role-play and fill in **Handout 11.2. Checklist for Nutrition Assessment**.

After 15 minutes, ask the class to discuss the following questions.

- Did the nurse address the important issues?
- Did the nurse provide appropriate interventions?
- What other information does the nurse need? Did she ask appropriate questions to get this information?
- What did the nurse do right?
- What did the nurse do that she shouldn't have done?
- What could the nurse have done better?
- What issues, if any, where not discussed?
- What would the nurse want to follow up on the next visit?

2. **Management of common diet related HIV symptoms** (slide 19)

HIV disease causes many symptoms, some of which can be managed using diet to minimize their impact on child nutritional status.

Handout 11.4. Job Aids for Nutrition Counseling and Education and **Handout 11.7. Job Aid for Counseling on Management of Common HIV Symptoms that Affect Children's Dietary Intake** can help health service providers manage common dietary problems and symptoms of HIV-infected children. **Handout 11.8. Job Aid for Counseling on Managing Inadequate Dietary Intake in HIV-Infected Children** can help health service providers counsel clients on inadequate nutrient intake resulting from poor appetite, early satiety, abdominal pain, nausea, and thrush/mouth sores. Other job aids that can help health service providers counsel caregivers to manage common symptoms in children with HIV are **Handout 11.10. Job Aid for Counseling on Management of Opportunistic Infections or Fever in HIV-Infected Children**, **Handout 11.11. Job Aid for Counseling on Management of Gastrointestinal Problems in HIV-Infected Children**, **Handout 11.12. Job Aid for Counseling on Management of Altered Taste in HIV-Infected Children**, and **Handout 11.13. Job Aid for Counseling on Socioeconomic Factors That May Affect Nutrition in HIV-Infected Children**.

3. **Improved diet to meet needs for growth and development** (slide 20 and 21)

Many HIV-positive children fail to thrive or lose weight. Their diets must be individualized to provide adequate calories and nutrients based on their age, weight, and symptoms.

Health service providers should review HIV-infected children's diet at every well and sick child visit and counsel caregivers to 1) improve the diet taking into consideration the child's age, local resources, and the family circumstances, feed locally available nutrient-dense foods from all the food groups, and feed an extra meal after illness to help the child catch up growth, as per IMCI guidelines, 2) manage diet-related symptoms with appropriate nutrition interventions, and 3) address feeding difficulties such as food aversion and food refusal in order to maximize food intake. **Handout 11.9. Job Aid for Counseling on Management of Feeding Difficulties in HIV-Infected Children** can help health service providers counsel caregivers on managing these problems. HIV-infected children should receive multivitamin supplementation, including prophylactic vitamin A supplementation, where available, according to national recommendations. Other nutrition or nutrition-related interventions include presumptive deworming every 6 months, using insecticide-treated bed nets to prevent malaria, and using iodized salt in food preparation.

Inadequate energy and micronutrient intake affect growth and development. The diet of the HIV-infected child can be improved by increasing energy intake and providing micronutrient supplementation or fortification to help meet the increased energy demands of HIV infection and the needs for growth and development. The actions listed below can help caregivers increase the caloric intake of HIV-infected children who may be ill frequently and suffer from fever, mouth sores, and decreased appetite.

- Increase the frequency of meals (6–8 small meals throughout the day).
- Feed small amounts of nutrient-dense foods every 2 hours to maximize intake if appetite is very poor.
- Feed high-energy and nutrient-dense foods (e.g., fortified, germinated, or fermented foods).
- If available and the child does not have diarrhea or malabsorption, add high-calorie, high-protein foods such as margarine, butter, vegetable oil, dry milk powder, cooked eggs, cheese, or peanut butter to foods for the child.
- Feed a variety of locally available fruits, vegetables, legumes, animal products, cereals, and fortified foods.
- Give the child nutritious and energy-dense snacks between meals.
- Give the child soft foods that require less chewing or are easy to eat.
- Feed the child patiently and persistently with supervision and love.

4. **Promotion of good hygiene and food and water safety** (slide 22)

Good hygiene and food and water safety can avoid pathogenic contamination (e.g., diarrhea, dysentery, cholera, or typhoid) that can further weaken the immune system and speed up HIV disease progression. Caregivers should follow the same safe and hygienic practices for food handling and preparation for children as for adults. They also should teach children how to wash their hands before they handle food and after they use the toilet and how to say politely, "No, thank you" when they are offered "unsafe" food or water. Session 8 includes a list of these practices.

5. **Prompt treatment of secondary infections** (slide 23)

Secondary infections such as tuberculosis, oral thrush, fever, persistent diarrhea, and pneumonia in HIV-infected children should be promptly treated. Maintaining the child's

food intake can help minimize the nutrition impact of these infections. Some medications to treat OIs and other diseases may have side effects that affect intake. Side effects that are diet related, such as nausea and vomiting, taste changes, and loss of appetite, may be managed through diet. Session 4 discusses the management of HIV-related complications. The child should be give presumptive treatment such as Cotrimoxazole for infections.

6. **Treatment of severe malnutrition** (slides 24 and 25)

Many HIV-infected children are at risk of malnutrition. Severely malnourished children should be referred to an appropriate nutrition rehabilitation center (therapeutic feeding center, community therapeutic care program, or hospital-based unit). Health service providers should follow the 1999 WHO *Management of Severe Malnutrition: A Manual for Physicians and Other Senior Health Workers* if there are no applicable national guidelines. WHO guidelines do not specifically address HIV-positive malnourished children, but offer the following general principles for managing severe acute malnutrition:

- Categorize the extent of malnutrition by both anthropometric and clinical and biomedical methods and determine current intake patterns to assess adequacy and determine optimal intervention.

- Treat any infections, especially those that affect food intake and absorption.

  - Prevent and control hypoglycemia (low blood sugar).
  - Use oral rehydration therapy to replace lost fluids.
  - Regulate body temperature to prevent hypothermia.
  - Use antibiotics as necessary to treat infections.

- Provide adequate nutrition therapy.

  - Provide F-75 therapeutic milk during initial stabilization while life-threatening illnesses are treated and until appetite returns. For severely anorexic children, consider nasogastric feeding, which is reserved as a last resort as it may increase risk of infection.
  - Provide F-100 therapeutic milk or ready-to-use therapeutic food (RUTF) during the rehabilitation phase to gain weight. Supplement with nutrient and energy-dense local foods.
  - Encourage active feeding by caregivers.
  - Provide deworming and vitamin A supplementation according to national protocols (e.g., 200,000 IU on admission, a second dose the next day, and a follow-up dose 14 days later).

- Provide nutrition counseling to caregivers.
- Follow up the child after discharge to monitor weight, adequacy of the diet, and infections.

Community-based management of acute malnutrition (slide 26)

Community-based management of acute malnutrition (CMAM) has been shown to maximize the coverage and timeliness of the treatment of severe acute malnutrition (SAM) by allowing children to be treated in their homes instead of hospitals or therapeutic feeding centers. CMAM focuses on children under 5, traditionally the age group most vulnerable to SAM.

WHO classifies malnutrition has two categories: SAM and moderate acute malnutrition (MAM), defined by anthropometric measurements and the presence of bilateral pitting edema. Traditionally these categories have been used to determine eligibility for 1) inpatient therapeutic feeding for children with SAM and 2) outpatient supplementary feeding for children with MAM. CMAM involves a third mode of treatment: Outpatient therapeutic feeding for children with SAM and no additional medical complications.

Table 6 shows the CMAM classification of malnutrition, which is used to determine the mode of treatment.

Table 6. CMAM classification of acute malnutrition

Type of malnutrition	SAM with complications	SAM without complications	MAM
Characteristics	< 80% of median weight for height OR Bilateral pitting edema +++ OR MUAC < 125 mm AND One of the following: Anorexia, lower respiratory tract infection, high fever, severe dehydration, severe anemia, lack of alertness, hypoglycemia, hypothermia	< 70% of median weight for height OR Bilateral pitting edema + or ++ OR MUAC < 110 mm AND Appetite, clinical wellness, alertness	70–80% of median weight for height AND No edema OR MUAC 110–125 mm AND Appetite, clinical wellness, alertness
Treatment	Inpatient stabilization and care using IMCI/WHO protocols	Outpatient therapeutic care	Outpatient supplementary feeding

7. **Provision of antiretroviral therapy** (slides 27 and 28)

Antiretroviral therapy (ART) helps prolong HIV-infected children's survival and enhance their quality of life by reducing viral load and hence delaying disease progression. ART can also help improve growth parameters including weight, weight for height, and muscle mass. Some common side effects of ARVs—nausea, vomiting, diarrhea,

constipation, anorexia, and taste changes—are similar to the common symptoms of HIV infection that affect dietary intake. Management of these side effects is crucial to ensure drug efficacy and tolerance and continued food intake to maintain food nutritional status.

Some ARVs are best taken on an empty stomach, others should be taken with food, and others can be taken with or without food. Treatment of HIV-infected children should follow national recommendations where available. The first line of ARVs recommended for children > 3 years old and/or weighing > 10 kg are Zidovudine/ Lamuvidine/Efavirenz (African Network for the Care of Children Affected by AIDS 2005). Health service providers should be familiar with the ARVs available in the country for children, possible side effects that might affect dietary intake, whether or not they should be taken on an empty stomach or with food, and associated drug-food interactions. Counseling and education on timing of medications, meals, and snacks and on food composition are important components of ART. Other medical management may include Cotrimoxazole prophylaxis and Immunization according to local policies.

Field visit

If possible, arrange for the class to observe a National Health Day or similar event and discuss afterward whether this is a good contact point for nutrition interventions for HIV-infected children in the area. If not, ask how the nutrition care and support interventions can be incorporated into other contact points for children 2–9 years old.

Nutrition actions for care of the HIV-infected child (slide 29)

Health service providers should practice the following actions to provide care and support for HIV-infected children:

- Review the child's diet for appropriate food and nutrient intake.
- Counsel the caregiver on correct amount and variety of foods.
- Counsel the caregiver on appropriate feeding practices.
- Promote good hygiene and food preparation.
- Routinely monitor growth.
- Promote essential child services (immunization and supplementation).
- Help identify OIs.
- Identify community support services for nutrition.
- Refer the caregiver to programs offering ARVs.

Issues and challenges for nutrition care and support of HIV-infected children (slide 30)

Metabolic complications are associated with the long-term use of ARVs in children. Such complications include glucose metabolism and bone metabolism. Much is still unknown about the long-term impact of ARV treatment in children, especially malnourished children, and about the effect of HIV infection on children's micronutrient, protein, and fat requirements. Another challenge is the fact that many settings lack the human resource capacity to provide the care and support needed to ensure survival of the HIV-infected child.

Conclusions (slide 31)

Children with HIV are vulnerable to undernutrition and growth failure. HIV causes excess nutrient losses and malabsorption, further increasing nutritional requirements and the risk of undernutrition. Micronutrient deficiencies, frequent infections, mouth and throat sores, and decreased appetite all affect nutritional status. Because of the many complications experienced by the HIV-infected child, nutrition care and support should be an integral component of treatment.

Early nutrition intervention can help delay HIV disease progression or death in the HIV-positive child. Components of nutrition care and support for young HIV-infected children include nutrition screening and assessment, management and treatment of common diet-related HIV symptoms, improved diet to meet needs for growth and development, promotion of good hygiene and food and water safety, treatment of severe malnutrition, and provision of ARVs.

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Handout 11.1. Nutrition Actions for the Care and Support of HIV-Infected Children

- Review children's nutritional status (including weight and height) at every clinic visit to ensure appropriate and adequate food intake.

- Counsel caregivers to increase the amount and variety of foods given to children, especially after illness, emphasizing locally available energy-dense, high protein, fortified foods and fruits and vegetables.

- Counsel caregivers to give children family foods rich in energy (cereals, cooking bananas, roots, tubers), protein (pulses, nuts, foods of animal origin), and vitamins and minerals (fruits, vegetables, fats, and oils) at least three times a day and nutritious snacks between meals at least twice a day.

- Counsel caregivers to feed smaller, more frequent meals six–eight times a day if children have poor appetite or are not feeling well. Nutrient dense foods every 2–3 hours can help maximize nutrient intake for children with poor appetite.

- Counsel caregivers on cultural feeding habits, traditional therapies, and other practices that may be harmful to young children or reduce food intake.

- Promote good hygiene and food and water safety to prevent infections.

- Promote the use of safe, clean, and boiled water for drinking and food preparation.

- Promote the use of iodized salt for cooking and insecticide-treated bednets for sleeping.

- Regularly and accurately monitor child weight and height to identify growth faltering and undernutrition and appropriate interventions.

- Provide or refer caregivers to routine essential infant and child services (immunization, vitamin A supplementation, and deworming) according to national guidelines.

- Counsel caregivers to identify opportunistic infections (OIs) such as oral thrush, fever, and gastrointestinal problems or other infections such as malaria, acute respiratory infections, and diarrhea in children and seek early treatment from health service providers.

- Provide oral rehydration salts to prevent dehydration from diarrhea, a common symptom in HIV-infected children.

- Counsel caregivers to identify support services and programs in their communities that may improve nutrition, quality of living, and well being for HIV-infected children.

- Refer caregivers to programs that treat OIs and provide antiretroviral drugs for young children.

- Refer caregivers to presumptive treatment such as Cotrimoxazole to help prevent infections in children.

- Refer caregivers to food assistance or food supplementation if food security is an issue

Handout 11.2. Checklist for Nutrition Assessment

Did you …	YES	NO
Accurately weigh and measure the child and plot the weight and height on the growth chart?		
Evaluate and review any growth faltering shown on the growth chart with the caregiver?		
Provide an appropriate intervention to manage the growth faltering?		
Assess the child's typical intake and review the child's diet with the caregiver?		
Review the caregiver's ability to financially meet the child's energy and nutrient needs (food security issues)?		
Recommend ways to increase energy and nutrient intake in the child's diet using locally available foods?		
Investigate and provide appropriate nutrition interventions for poor intake or excessive losses through diarrhea or vomiting?		
Review the medications and/or ARVs the child is taking and provide appropriate interventions for any side effects noted?		
Recommend a daily multivitamin supplement, if available?		
Assess any physical signs of malnutrition and provide an appropriate intervention if present?		
Check whether the child has received routine essential infant and child services (immunization, deworming, and vitamin A supplementation) according to national guidelines and advise the caregiver accordingly?		
Discuss hygiene and food and water safety issues if necessary?		
Ask whether the caregiver has any questions or concerns about the child's nutrition or health?		
Schedule a follow-up appointment with the caregiver?		

Handout 11.3 Monitoring the HIV-Positive Child

1. Do a baseline nutrition assessment as soon a child is diagnosed with HIV to identify needed actions to prevent malnutrition and growth failure.

2. Follow up the nutrition assessment every 6 months or more frequently if the child has clinical symptoms or growth failure. A complete nutrition assessment includes weight, height, body composition (skin fold and mid-upper arm circumference, or MUAC).

3. Evaluate the child's weight and height growth velocities using the growth charts. Any growth faltering indicates the need to evaluate for nutritional intervention.

4. Where testing is available, monitor the biochemical markers albumin and hemoglobin.

5. Assess the child's typical dietary intake using 24-hour recall. Investigate and take appropriate action if there is any indication of poor intake or excessive losses through diarrhea or vomiting.

6. Schedule a follow-up appointment with the caregiver.

Handout 11.4. Job Aid for Nutrition Counseling and Education

This algorithm assumes that the child's weight has been taken, recorded, and evaluated.

Excessive losses through diarrhea
Counsel caregiver to:

- Use oral rehydration salts to avoid dehydration
- Ensure that the child drinks plenty of fluids, offering diluted fruit juices or clean boiled water every 1–2 hours.
- Reduce or avoid the use of cooking oil and fat in food.
- Give the child smaller but more frequent meals every 2 hours or so.
- Feed the child soft, moist foods such as plain rice, ripe bananas, plain bread, boiled potatoes, and boiled meat.
- If milk makes the diarrhea worse, avoid giving it to the child until he/she is better.
- Give multivitamin supplements if available.

Poor appetite
Counsel caregiver to:

- Give the child favorite foods in small amounts every 2–3 hours.
- Make every bite count by giving the child energy-dense foods and increasing the protein in the foods by adding peanut butter, egg, or fish powder to vegetable soup or porridge.
- Provide a multivitamin supplement where available.

Difficulty chewing and swallowing because of thrush/mouth sores
Counsel caregiver to:

- Give the child pureed or soft, moist, non-spicy foods at room temperature.
- Avoid acidic foods and sugar.
- Give the child a straw for drinking.
- If possible, rinse the child's mouth with warm water at least three times a day, preferably after eating.

Excessive losses through vomiting
Counsel caregiver to:

- Give the child plenty of fluids to replace fluids lost and prevent dehydration.
- Offer small meals every 2 hours and fluids every 1–2 hours.
- Try feeding the child plain foods such as dry bread, plain toast, and chapatti.
- Give oral rehydration salts if vomiting is severe to avoid dehydration.
- Avoid feeding the child foods with strong or unpleasant odors or greasy or fried foods.
- Feed cool foods and foods that are soft and moist

Handout 11.5. Assessing Child Growth

Is the child's growth optimal?

- Weigh the child and measure his/her height.
- Plot the weight and height on the growth chart.
- Assess whether the child is growing optimally by comparing his/her weight and height to the reference charts.

If yes

- Praise the caregiver and encourage continuing to provide a balanced diet to the child to maintain weight and lean body mass.
- Stress good hygiene and food and water safety.
- Encourage the caregiver to seek immediate medical care if the child is ill.
- Ensure child has had all the appropriate immunizations.
- Encourage the use of iodized salt in food preparation.
- Provide presumptive deworming every 6 months as required.
- Promote the use of insecticide-treated bednets to prevent malaria.

If no

- Review the diet to make sure it is adequate. If not,
- Counsel the caregiver on appropriate feeding for the child's age.
- Discuss with the caregiver ways to increase the child's energy and nutrient intake.
- Address diet-related symptoms of HIV that affect food intake.
- If the child's growth faltering is not related to nutrition, refer the child for appropriate management, encourage the caregiver to seek treatment of the child's opportunistic infections, and make sure the child has had all the appropriate immunizations for his/her age.
- Encourage the caregiver to have the child weighed regularly.

Handout 11.6. Physical Characteristics of Normal Nutrition and Malnutrition with Possible Nutrient Deficiency

Normal appearance	Malnutrition	Possible Nutrient Deficiency
Hair		
Shiny Difficult to pluck Normal distribution	Dry, dull Alopecia (baldness) Brittle Early graying	Protein, energy, or essential fatty acid deficiency Protein, zinc or biotin Protein, energy or copper Vitamin B_{12}
Face		
Uniform Not swollen	Full Puffy Cheeks drawn in	Protein Protein, energy Protein, energy
Eyes		
Bright, clear, shiny Membranes moist, pink No broken vessels	Corneal or conjunctival dryness Conjunctival pallor Corneal vascularization Bilateral redness and fissuring of eyelid corners	Vitamin A Iron, folic acid Riboflavin, vitamin B-complex Riboflavin, vitamin B-complex, vitamin B_{12}
Lips		
Pink, moist, smooth	Angular stomatitis Cheilosis (chapping, fissuring)	Niacin, riboflavin, iron, vitamin B_6 Niacin, riboflavin, vitamin B_6
Tongue		
Taste buds over dorsum and sides of tongue Pink, moist, smooth	Magenta, painful, edema Scarlet, painful, smooth Pallor Papillary atrophy Papillary hypertrophy Fissuring, edema Taste changes Glossitis	Riboflavin, biotin Niacin, folic acid, vitamin B6 Biotin, iron vitamin B12 Iron, folic acid, vitamin B12, niacin, riboflavin Niacin, riboflavin, vitamin B12 Niacin Zinc, vitamin A Iron, vitamin B12, folic acid, riboflavin, pyridoxine, vitamin B6

Normal appearance	Malnutrition	Possible Nutrient Deficiency
Gums and Teeth		
Pink, moist, smooth 32 teeth, white, shiny	Bleeding, receding Gingivitis, stomatitis Fluorosis Carious	Vitamin C Folic acid, vitamin B_{12} Fluoride excess Protein, energy, fluoride
Skin		
Smooth No rashes, swelling or scales	Xerosis (dryness) Scaly dermatitis Follicular hyperkeratosis Delayed wound healing Xanthoma (yellowish papules) Decubitus ulcers Dematitis herpertiformis	Vitamin A. essential fatty acids, zinc Riboflavin, biotin, zinc, essential fatty acids Vitamin A, essential fatty acids Zinc, protein, vitamin C Elevated cholesterol Zinc, protein, vitamin C Gluten enteropathy
Nails		
Firm, Pink	Koilonychia (spoon nails) Egg shell nails Blue lunula	Iron, chromium Vitamin A Copper excess
Abdomen		
Symmetrical, flat	Distension Flatus	Protein, energy Lactose intolerance, low fiber
Musculoskeletal		
Good tone with some fat Normal movement	Wasting Tenderness Reduced strength Bone pain Dowagers's hump Bowed legs, pigeon chest	Protein, energy, thiamin Thiamin, Selenium Protein, energy, calcium, sodium, vitamin D, potassium Vitamin D, calcium phosphate Calcium, vitamin D Vitamin D, calcium

Normal appearance	Malnutrition	Possible Nutrient Deficiency
Neurological		
Psychological stability Normal reflexes	Depression Confusion Dementia Sensory neuropathy Tetany	Pyridoxine, zinc, niacin, vitamin B_{12} Thiamin, niacin, vitamin B_{12} Niacin, vitamin B_{12} Vitamin B_{12}, vitamin B-complex, vitamin E Calcium, magnesium

Source: American Dietetic Association and Dieticians of Canada 2000.

Handout 11.7. Strategies for Managing Common HIV Symptoms That Affect Children's Dietary Intake

Symptom	Nutrition intervention
Sores in mouth and throat	Give the child pureed or soft, moist, non-spicy foods at room temperature. Avoid giving the child acidic foods and sugar. Give the child a straw for drinking. If possible, rinse the child's mouth with warm water at least three times a day, preferably after eating.
Fever	Encourage the child to drink plenty of fluids (water, juice, soup, tea). Offer sips of fluid almost every hour. Mix oral rehydration solution (ORS) to give the child to drink. Continue to encourage food intake, give energy- and nutrient-dense foods in small amounts and more often. Offer soft foods as tolerated. Give the child multivitamin supplements, if available.
Diarrhea	Give the child ORS to avoid dehydration. Make sure the child drinks plenty of diluted fruit juices or clean boiled water every 1–2 hours. Reduce or avoid the use of cooking oil and fat in food. Give the child smaller but more frequent meals every 2 hours or so. Feed the child soft foods such as plain rice, ripe bananas, plain bread, boiled potatoes, and boiled meat. If milk makes diarrhea worse, do not give it until the child is better. Give the child multivitamin supplements, if available.
Decreased appetite (anorexia)	Give the child favorite foods in small amounts and more frequently, every 2–3 hours. Make every bite count by feeding the child energy-dense foods and increasing the protein content of the food by adding peanut butter, egg, or fish powder to vegetable soup or porridge. Give the child multivitamin supplements, if available.
Nausea and vomiting	Give the child plenty of fluids to drink to replace fluids lost and prevent dehydration. Offer small meals every 2 hours and fluids every 1–2 hours. Feed the child plain foods such as dry bread and chapatti. Give oral rehydration salts if vomiting is severe to avoid dehydration. Avoid feeding the child foods with strong or unpleasant odors and greasy or fried foods. Feed cool foods and foods that are soft and moist.

Symptom	Nutrition intervention
Lactose intolerance	Limit or avoid feeding the child milk and milk products and reintroduce them slowly once symptoms subside.
Taste changes	Give the child favorite foods in small quantities. Use a variety of flavor enhancers to increase taste acuity and mask unpleasant taste sensations. Try different textures of food. Encourage the child to chew food well.

Handout 11.8. Job Aid for Counseling on Management of Inadequate Intake in HIV-Infected Children

Children with HIV may not eat enough food to maintain their nutritional status because of poor appetite, early satiety, abdominal pain, nausea, thrush/mouth sores, or side effects of medication.

1. Try to determine the cause of the inadequate intake.

    - If the caregiver is providing replacement feeding, find out whether the formula is prepared correctly and advise accordingly.

2. Assess the child's growth if possible.

    - Weigh the child and plot the weight on a growth chart.
    - If the chart shows early growth faltering, determine whether the child needs medical attention or increased energy intake and advise the caregiver accordingly.

3. Ask about the child's current eating habits.

    - Use a list of locally available food to determine what the child is eating.
    - Counsel the caregiver on what foods to prepare to increase energy intake, especially if the child is losing weight.
    - Ensure that the caregiver uses iodized salt to prepare the child's food.

4. Encourage the caregiver to feed the child small but nutritious meals more frequently.

    - Advise the caregiver to give the child something to eat every 2–4 hours.
    - Advise the caregiver to give the child energy-dense foods and snacks and increase the amount.
    - Advise the caregiver to give the child a variety of foods from all the food groups.
    - Advise the caregiver to give the child fluids such as clean boiled water between meals.
    - Advise the caregiver to give the child favorite foods whenever he/she wants.
    - If the child has thrush/mouth sores, advise the caregiver to feed the child room-temperature foods, avoid citrus fruits, sugar, and dry, sticky, or hard foods and clean the child's mouth after each meal with cotton wool and lightly salted, clean, boiled warm water and to give an older child a straw for drinking.

5. Encourage the caregiver to feed the child patiently and persistently, with supervision and love.

6. Counsel the caregiver to take the child for medical treatment if the condition persists for a long time to help prevent growth failure and undernutrition.

7. Encourage the caregiver to continue giving the child medication as prescribed but to seek medical attention if the side effects of the medication are the cause of the food aversion or refusal.

8. Refer the caregiver to routine essential infant and child services such as immunization, vitamin A supplementation, iron supplementation, and deworming according to national guidelines.

Handout 11.9. Job Aid for Counseling on Management of Feeding Difficulties in HIV-Infected Children

Children with HIV may have aversions to or refuse certain foods.

1. Assess the child's growth if possible.

   - Weigh the child and plot the weight on a growth chart.
   - If the chart shows early growth faltering, determine whether the child needs medical attention or increased energy intake and advise the caregiver accordingly.

2. Ask about the child's current eating habits.

3. Counsel the caregiver to mitigate the nutritional effects of the child's food aversion.

   - Advise the caregiver to increase the energy of the foods the child is eating by adding margarine, butter, vegetable oil, milk powder, groundnut paste, or cooked egg to prevent weight loss.
   - Advise the caregiver to avoid giving the child excessive amounts of fruit juices or sodas because they fill up the child, replace more energy- and nutrient-dense foods, and have no nutritional value.

4. Counsel the caregiver on how to manage food aversion or refusal.

   - Encourage the caregiver to offer the child small, frequent meals of favorite foods.
   - Advise the caregiver to concentrate on feeding the child nutrient- and energy-dense foods.
   - Advise the caregiver to give the child a variety of foods.
   - Encourage the caregiver to feed the child patiently and persistently, with supervision and love.

5. Counsel the caregiver to take the child for medical treatment if the condition persists for a long time to help prevent growth failure and undernutrition.

6. Encourage the caregiver to continue giving the child medication as prescribed but to seek medical attention if the side effects of the medication are the cause of the food aversion or refusal.

7. Refer the caregiver to routine essential infant and child services such as immunization, vitamin A supplementation, iron supplementation, and deworming according to national guidelines.

Handout 11.10. Job Aid for Counseling on Management of Opportunistic Infections or Fever in HIV-Infected Children

1. Ask the caregiver how long the child has had the infection.

   - If the condition has persisted despite all efforts by the caregiver and is accompanied by fever, refer the caregiver for immediate medical treatment.

2. Ask how long the child has had the fever and advise the caretaker to seek medical attention.

   - The fever has lasted for several days and is not relieved with medication.
   - The child has lost consciousness.
   - The child has yellow eyes.
   - The child has convulsions or seizures.
   - The child has severe diarrhea.

3. Ensure the child is not dehydrated if he/she has a fever.

   - Signs and symptoms of dehydration include: lethargy, low or no urine output, dry oral membranes, rapid breathing, and decreased skin elasticity (turgor).
   - If the child shows any of these signs, refer him/her for immediate medical treatment.

4. Ask the caregiver whether the child has been given fluids and what kind.

   - Ensure the child is given plenty of fluids to avoid dehydration.

5. Assess the child's growth if possible.

   - Weigh the child and plot the weight on a growth chart.
   - If the chart shows early growth faltering, determine whether the child needs medical attention or increased energy intake and advise the caregiver accordingly.

6. Counsel the caregiver to continue feeding the child.

   - Counsel to provide small but more frequent meals.
   - Counsel to feed the child high-energy and high-protein foods.
   - Counsel to add calories with sugar and/or milk, for example, in porridge.
   - Counsel to give the child extra food, especially if he/she lost weight with the fever.

7. Refer the caregiver to routine essential infant and child services such as immunization, vitamin A supplementation, iron supplementation, and deworming according to national guidelines.

Handout 11.11. Job Aid for Counseling on Management of Gastrointestinal Problems in HIV-Infected Children

Diarrhea

1. Ask the caregiver whether the child is taking any medications such as antiretroviral drugs (ARVs).

   - If the diarrhea is related to medication, encourage the caregiver to continue giving the child the medication but to seek medical care immediately if the diarrhea gets worse or lasts more than 2 days.
   - If the diarrhea is related to an alternative or traditional therapy, discuss with the caregiver the possibility that the therapy may harm the child's health (and the diarrhea will deplete the nutrients in the child) and ask the caregiver to stop giving it to the child.

2. Ask the caregiver how long the child has had diarrhea.

   - If the diarrhea is severe and has lasted for more than 2 days or is bloody, refer the child for immediate medical treatment.

3. Stress with the caregiver that diarrhea in very young children can be life threatening because of the risk of dehydration.

   - Advise the caregiver to give the child oral rehydration solution (ORS) after each bout of diarrhea. Provide information on where to get ORS or show the caregiver how to prepare it by mixing one pinch of salt and one tablespoon of sugar in one cup of clean boiled water.
   - Advise the caregiver to keep giving the child other fluids as well.
   - If the child is dehydrated (shows symptoms such as lethargy, low or no urine output, dry oral membranes, rapid breathing, or decreased skin elasticity), advise the caregiver to seek treatment immediately.

4. Counsel the caregiver to give the child food that can slow down the diarrhea.

   - Advise the caregiver to feed the child soft, moist foods such as bananas, soft boiled white rice, potatoes, and lentils.
   - Advise the caregiver to avoid giving the child large quantities of juice or milk and milk products until the symptoms improve.
   - Advise the caregiver to feed the child small amounts of food more often.

5. Assess the child's growth if possible.

   - Weigh the child and plot the weight on a growth chart.
   - If the chart shows early growth faltering, determine whether the child needs medical attention or increased energy intake and advise the caregiver accordingly.

6. Advise the caregiver to resume the child's regular diet once the diarrhea stops.

7. Advise the caregiver to give the child a little extra food after the diarrhea stops, especially if the child lost weight with the diarrhea.

8. Remind the caregiver of the importance of food safety and hygiene.

   - Stress washing hands with soap and water after using the toilet and before handling and preparing food to prevent infection.
   - Advise the caregiver to make sure the food served to the child is well cooked.
   - Advise the caregiver to use clean boiled water to make juice and prepare food.

Vomiting

1. Counsel the caregiver that young children get dehydrated very quickly and that the caregiver should take the following measures to replace fluids lost to vomiting and prevent dehydration:

   - Give the child plenty of fluids.
   - Give the child ORS.
   - If the caregiver is unable to do the above, advise to seek medical attention immediately to avoid dehydration in the child.

2. Counsel the caregiver to avoid giving the child foods with strong or unpleasant odors or greasy or fried foods.

3. Counsel the caregiver to give the child foods at room temperature that are soft, moist, and easy to chew and swallow.

4. Counsel the caregiver to give the child small but more frequent meals.

5. Counsel the caregiver to give the child foods at room temperature that are soft, moist, and easy to chew and swallow.

6. Instruct the caregiver where to get immediate medical attention if the vomiting lasts more than 24 hours; the child is unable to eat, drink, or keep food down; or the vomiting is accompanied by fever.

7. Stress to the caregiver that young children get dehydrated very quickly.

8. Assess the child's growth if possible.

   - Weigh the child and plot the weight on a growth chart.
   - If the chart shows early growth faltering, determine whether the child needs medical attention or increased energy intake and advise the caregiver accordingly.

Malabsorption

1. Advise the caregiver to do the following to reduce the risk of malabsorption in the child:

- Eliminate the use of oils, butter, ghee, or margarine in the child's food.
- Reduce the use of cooking oil and other fats in the food.
- Avoid giving the child deep-fried, greasy, or high-fat foods.
- Feed the child smaller but more frequent meals evenly throughout the day.
- Seek medical attention if the child loses weight and the condition persists.

2. Assess the child's growth if possible.

   - Weigh the child and plot the weight on a growth chart.
   - If the chart shows early growth faltering, determine whether the child needs medical attention or increased energy intake and advise the caregiver accordingly.

3. Refer the caregiver to routine essential infant and child services such as immunization, vitamin A supplementation, iron supplementation, and deworming according to national guidelines.

Handout 11.12. Job Aid for Counseling on Management of Altered Taste in HIC-Infected Children

HIV-infected children may experience altered taste as a result of HIV infection, malnutrition, or medications. Signs of altered taste may be refusing to eat some or all foods and spitting up foods. Altered taste may be difficult to evaluate in small children who cannot yet talk.

1. Ask the caregiver whether the child is taking any medications and whether the condition started when the child started taking the medications.

2. Ask about the child's current eating habits.

   - Use a list of locally available food to determine what the child is eating.
   - Counsel the caregiver on what foods to prepare to increase energy intake, especially if the child is losing weight.
   - Ensure that the caregiver uses iodized salt to prepare the child's food.

3. Counsel the caregiver to encourage the child to eat by:

   - Giving the child favorite foods in small quantities
   - Using flavor enhancers such as salt and sugar to increase taste acuity and mask unpleasant taste sensations.
   - Feeding the food different textures of food (pureed, minced, soft, and moist)
   - Feeding the child patiently and persistently with supervision and love

4. Assess the child's growth, if possible.

   - Weigh the child and plot the weight on a growth chart.
   - Address early growth faltering if noted by referring the child for medical attention and/or advising the caregiver to increase the child's energy intake to promote weight gain.

5. Refer the caregiver to routine essential infant and child services such as immunization, vitamin A supplementation, iron supplementation, and deworming according to national guidelines.

Handout 11.13. Job Aid for Counseling on Socioeconomic Factors That May Affect Nutrition in HIV-Infected Children

Feeding relationship between the child and caregiver

1. If possible, observe a feeding session.

   - Assess whether the child is fed patiently and persistently, with supervision and love.
   - Assess whether the child is eating foods appropriate for his/her age and developmental level.
   - If the meal is not balanced, advise the caregiver to feed the child locally available foods from each food group.
   - Advise the caregiver to feed the child a staple food together with a combination of foods from the other food groups at each meal.
   - Discuss with the caregiver any other concerns you have.

2. Assess the environment in which the child is fed.

   - Advise the caregiver to remove any distractions that can make the child lose interest in eating.
   - Advise the caregiver to feed the child from his/her own plate or bowl.
   - Advise the caregiver to feed the child patiently, talk to him/her lovingly, look into his/her eyes, and actively encourage him/her to eat or help an older child feed himself/herself.
   - Address with the caregiver any food safety and hygiene issues you notice.

3. Discuss the importance of feeding small, frequent meals, especially to a sick child.

   - Explain to the caregiver that HIV-infected children get sick more often and more easily than non-infected children and that sick children may not have an appetite.
   - Advise the caregiver to feed the child small amounts often throughout the day to make sure he/she gets enough food.

Poverty and food insecurity

1. Assess the caregiver's ability to access and prepare food.

   - Assess the caregiver's health.
   - Assess whether the caregiver has a steady income.
   - Assess how many meals the caregiver can afford to feed the child every day.

2. Refer the caregiver to any of the following community resources, if available, for support in providing enough nutritious food for the child.

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   - Food bank
   - Food rations
   - Food assistance
   - Micronutrient supplements
   - Therapeutic feeding of severely malnourished children

- Supplementary feeding of moderately malnourished children
- Community support groups
- Community gardens
- Community kitchens

Session 11: Nutrition Care of Children 2–9 Years Old Living with HIV

Purpose

Provide current knowledge and a general understanding of nutrition care and support of children 2–9 years old who are living with HIV

2

Learning Objectives

- Describe the nutritional needs of and dietary recommendations for children 2–9 years old.
- Explain how HIV increases the risk of undernutrition and the etiology and consequences of growth failure and development in children infected with HIV.
- Describe dietary recommendations for children infected with HIV.
- Explain factors to consider when planning nutrition care and support for children 2–9 years old infected with HIV.

3

Session Outline

- Undernutrition in young children
- HIV infection in young children
- Effects of HIV on the nutritional status of young children
- Purpose of nutrition care and support for young HIV-infected children
- Components of nutrition care and support for young HIV-infected children

4

HIV in Children 2–9 Years Old

- Most children with HIV are infected:
  - In utero
  - During labor and delivery
  - During breastfeeding
  - From contaminated needles
  - From blood
  - From sexual abuse
- Children with HIV are vulnerable to childhood illnesses and disease.

5

HIV in Children 2–9 Years Old, Cont.

- Routine diagnosis of pediatric HIV is not done in many developing countries:
  - Early diagnosis of pediatric AIDS is difficult.
  - Tests for adults cannot be used for children < 18 months old.
  - Child HIV tests are expensive.
- Signs and symptoms of HIV (WHO)
  - Weight loss
  - Chronic diarrhea
  - Failure to thrive
  - Oral thrush
  - Fever

6

HIV in Children 2–9 Years Old, Cont.

- Children with four of the following symptoms are classified as having HIV (IMCI guidelines):
  - Recurrent pneumonia
  - Oral thrush
  - Present and past ear discharge
  - Very low weight
  - Persistent diarrhea
  - Enlarged lymph nodes
  - Parotid enlargement
- Lab tests are encouraged for accurate diagnosis.

7

Effects of HIV on the Nutritional Status of Young Children

- Heightened nutritional needs
  - Increased undernutrition
  - Repeated infections
  - Micronutrient deficiencies (vitamins A, E, B_6, B_{12}, and C and minerals zinc and selenium)
- Negative linear growth
- Failure to thrive
- Early and sustained stunting (although not usually wasting)

8

Effects of HIV on the Nutritional Status of Young Children, Cont.

- Inadequate food intake resulting from poor appetite, early satiety, mouth sores, abdominal pain, and decreased interest in food
- Increased nutrient losses from malabsorption, diarrhea, vomiting, and HIV enteropathy
- Increased nutrient needs because of hyper-metabolic and hyper-catabolic effects of infections, OIs, and HIV itself
- Feeding difficulties because of food aversions, thrush, and food refusal
- Socioeconomic factors such as poverty, illness of parent(s), and food security affecting food access

9

Purpose of Nutrition Care and Support for Young HIV-Infected Children

- Improve the immune system and delay the onset of AIDS.
- Maintain and promote healthy weight, growth, and development.
- Preserve lean body mass.
- Minimize gastrointestinal symptoms such as diarrhea.
- Prevent water- and food-borne illnesses.
- Enhance response to therapy.
- Reduce morbidity and mortality.

10

Purpose of Nutrition Care and Support for Young HIV-Infected Children, Cont.

- Early monitoring to avoid growth impairment even before symptomatic HIV disease
- Nutrition intervention as soon as suboptimal height for age is noted
- Follow-up growth faltering to determine the cause and identify appropriate interventions
- Referral to needed services

11

Nutrient Requirements

- Energy: HIV negative (WHO)
  - Boys: from 1,360 kcal/day at age 2 to 2,260 kcal/day at age 9
  - Girls: from 1,350 kcal/day at age 2 to 2,110 kcal/day at age 9
- Energy: HIV positive (WHO)
  - Asymptomatic: 10% increase to maintain growth
  - Symptomatic and no weight loss: 20−30% increase
  - Symptomatic with weight loss: 50−100% increase

12

Translating Calories to Food Intake

- Give the child an extra snack or meal to help meet increased energy requirements.
  - 1 cooked egg: 77 kcal
  - 1 banana: 109 kcal
  - 1 small or medium boiled potato: 116 kcal
  - 1 tsp. margarine: 34 kcal
  - 1 tsp. peanut butter: 30 kcal
- Increase energy in mashed boiled potato by adding a boiled egg or 1−2 tsp. margarine.
- A snack of a cooked egg and a banana can add 187 kcal (77 + 109).

13

Translating Calories to Food Intake, Cont.

- Dry maize flour has little water and high energy.
  - Dry maize flour: 340 kcal/100 g
  - With water added: Energy content reduced by more than ⅓, to 115 kcal/100 g.
- High-fat foods increase energy content: 1 tsp. peanut butter adds 30 kcal.
- Energy content is higher from fats than from carbohydrates.
- Fatty foods improve energy density if child does not have fat malabsorption, diarrhea, nausea, or vomiting.

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Nutrient Requirements, Cont.

- Protein (same as for healthy non-infected children)
  - 2−3 years: 1.15 g/kg
  - 3−5 years: 1.10 g/kg
  - 5−7 years: 1.00 g/kg
  - 7−10 years 1.00 g/kg
  - Should meet 12−15% of total energy intake
- Fats (same as for healthy non-infected children)
  - No more than 30% of total calories
  - Fat restriction not recommended

15

Nutrient Requirements, Cont.

- Micronutrients
  - WHO recommends HIV-infected children eat healthy diets to meet RDA and does NOT recommended changes in RDA.
  - Some children may need supplementation.
    - Multivitamin supplementation recommended but not over RDA for each nutrient
    - WHO supplementation recommendations
      - Vitamin A: WHO schedule for children under 5
      - Iron: National protocols or WHO schedule for children 2−11 years old: 2−5 years: 20−30 mg/day, 6−11 years: 30−60 mg/day
      - Zinc: Not above RDA; during chronic diarrhea, follow IMCI or national guidelines

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Components of Nutrition Care and Support for Young HIV-Infected Children

1. Nutrition screening and assessment
2. Prompt management and treatment of symptoms
3. Improved diet to meet growth and development needs
4. Promotion of good hygiene and food and water safety
5. Prompt treatment of secondary infections
6. Treatment of severe malnutrition
7. Provision of antiretroviral drugs

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1. Nutrition Screening and Assessment

- Useful for monitoring growth and development and identifying children at risk
- Assessment measurements
  - Anthropometrics: Body composition by weight, height, age
  - Social history: Physical environment, caregiver health, family food preparation and consumption
  - Clinical diagnosis: Gastrointestinal problems, bowel movement patterns, presence of OIs, current medical problems, and medication taken
  - Dietary examination: Food intake and preferences, appetite and taste changes, use of vitamin supplements
  - Physical examination and observation: Marasmus and kwashiorkor; poor muscle tone; nail, hair, and skin changes; dehydration; easy bruising; pallor

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2. Symptom Management

- Sore mouth and throat: Eat soft, moist foods, avoid acidic foods, use a straw for drinking, rinse mouth with warm water.
- Fever: Drink plenty of liquids, sipping liquids almost hourly, eat small frequent meals, use ORS.
- Diarrhea: Eat small, frequent meals, use ORS, reduce oil in food.
- Decreased appetite: Eat small amounts of favorite foods, use energy-dense foods.
- Vomiting: Increase fluid intake, avoid unpleasant or greasy and oily foods.
- Lactose intolerance: Limit intake of dairy products.

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3. Improved Diet

- Individualized diet to provide adequate calories and nutrients based on age, weight, and symptoms
  - Review diet at every well and sick child visit.
  - Advise and counsel on how to improve the diet.
  - Manage diet-related symptoms with appropriate interventions.
  - Provide multivitamin supplements if available.

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3. Improved Diet, Cont.

- Other nutrition related interventions
  - Provide presumptive de-worming every 6 months.
  - Promote use of mosquito treated bed nets.
  - Give an extra meal after episodes of illness to allow for catch-up growth as per IMCI guidelines.
  - Use iodized salt in food preparation.
  - Increase energy.
  - Provide micronutrient supplementation or fortification.

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4. Promotion of Good Hygiene and Food and Water Safety

- Avoid pathogenic contamination from diarrhea, dysentery, cholera, and typhoid, which can further weaken immune system speed up disease progression.
- Teach children how to wash their hands before food handling and after toilet.
- Teach children about “unsafe” food and water and how to politely say no when offered “unsafe” food or water.

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5. Prompt Treatment of Secondary Infections

- Promptly treat secondary infections (e.g., fever. TB, pneumonia, oral thrush, persistent diarrhea).
- Maintain food intake to minimize the nutritional impact of these infections.
- Manage diet-related side effects of medications such as vomiting, nausea, taste changes, and anorexia through diet.
- Ensure presumptive treatment such as Cotrimoxazole, where available, for infections.
- Immunize children according to local policies.

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6. Treatment of Severe Malnutrition

- Malnutrition likely among HIV-positive children
- Management according to WHO guidelines:
  - Categorize by anthropometric and clinical methods.
  - Treat infections, esp. those that affect food intake and absorption.
  - Provide adequate nutrition therapy.
  - Provide nutrition counseling to caregivers.
  - Provide and ensure follow-up after discharge.
  - Monitor weight, adequacy of diet, and other infections.

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6. Treatment of Severe Malnutrition, Cont.

- Community-based management of acute malnutrition (CMAM)
  - Treats children in the home instead of a hospital or clinic
  - Focuses on children under 5, who are most vulnerable to mortality and morbidity in emergencies

25

Classification and Treatment of Malnutrition

Severe acute malnutrition (SAM) with complications	SAM without complications	Moderate acute malnutrition (MAM) without complications
< 80 % of median weight for height OR bipedal pitting edema OR MUAC < 110 mm AND one of the following: Anorexia, lower respiratory tract infection, high fever, severe dehydration, severe anemia, no alertness	< 70 % of median weight for height OR bipedal pitting edema OR MUAC < 110 mm AND Appetite Clinically well Alert	70−80% of median weight for height AND no edema OR MUAC 110−125 mm AND Appetite Clinically well Alert
Inpatient IMCI/WHO protocols	Outpatient therapeutic care	Outpatient supplementary feeding

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7. Provision of Antiretroviral Drugs

- Prolong survival and enhance quality of life by reducing viral load
- Help improve growth parameters including weight, weight for height, and muscle mass
- Have side effects similar to symptoms of HIV (nausea, diarrhea, constipation, anorexia, taste changes) that can affect dietary intake

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7. Provision of Antiretroviral Drugs, Cont.

- Service providers should:
  - Be familiar with the ARV medications available
  - Know potential side effects.
  - Know how ARVs should be taken (on an empty stomach or with food).
  - Know food interactions associated with the ARVs.
  - Treat HIV-infected children following national recommendations if available.

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Nutrition Actions for Care and Support of the HIV-Infected Child

- Review diet for appropriate food and nutrient intake.
- Counsel caregiver on correct amount and variety of foods.
- Counsel caregiver on appropriate feeding practices.
- Promote good hygiene and food preparation.
- Routinely monitor growth.
- Promote essential child services (immunization and supplementation).
- Help identify OIs.
- Identify community support services for nutrition.
- Refer caregiver to programs offering ARVs.

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Challenges for Nutrition Care and Support of Children

- Metabolic complications associated with long-term ARV use in children (glucose and bone metabolism)
- Largely unknown long-term impact of ARVs in children, especially malnourished children
- Largely unknown effect of HIV on children's micronutrient, protein, and fat requirements
- Lack of human resource capacity

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Conclusions

- Children with HIV are vulnerable to undernutrition, growth failure, micronutrient deficiencies, frequent infections, and decreased appetite.
- Early nutrition intervention can help delay disease progression or death in the HIV-positive child.
- Components of nutrition care and support for HIV-infected children include the following:
  - Nutrition screening and assessment
  - Management of diet-related HIV symptoms
  - Improved diet
  - Promotion of good hygiene and food/water safety
  - Treatment of severe malnutrition
  - ART

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SESSION 12: NUTRITION CARE OF ADOLESCENTS LIVING WITH HIV

Purpose (slide 2)

The purpose of this session is to provide current knowledge and understanding of the special considerations for nutrition care and support for adolescents living with HIV.

Learning objectives (slide 3)

By the end of this session the student will be able to:

- Explain the importance of adolescent nutrition in the lifecycle
- Describe the nutritional requirements for adolescent boys and girls
- Describe the essential components for nutrition care of the HIV-infected adolescent
- Know factors to consider when planning nutrition care and support for HIV-infected adolescents
- Know contact points that can be used to deliver services to adolescents and their caregivers

Prerequisite knowledge

- Basic science (biology, physiology)
- Basic nutrition throughout the life cycle (Session 1)
- Basics of HIV and AIDS in Africa (Session 2)

Estimated time: 110 minutes, excluding time for the field visit

Session guide (slide 4)

Content	Methodology	Activities	Estimated time (minutes)
Introduction	Presentation	Introduce the session and rationale.	5
Importance of adolescent nutrition	Participatory presentation	Describe the importance of nutrition during adolescent growth and development.	10
Adolescent nutrition in the context of HIV	Participatory presentation	Explain the impact of HIV on adolescent nutritional status.	10
Goals of nutrition care and support for HIV-infected adolescents	Participatory presentation	Present the goals of nutrition care and support for adolescents with HIV.	10
Nutritional requirements of adolescents in the context of HIV	Participatory presentation	Describe the dietary recommendations for HIV-infected adolescents.	15
Nutrition issues that affect the HIV-infected adolescent	Participatory presentation	Describe adolescent vulnerability to chronic energy deficiency, iron deficiency anemia, and vitamin A deficiency and ways to address these issues.	15
Components of nutrition care and support for HIV-infected adolescents	Participatory presentation	Review the essential components of nutrition care for HIV-infected adolescents.	15
Issues and challenges for nutrition care and support of HIV-Infected adolescents	Participatory presentation Field visit	Explain factors to consider when planning nutrition care and support for HIV-infected adolescents. Organize a field visit to services or programs that provide health or nutrition services to adolescents with HIV.	15
Discussion points		Facilitate discussion based on the content of the session.	15

Conclusions			5
Review			5
Total time			120

Required materials

- Flipchart stand and paper
- Writing pens
- Blackboard and chalk or whiteboard and markers
- Overhead projector and transparencies or LCD projector and laptop

Materials provided

- PowerPoint 12
- **Handout 12.1. Field Visit Questionnaire**:

Preparation

1. Be familiar with Lecture Notes and PowerPoint 12.
2. Review the handout and Discussion Points to identify relevant questions to help students master the concepts.
3. Contact sites to request field visits, inform them of the objectives, arrange the timing and content of the visits, and identify contact people for students to contact on arrival.

Suggested reading

American Dietetic Association and Dietitians of Canada. 2000. Manual of Clinical Dietetics, 6th edition. Chicago.

Delisle, H., V. Chandra-Mouli, and B. de Benoist. 2005. Should Adolescents Be Specifically Targeted for Nutrition in Developing Countries? To Address Which Problems? And How?. Geneva: World Health Organization (WHO).

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Piwoz, E., and E. Preble. 2000. HIV/AIDS and Nutrition: A Review of the Literature and Recommendations for Nutritional Care and Support in Sub-Saharan Africa. Washington, DC: SARA Project, Academy for Educational Development.

Regional Centre for Quality of Health Care: Nutrition and HIV/AIDS: A Training Manual. 2003. Kampala. Uganda.

UNAIDS. 2001. Fact Sheet: Preventing HIV/AIDS among Young People. United Nations Special Session on HIV/AIDS. Geneva.

WHO. 1991. Energy and Protein Requirements: Report of a Joint FAO/WHO/UNU Consultation. Geneva. Switzerland

_____. 2003. Adolescent Friendly Health Services. An Agenda for Change. Geneva.

Importance of adolescent nutrition (slides 5 and 6)

Tomorrow's adults are today's adolescents. The World Health Organization (WHO) defines adolescence as the period between 10 and 19 years old (WHO defines "youth" as people between 15 and 24 years, including adolescents). Approximately one-fifth of the world's population is in this age group. The adolescent period is a critical part of development in the life cycle, a time of physical and emotional change as the body matures. Most adolescents tend to have a lower prevalence of infection than children under 5 and a lower prevalence of chronic disease than aging adults. As a result, adolescents generally receive little health and nutrition attention except in regard to reproductive health issues.

The adolescent period is one of rapid growth and development that includes physical, psychological, intellectual, and social changes. This growth and development creates increased demands for energy and nutrients. Because nutrition and physical growth are integrally related, inadequate energy and nutrients can slow or stop linear growth (stunting) and delay sexual maturation.

Adolescents have different needs according to their stage of development (table 1) and personal circumstances.

Table 1. Adolescent changes according to stage of development

Period	Characteristics
Early adolescence: 10–13 years	The body experiences a spurt in growth and the beginnings of sexual maturation, while thinking is more abstract.
Mid-adolescence: 14–15 years	The main physical changes are complete. The person develops a stronger sense of identity and relates more strongly to peers, although family usually remains important. Thinking becomes more reflective.
Late adolescence: 16–19 years	The body fills out and takes its adult form, while the person now has a distinct identity and more settled ideas and opinions.

Source: WHO 2003.

Adequate nutrition is required to reach full growth potential. In sub-Saharan Africa, where undernutrition is endemic, many adolescents do not get adequate energy and nutrients, resulting in stunted growth and micronutrient deficiencies. Iron deficiency anemia is particularly evident in young girls. Undernutrition in Africa is complicated by HIV, which compromises nutritional status and increases vulnerability to infection. Adequate nutrition can help delay HIV disease progression, but improving the diet and hence nutritional status of adolescents, who are rarely a priority group for nutrition interventions, is a challenge for policymakers, service providers, and caregivers.

Adolescent nutrition in the context of HIV (slide 7)

One-half of all new HIV infections—over 7,000 every day—occur in young people between the ages of 15 and 25. An estimated 10.3 million young people are living with HIV, 70 percent of them in sub-Saharan Africa. Two girls are infected for every boy in the same age group. Biological, social, and economic factors play a major role in making

young women vulnerable to HIV, leading to infection soon after they become sexually active. A study of young women in Zambia found that 18 percent were HIV positive within 1 year of becoming sexually active. Most young people who are infected do not know their status, and only a few adolescents who engage in sex know the HIV status of their partners.

Adolescents are particularly vulnerable to HIV infection and usually carry the burden of taking care of family members living with HIV. Risky sexual behavior, lack of access to HIV information and prevention services, and a host of social and economic reasons increase the vulnerability of adolescents to HIV. Many adolescents do not go to school and therefore do not have access to information or opportunities to develop the skills they need to turn this information into action. In addition, many services that are available do not take the specific needs of adolescents into account. As a result, many young people often perceive health services as irrelevant to their needs and distrust them. They tend to avoid the services altogether or seek them only when they are desperate. Nevertheless, adolescents offer the most hope for changing the course of the HIV epidemic if given the right tools and support.

Goals of nutrition care and support for HIV-infected adolescents (slide 7)

As noted, adolescents are rarely considered a priority target group for nutrition interventions, yet adolescence is a time of rapid change and growth that increase the need for energy and micronutrients such as iron. Physical changes that require extra nutrition include changes in weight, height, the onset of menarche for girls, and increases in fat and muscle mass. Approximately 25 percent of person's height is achieved during adolescence, which usually marks the end of height growth. This growth depends on adequate nutrition, including both the quantity and the quality of the food and the ability to digest, absorb and utilize food. Chronic undernutrition during this period can lead to stunting.

Consequently, the nutritional status of the HIV-infected adolescent will have a great impact on overall health, growth, and development. The goals of nutrition care and support for adolescents with HIV are listed below.

- Provide adequate nutrient intake to promote normal growth and development during puberty.
- Maintain adequate nutritional status to promote health and prevent disease after physiological growth is complete.
- Promote optimal nutrition and prevention of malnutrition.
- Manage or reduce symptoms of HIV disease.
- Enhance drug compliance and efficacy through diet counseling.
- Prevent food-borne illness.
- Manage complications associated with HIV and antiretroviral therapy (ART).

Nutritional requirements of adolescents in the context of HIV (slides 8–15)

Adolescence is considered a nutritionally vulnerable period of life for a number of reasons. The body demands more nutrients and calories as a result of the increase in physical growth and maturation and changes in body composition. Eating habits and

behavior may be affected by a change in lifestyle and activity level, growing independence, the need for peer acceptance, and concern with appearance

The growth spurt in adolescents results from changes in the quantity and distribution of fat and the enlargement of many organ systems. In girls this growth spurt occurs at the ages of 10 to 12 and in males about 2 years later, although this may vary. These changes have important implications for the nutritional needs of adolescents. Adequate intake of energy, protein, fat, and micronutrients is required to meet the needs of the rapidly growing, developing, and maturing body.

The HIV-infected adolescent is at high nutritional risk. HIV infection causes excess nutrient loss and malabsorption, further increasing nutritional requirements over those needed for the rapid growth and development that occurs during puberty. The requirements may even be higher if the HIV-infected adolescent suffers from secondary infections or is pregnant or lactating.

Recommended dietary allowances (RDAs) provide guidelines for normal nutrition intake for healthy adolescent girls and boys in two age categories: 11–14 and 15–18. The increases in requirements for energy and nutrients (protein, calcium, iron, zinc) are determined by increases in lean body mass rather than increases in weight. The RDAs are set to meet the needs of almost all (97–98 percent) of people in a group. The nutrient requirements for both healthy and HIV-infected adolescents are discussed below.

Macronutrient requirements (slide 10)

As for adults, a caloric distribution of 55–60 percent carbohydrate, 12–20 percent protein, and no more than 30 percent fat is recommended for most adolescents. Session 2 provides information on the food source of these nutrients in the diet.

It is helpful for health service providers to know the locally available and affordable food sources of energy, protein, and fats in their communities. Keeping a list of locally available and affordable foods can be helpful for providing nutrition counselling.

Energy

Energy needs increase during adolescence and vary based on activity level and stage of growth. WHO energy estimates for adolescents are presented in table 2. The energy estimates are based on actual measurement of energy expenditure in adolescents and presented as an estimation of basal energy expenditure (BEE) based on actual weight. The average activity and growth needs are accounted for.

Table 2. WHO energy estimates for adolescents

Sex	Age (years)	Estimated energy requirements (BEE equation)
Male	10–18	Kcal per day = 17.5 x weight (kg) + 651
Female	10–18	kcal per day= 12.2 x weight (kg) + 746

Source: FAO and WHO 1985.

Energy needs of the HIV-infected adolescent

The HIV-infected adolescent needs more energy because of the infection and changes in metabolism. The current recommended increase in energy intake for the adolescent is the same as that recommended for HIV-infected adults.

Table 3. Recommended energy intake for the HIV-infected adolescent

Asymptomatic HIV-infected adolescent	10% more than the basic energy requirements for a non-HIV-infected adolescent of the same age, sex and physical activity level
Symptomatic HIV-infected adolescent	20–30% more than basic energy requirements for a non-HIV-infected adolescent of the same age, sex and physical activity level

Protein requirements of the HIV-infected adolescent (slide 11)

Protein is a body building food that serves as a major structural component of all cells in the body. Protein needs should be estimated using actual body weight. Table 4 shows the RDA for protein for adolescents.

Table 4. RDA for protein for adolescents

Sex and age group	**RDA for protein**
Males	
9–13 years old	34 g/day
14–18 years old	52 g/day
Females	
9–13 years old	34 g/day
14–18 years old	46 g/day

The estimates are based on 0.95 g/kg/day for 4–13 years old age and 0.85 g/kg/day for 13–18 years old.
It is important that adolescents get adequate protein in their diet to meet the demands of their rapidly growing bodies. If energy intake is inadequate, protein is used to provide the body with energy, making it unavailable to meet the demands of the rapid growth and development during puberty.

Although infection increases protein requirements, there are currently no recommendations to increase protein intake for adults and adolescents infected with HIV. Any additional protein needs should be individualized and based on nutrition

assessment and pre-existing (e.g., resulting from pregnancy) and concurrent protein deficiencies. The diet should contain foods that provide both adequate protein and energy.

Fat requirements of the HIV-infected adolescent (slide 11)

Fats are a good source of energy and can be used to maintain or regain weight, but eating too much fat can be harmful. No more than 30 percent of total calories in the diet should come from fat. Adolescents taking certain antiretroviral drugs (ARVs) may need to change their fat intake to address interactions between fats and the ARVs.

Although fat is a good source of additional of energy in the diet, there are no current recommendations to increase fat intake as a result of HIV infection. Additional fat needs should be based on an individual nutrition assessment to increase energy intake for the HIV-infected adolescent.

Micronutrient requirements (slides 12 and 13)

As the adolescent grows, vitamin and mineral needs increase. Of particular importance during puberty are iron, calcium, and zinc. Many people with HIV experience micronutrient deficiencies such as deficiencies in vitamin A, vitamin B_6, vitamin B_{12}, vitamin C, vitamin E, magnesium, iron, selenium, or zinc. Correcting deficiencies of these micronutrients can help strengthen immune response.

Iron (slide 12)

Iron needs increase during adolescence because of an increase in muscle mass and blood volume. Females need more iron than males because of iron losses from menses. Adolescents who have low energy intake and/or do not regularly eat meat may not meet the RDA and thus need supplementation. Developing countries have a high prevalence of anemia, largely caused by deficiency. Table 5 shows the RDA for iron.

Table 5. RDA for iron for adolescents

Sex and age group	RDA for iron
Males	
9–13 years old	8 mg/day
11–18 years old	11 mg/day
Females	
9–13 years old	8 mg/day
11–18 years old	15 mg/day

Zinc (slide 13)

Zinc is involved in protein synthesis, wound healing, immune function, and growth and maintenance of tissues. During adolescence zinc is especially important because of its role in growth and sexual maturation. The RDA for zinc is shown in table 6.

Table 6. RDA for zinc for adolescents

Sex and age group	RDA for zinc
Males	
9–13 years old	8 mg/day
14–18 years old	11 mg/day
Females	
9–13 years old	8 mg/day
14–18 years old	9 mg/day

Calcium (slide 13)

Calcium needs increase as a result of skeletal and muscular development, Adolescence is a critical time for bone growth and deposition of calcium. The RDA for calcium is shown in table 6.

Table 7. RDA for calcium for adolescents

Sex and age group	RDA for calcium
Males	
9–18 years old	1,300 mg/day
Females	
9–18 years old	1,300 mg/day

Vitamin A (slide 14)

Between the ages of 10 and 19, the need for vitamin A reaches the levels of those for non-pregnant adults. Lack of sufficient vitamin A and recurrent infections are a major cause of vitamin A deficiency in adolescents. Supplementation with vitamin A should not

exceed two times the RDA, as excess amounts could impair rather than improve the immune system. The RDA for vitamin A in healthy adolescents is shown in table 7.

Table 8. RDA for vitamin A for adolescents

Sex and age group	RDA for vitamin A
Males	
9–13 years old	600 mg/day
14–18 years old	900 mg/day
Females	
9–13 years old	600 mg/day
14–18 years old	700 mg/day

Other vitamins and minerals

The body needs thiamin, riboflavin, and niacin to utilize carbohydrates. Vitamin A and C are important for new cell growth and healthy skin, and vitamin D is essential for rapid skeletal growth. Adequate intake of all these vitamins is essential to ensure proper growth and development and avoid deficiencies during adolescence.

The use of iodized salt in food should be encouraged for adolescents and their caregivers to prevent iodine deficiency, especially for pregnant and lactating adolescents.

Micronutrient supplementation of the HIV-infected adolescent (slide 15)

Multivitamin supplements can be provided to help meet the nutrient requirements for HIV-infected adolescents whose diet is inadequate. Wherever available, multivitamin supplements should also be provided to infected adolescents during pregnancy as this has been shown to lead to positive birth outcomes.

As with adults, evidence is currently insufficient to support micronutrient intake for HIV-infected adolescents different from the requirement for non-HIV-infected adolescents. HIV-infected adolescents should consume the RDA of all micronutrients, and higher levels may be needed if deficiencies are present. When it is not possible to obtain sufficient micronutrients from a diverse diet, a multiple micronutrient supplement (formulated to provide 1 RDA of micronutrients) may be needed.

Nutrition care and support guidelines for the HIV-infected pregnant or lactating adolescent are presented in detail in Session 9.

Nutrition issues that affect the health of HIV-infected adolescents (slides 16 and 17)

HIV-infected adolescents are vulnerable to chronic energy deficiency. Iron deficiency anemia, and vitamin A deficiency, described below.

Chronic energy deficiency (slide 16)

Adolescents need additional energy to meet the demands of their growing and maturing bodies. However, for many adolescents, intake of energy is inadequate over several months or years, leading to chronic energy deficiency, also known as protein-energy malnutrition (PEM) or protein-calorie malnutrition. This results in stunting, which is common among adolescents in populations where malnutrition is high.

The main causes of chronic energy deficiency in adolescents include insufficient quantity and quality of food, parasitic infection including worms and malaria, and malabsorption mainly because of diarrhea and heavy workloads. The daily energy needs of adolescents are among the highest of any age group.

Chronic energy deficiency has several implications for adolescents. HIV-infected adolescents may not know their HIV status, and poor nutritional status puts them at higher risk for poor clinical outcomes. Studies have shown that clinical outcomes for HIV are poorer among people with poorer nutritional status. Supporting HIV-infected adolescents to improve nutritional status is a challenge because malnutrition is endemic problem in sub-Saharan Africa, compounded by the effects of poverty and food insecurity. Moreover, adolescents are usually not a priority group for nutrition interventions.

Programs that provide care and support for adolescents and youth should provide appropriate nutrition counselling and education to encourage increased intake of energy. Increased energy intake will help meet increased needs resulting from infection and therefore prevent weight loss and loss of lean body mass. Programs providing HIV care and support services for adolescents and youth should encourage them to develop home gardens and grow nutritious foods that are less labor intensive, such as sweet potatoes. If food insecurity is an issue, referral to food assistance programs may be warranted to help the HIV-infected adolescent meet increased energy requirements. This is particularly important for the HIV-positive pregnant or lactating adolescent.

Iron deficiency anemia (slide 17)

During adolescence, the body's needs for iron increase markedly because of the rapid growth that occurs. Adolescent boys need more iron to manufacture myoglobin for their expanding muscle mass and hemoglobin for the expanding blood volume. Adolescent girls need more iron because of the onset of menses and their expanding blood volume.

Iron deficiency anemia is a critical health concern for adolescents because it affects their growth and energy levels. In developing countries approximately 27 percent of adolescents are estimated to be anemic. In Africa the prevalence of anemia is estimated to be higher in boys (57 percent) than in girls (45 percent). The fact that boys develop more muscle mass than girls, which requires more iron than fat deposition, may explain the high prevalence of anemia in boys during this stage of development. For girls, anemia is associated with premature births, low birth weight, and perinatal and maternal

mortality during pregnancy. Anemia in adolescents is also associated with impaired cognitive functioning, lower school achievement, and lower physical work capacity.

Inadequate intake of iron to meet the needs of development, parasitic infections, diarrhea, intestinal infections, and HIV are the most likely cause of anemia among adolescents. Anemia is common in people living PLHIV. The HIV-infected adolescent with anemia may present with complaints of fatigue, anorexia, and reduced ability to work or exercise. If severe, physical signs of anemia may include glossitis, angular stomatitis, and conjunctival pallor.

It is important to screen adolescents routinely for iron deficiency to prevent and treat early deficiencies. Iron supplementation in PLHIV is controversial because iron may contribute to the development of opportunistic infections (OIs). Therefore, HIV-infected adolescents should be given oral iron supplements under medical supervision. Like all pregnant women, pregnant HIV-infected adolescents should receive iron supplements as per national or WHO protocols.

Health service providers who work with HIV-infected adolescents should encourage them to eat iron-rich foods, including foods from animal sources, whose iron is more bio-available than that of plant sources. However, animal foods such as meat are usually expensive. Adolescents can be counseled to increase the bioavailability of iron from plant sources by eating vitamin C-rich foods at the same time. Health service providers should have a list of locally available and affordable foods to counsel HIV-infected adolescents and their caregivers on ways to increase iron-rich foods, including iron-fortified foods, in their diets. Adolescents, like adults, should be advised to eliminate or avoid foods that inhibit the absorption of iron, such as coffee and tea, or wait 2–3 hours after eating before drinking tea or coffee. They should be encouraged to eat a variety of foods that are good sources of iron and to be treated for parasitic infections and dewormed regularly.

Vitamin A deficiency (slide 18)

Vitamin A is essential for normal vision, gene expression, reproduction, embryonic development, and immune function. Vitamin A deficiency in adolescents is associated with impaired immune function, poor growth, and late sexual maturation. In sub-Saharan Africa the main cause of vitamin A deficiency in adolescents is lack of sufficient vitamin A in the diet and recurrent infections.

To manage vitamin A deficiency in HIV-infected adolescents, health service providers should identify dietary sources of vitamin A that are locally available and affordable and encourage adolescents to eat these foods. Good sources of vitamin A include liver, dairy products, fish, dark-colored fruits, and leafy vegetables. Where necessary, supplementation should be provided to adolescents with vitamin A deficiency to meet the requirements for non-pregnant adults. However, health service providers should be cautious in recommending vitamin A supplementation for adolescents because adolescents with severe protein malnutrition may be more susceptible to the adverse effects of excess vitamin A.

Adolescents who are pregnant or may become pregnant should not take high-dose vitamin A supplements because this can put the fetus at risk for birth defects. Pregnant adolescents diagnosed with severe vitamin A deficiency (night blindness is an indictor of

such deficiency) should be treated with daily oral doses of 10,000 international units (IU) daily or 25,000 IU weekly for 4–8 weeks. However, these recommended low-dose formulations are not widely available. In areas where they are not accessible, adolescents should eat vitamin A-rich animal source foods, especially liver, to increase their vitamin A intake.

Because the role vitamin A plays in HIV disease progression is not fully known, supplementation of HIV-infected adolescents and youth with vitamin A should be done under medical supervision.

Components of nutrition care and support for HIV-infected adolescents (slide 19)

Ideally, nutrition interventions for the HIV-infected adolescent should begin as early as possible in the course of the disease to help minimize weight loss and slow progression of the disease to AIDS. However, because this group is usually not targeted for HIV testing and counselling, the HIV status of adolescents may not be known until they present with OIs. Health service providers and programs need to form close links with youth services, youth groups, and schools to provide appropriate care, interventions, and prevention services for adolescents. Nutrition care and support should be part of comprehensive HIV services for adolescents and include the following components:

1. **Nutrition assessment and screening** (slide 20)

Nutrition assessment provides the basis for determining appropriate nutrition interventions. Nutrition assessment and screening and diet recommendations for the HIV-infected adolescent should be individualized based on symptoms and the adolescent's ability to meet nutrient requirements. The adequacy of the intervention can be monitored with frequent follow-up using nutrition assessment parameters.

As for adults, nutrition assessment includes the following components:

- Anthropometric measurement: Weight, height, body mass index (BMI), and mid-upper arm circumference (MUAC)
- Dietary intake: 24 hour recall
- Biochemical assessment: hemoglobin and albumin (if available)
- Behavioral and environmental influences

Analysis of the nutrition assessment will provide information for the nutrition intervention, nutrition education, monitoring, and follow-up that is required. The information should be considered along with relevant information on medical status (e.g., diabetes), psychosocial needs (orphan, head of household, child abuse), and lifestyle issues.

Signs of potential nutrition problems in adolescents (American Dietetic Association 1998) are listed below.

Inappropriate food intake

- Irregular meal patterns (skipping meals)
- Limited diet
- Poor appetite

Poverty

- Inadequate income
- Inadequate food resources
- Lack of access to food

Nutrition-related conditions

- Pregnancy
- Iron deficiency anemia
- Chronic diseases, e.g., diabetes
- Underweight
- Overweight

Psychosocial factors

- Significant emotional stress or depression
- Stigma and discrimination

Lifestyle factors

- Heavy use of alcohol, drugs or tobacco
- Living alone
- Living in an unstable family or environment

2. **Nutrition education and counselling** (slide 21)

Nutrition education and counselling should be tailored to the results of nutrition screening and assessment and the age of the adolescent. The health service provider should help the older adolescent and/or caregiver understand the need to maintain an adequate diet and ways to manage common gastrointestinal problems related to HIV that may have a negative impact on diet. The health service provider also can help the adolescent explore feelings about and reactions to HIV. It is important to build a trusting relationship, maintain professionalism and confidentiality at all times, and treat adolescents with respect and acceptance despite their age, even if the counselor does not agree with their attitude, beliefs or life choices.

3. **Food safety and hygiene** (slide 22)

Food-borne illnesses can cause further damage to the weakened immune systems of PLHIV, increasing susceptibility to other infections. Health service providers should provide information on proper food safety and hygiene to HIV-infected adolescents and/or their caregivers to help prevent infections that cause diarrhea, a common cause of weight loss and HIV disease progression. Adolescents and their caregivers should be encouraged to keep their home environments clean, keep water outside the toilet to wash their hands with water and soap after using the toilet, and follow the safe food handling practices listed below.

- Wash hands thoroughly with soap and water before preparing, handling, or eating food and after using the toilet.
- Drink clean, safe water (boiled or bottled).
- Do not eat moldy, spoiled, or rotten foods.
- Do not eat raw eggs or foods that contain raw eggs.
- Keep food covered and away from insects, flies, rodents, and other animals.

- Wash and keep food preparation surfaces, utensils, and dishes clean.
- Eat food that is thoroughly cooked, particularly meats and chicken.

4. **Management of diet-related HIV problems** (slide 23)

The common diet-related HIV problems of adolescents are the same as those for adults, namely anorexia, nausea, vomiting, diarrhea, constipation, bloating, mouth or throat sores, fever, malabsorption, fatigue, and taste alterations. All these symptoms can affect the nutritional status of the HIV-infected adolescent by decreasing food intake and hence nutrient intake. Dietary modification to manage these symptoms will help minimize their impact on the adolescent's nutritional status, maximize nutrient intake, ensure adequate growth and development, and prevent weight loss. Session 4 provides detailed guidance on the dietary management of these symptoms.

Follow-up and monitoring of progress in managing these symptoms is important to prevent worsening of symptoms or development or worsening of undernutrition.

5. **Physical activity** (slide 24)

Physical activity has been shown to improve body composition and quality of life for PLHIV. Exercise also helps stimulate appetite and increase energy, improve blood circulation, and reduce stiffness in the joints, muscle aches, and wasting. Health service providers working with HIV-infected and -affected adolescents should encourage them to do simple exercise such as walking.

6. **Psychosocial support** (slide 25)

Referral to peer support or youth groups in the community that work with HIV-infected adolescents is encouraged because puberty is a period in which adolescents are easily influenced by their peers. Support from peers who have similar issues that they can identify with can have a profound effect on adolescents' self-esteem and hence acceptance of and adherence to advice on nutrition and other care.

7. **Food security** (slide 26)

Improving adolescents' access to food and control over their food resources is a major component of a supportive environment and a primary factor for food security. The impact of HIV has left many adolescents to fend for themselves and take responsibility for younger siblings after the sickness or death of one or both parents. Unsafe and unhealthy ways to find money for food can lead to exploitation and abuse and behaviors that increase the risk of HIV infection.

Addressing food security should be an integral part of the comprehensive care and support of HIV-infected and -affected adolescents. Health service providers who provide nutrition care and support to adolescents need to understand the constraints they face as a group and as individuals to following recommendations to maintain good nutritional status. Programs working with HIV-infected adolescents and those vulnerable to HIV infection should be aware of services that can strengthen food access and availability and where possible link and refer them to these services to improve their access to food. An assessment should be carried out to assess gaps, sources of food, and food security

options. Based on the assessment, the most appropriate and feasible options should be identified to improve dietary practices and nutritional status.

8. **Safer sex practices and reproductive health services** (slide 27)

Re-infection of the already HIV-infected adolescent can lead to faster disease progression. Sexual health education and counselling should be part of any program targeting young people, as many do not have the skills and services to protect themselves from sexual relations that expose them to HIV re-infection and sexually transmitted infections (STIs). Promoting safer sex practices such as condom use and fidelity to one partner should be integral to the care of HIV-infected adolescents. Services should be youth friendly, taking into account issues of confidentiality, convenience, caring, counselling, community support, and costs.

Issues and challenges for nutrition care and support of HIV-infected adolescents (slide 28)

All adolescents have the right to knowledge and skills to help them reduce their vulnerability to HIV and prevent HIV infection. Health care services and service providers should bear in mind the following challenges when providing nutrition care and support to young people.

Psychosocial issues

HIV can affect the self-esteem of an adolescent, leading to depression, feelings of isolation, lack of appetite, and stigmatization and discrimination. Emotional, spiritual, and social support is essential to well-being and survival. At the same time, puberty is a time of self-identification and desire for peer acceptance. Stigma and discrimination associated with HIV can compound the effect on the HIV-infected adolescent's self-esteem. These important developmental issues should be noted in programs and services that provide care and support for the HIV-infected adolescent and young person. Feelings of guilt, fear, and denial may need to be explored. Health service providers should be sensitive to signs of anxiety in adolescents and know where to refer them for psychosocial counseling or support.

Food insecurity

Food insecurity increases the vulnerability of adolescents to HIV in sub-Saharan Africa. In food-insecure areas, adolescents may be the heads of households and need food assistance or livelihood support.

Access to HIV prevention and treatment services

Like adults, many adolescents who become infected with HIV do not know that they are infected until the disease has advanced, yet nutrition intervention is needed early in HIV disease. This means that counselling and testing services need to be made accessible to adolescents, not just adults. Most social and health services have been designed for adults, and adolescent needs have not always been taken into consideration in the health system. Forging links with youth peer groups, for example, can help provide a place where adolescents can go for testing and counselling and referral to other HIV-related services, including nutrition care and support.

Better communication and social mobilization efforts are needed to increase awareness of HIV and AIDS among adolescents in areas where the education system may be in disarray. HIV and AIDS programs that target adolescents need to respect their role in looking out for their own well-being and involve them in the programs while being sensitive to their cultures. Media, art, and culture can be used to draw young people into discussions about HIV, leading to discussion of testing, prevention, care, support, and treatment.

Adolescent-friendly services can be delivered in hospitals, health centers, schools, or community settings. Many adolescents have expressed a desire for welcoming facilities where they can drop in and be attended to quickly, be treated with respect, and not judged. Adolescents place high priority on confidentiality which affects treatment-seeking behavior. Health facility staff need to develop an empathetic approach that encourages young people to attend nutrition HIV assessment and counseling services. Health service providers can hold special clinics with peer educators who can provide information on nutrition and HIV put adolescents in touch with relevant health and support services.

Young people who are unlikely to attend health facilities can be reached through youth and community centers. Outreach services can also help to reach street youths, who are marginalized and young people living in isolated communities. Schools provide an entry point for reaching young people with health education and services and can refer young people to local health facilities for further follow-up. It is important however to link the school health services to local health services so that students are not lost to follow-up care and to avoid duplication of services.

Young people in crisis, such as those newly diagnosed with HIV may need counselling and community support that goes beyond what health services can provide. This support can come from family, parents, teachers, trained counselors, religious leaders, peers, or youth leaders and other adults.

Gender inequity

Young women 15–24 years old bear the brunt of new HIV infections in sub-Saharan Africa. A number of factors make adolescent girls more vulnerable than adolescent boys, increasing their risk of infection and re-infection. Programs should seek opportunities to help girl children stay in school and prevent unwanted teenage pregnancies. Linkages and referrals to appropriate peer and women support groups are also important.

Field visit

Divide the students into groups of nor more than five and assign each group to visit a different site that offers health services for adolescents.

Review the objectives of the field visits with the students and direct them to the sites. Arrange for them to observe and talk to the contact persons or other relevant staff about the services provided for adolescents at the site. The students should be given copies of **Handout 12.1. Field Visit Questionnaire** in advance of their visits.

Follow up the field visit by asking each group to present its experience and findings to the rest of the class by answering the questions in the questionnaire.

Conclusions (slide 29)

Adolescence is a time of rapid physical growth that increases demands for energy and nutrients. One-half of all new HIV infections occur in young people 15–25 years old, and HIV compromises the nutritional status of adolescents and increases vulnerability to infection.

Adolescents have increased requirements for energy and nutrients (protein, calcium, and iron, micronutrients). Many adolescents are vulnerable to chronic energy deficiency (protein-energy malnutrition), iron deficiency anemia, and vitamin A deficiency because of inadequate intake and infections. It is important to screen and counsel adolescents to prevent and treat these deficiencies. However, adolescents are rarely a priority group for nutrition interventions.

The goals of nutrition care and support for adolescents with HIV are to promote adequate nutrient intake for growth and development during puberty and prevent infection, manage diet-related symptoms of HIV, and manage drug-related complications. This care and support should include nutrition assessment and screening, nutrition education and counseling, psychosocial support, and food security support. Adolescents are particularly sensitive to stigma and discrimination because of their need for peer acceptance and need adolescent-friendly and confidential nutrition and HIV care and support services.

Discussion points

1. Adolescents are subject to many of the same diseases as children and adults. What health risks are especially connected to adolescence? Identify and discuss these health risks.

2. Health services are often not readily accessible to adolescents and many adolescents do not use the existing health services. What services can be used to delivery nutrition care and support to HIV-infected adolescents in your community?

3. Discuss the gaps and challenges in providing nutrition care and support to adolescents in these services. How can they be addressed?

Handout 12.1. Field Visit Questionnaire

1. What health services are is provided to adolescents at the site you visited?

2. Does the service also serve HIV-infected adolescents? What is offered?

3. What health information on HIV and nutrition and HIV does the service offer, including for adolescents?

4. Are nutrition assessments carried out? What is done?

5. What other services other than nutrition are provided for adolescents?

6. Assess how accessible, equitable, acceptable, appropriate, comprehensive, effective, and efficient the service is.

7. What services, if any, exist to help adolescents who are food insecure?

8. What issues and challenges did you note?

9. What recommendations would you make to improve the services for adolescents at the site visited?

Session 12: Nutrition Care of Adolescents Living with HIV

Purpose

Provide current knowledge and understanding of the special considerations for nutrition care and support for adolescents living with HIV.

2

Learning Objectives

- Explain the importance of nutrition for adolescents.
- Describe adolescent nutritional requirements
- Describe the essential components of nutrition care of HIV-infected adolescents.
- List factors to consider when planning nutrition care and support for HIV-infected adolescents.
- List contact points where nutrition care services can be delivered to adolescents.

3

Session Outline

- Importance of adolescent nutrition
- Adolescent nutrition in the context of HIV
- Goals of nutrition care and support for HIV-infected adolescents

4

Importance of Adolescent Nutrition

- 1/5 of the world's population are 10–19 years old.
- Adolescence is a critical part of development, with rapid growth and physical, psychological, social, and intellectual changes.
- Adolescents have a lower prevalence of infection and chronic disease than children under 5 and aging adults.

5

Importance of Adolescent Nutrition, Cont.

- Adolescents have increased energy and nutrient demands.
- Inadequate consumption of nutrients can slow or stop linear growth, resulting in stunting and delayed sexual maturation.
- Adolescents receive little health and nutrition attention except regarding reproductive health.

6

Adolescent Nutrition in the Context of HIV

- ½ of new HIV infections occur in 15–25-year-olds.
- 10 million PLHIV are ages 15–25 years old.
- 70% of all young PLHIV live in sub-Saharan Africa.
- Adolescents are especially vulnerable to HIV
  - Risky sexual behavior
  - Lack of access to information and prevention
  - Social and economic challenges
  - Neglect of adolescent needs by HIV services

7

Goals of Nutrition Care and Support for HIV-Infected Adolescents

- Provide adequate nutrients for growth and development during puberty.
- Maintain nutritional status and prevent disease.
- Promote optimal nutrition, prevent malnutrition.
- Manage or reduce HIV-related symptoms.
- Enhance compliance with ART.
- Prevent food-borne illness.
- Manage complications associated with HIV and OIs.

8

Nutritional Requirements of Adolescents in the Context of HIV

- Adolescence a nutritionally vulnerable period:
  - Increased demand for nutrients and calories for physical growth and changes in body composition
  - Eating habits and behavior affected by lifestyle, activity level, growing independence, need for peer acceptance, and concern with appearance
- Increased nutrition risk if HIV positive
- Increased nutrient requirements if HIV positive because of nutrient loss and malabsorption
- Higher nutrient requirements if secondary infections, pregnancy, or lactation

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Nutritional Requirements of Adolescents in the Context of HIV, Cont.

- Macronutrient distribution of calories
  - 55–60% carbohydrates
  - 12–20% protein
  - No more than 30% fat
- Energy increases based on activity level and stage of growth
  - Male (10–18 years) kcal/day = 17.5 x kg + 651
  - Female (10–18 years) kcal/day = 12.2 x kg + 746
- Energy requirements for HIV+ adolescent
  - Asymptomatic: 10% energy increase above
  - Symptomatic: 20–30% energy increase

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Protein Requirements of Adolescents in the Context of HIV

- Protein

  Male
  - 9–13 years: 34 g/day
  - 14–18 years: 52 g/day

  Female
  - 9–13 years: 34 g/day
  - 14–18 years: 46 g/day
- Same protein requirements for HIV-positive and HIV-negative adolescents
- Same fat requirements for HIV-positive and HIV-negative adolescents

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Iron Requirements of Adolescents in the Context of HIV,

- Iron (for muscle promotion and increased blood volume)

  Male
  - 9–13 years: 8 mg/day
  - 14–18 years: 11 mg/day

  Female
  - 9–13 years: 8 mg/day
  - 14–18 years: 15 mg/day
- High risk of iron deficiency because of rapid growth
- Females even more vulnerable if pregnant

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Zinc and Calcium Requirements of Adolescents in the Context of HIV

- Zinc (for wound healing, immune function, and tissue growth)

  Male
  - 9–13 years: 8 mg/day
  - 14–18 years: 11 mg/day

  Female
  - 9–13 years: 8 mg/day
  - 14–18 years: 9 mg/day
- Calcium (for skeletal and muscular development)

  Male and female
  - 9–18 years: 1,300 mg/day

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Vitamin A Requirements of Adolescents in the Context of HIV

- Vitamin A (for growth, reproduction, immune function, vision)

  Male
  - 9–13 years: 600 mg/day
  - 14–18 years: 900 mg/day

  Female
  - 9–13 years: 600 mg/day
  - 14–18 years: 700 mg/day
- High-dose vitamin A can have teratogenic effects on the fetus and should not be given to pregnant adolescents.

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Micronutrient Supplement Requirements of Adolescents in the Context of HIV

- Micronutrient supplementation
  - Unknown whether needs differ for HIV-infected and -uninfected adolescents
  - If micronutrients supplements are available, WHO recommends no more than 1 RDA per day.

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Nutrition Issues for the Health of HIV-Infected Adolescents

- Chronic energy deficiency or protein-energy malnutrition
  - Result of inadequate food intake, parasites, or malabsorption over time
  - Nutritional status reduced by HIV
  - Addressed by improving diet, increasing food intake, and treating associated illness
- Adolescents less likely than adults to know their HIV status

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Nutrition Issues for the Health of HIV-Infected Adolescents, Cont.

- Iron deficiency anemia
  - Result of insufficient iron intake and parasites
  - Adolescents particularly vulnerable because increased demand for iron
  - Affects 57% of adolescent males and 45% of adolescent females and in sub-Saharan Africa
  - May cause premature births, low birth weight, maternal mortality, impaired cognitive functioning, reduced physical capacity
  - Addressed by eating iron-rich foods, eating a variety of foods, and treating parasites

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Nutrition Issues for the Health of HIV-Infected Adolescents, Cont.

- Vitamin A deficiency
  - Result of inadequate vitamin A in diet
  - Impairs immune function, vision, growth, and sexual maturation
  - Addressed by eating local foods rich in vitamin A and taking vitamin A supplements according to national protocol

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Components of Nutrition Care and Support for HIV-Infected Adolescents

1. Nutrition screening and assessment
2. Nutrition education and counseling
3. Food safety and hygiene
4. Management of diet-related HIV problems
5. Physical activity
6. Psychosocial support
7. Food security
8. Safer sex and reproductive health services

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1. Nutrition Screening and Assessment

- Adolescents need more calories and may change eating habits and behaviors.
- Nutrition assessment to determine appropriate interventions and diet changes may include:
  - Anthropometry
  - Dietary intake
  - Biochemical assessment
  - Assessment of behavioral and environmental influences
- Potential nutrition problems include inappropriate food intake, poverty, nutrition-related conditions, and psychosocial and lifestyle factors.

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2. Nutrition Education and Counseling

- Is based on nutrition assessment
- Should be appropriately tailored to adolescents
- Should be confidential and respectful even if the counselor disagrees with the adolescent's attitudes, beliefs, or life choices
- Can help adolescents explore feelings about being HIV positive

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3. Food Safety and Hygiene

- Food-borne illness can further damage immune system weakened by HIV.
- HIV-positive adolescents and their caregivers need information on food safety and hygiene practices.
- Practices include washing hands, drinking safe boiled water, eating unspoiled and thoroughly cooked food (especially meat and chicken), and keeping food free of insects and rodents.

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4. Management of Diet-Related HIV Problems

- Diet-related HIV problems for adolescents are the same as those for adults.
- Dietary modification can minimize the impact of the symptoms on nutritional status, maximize nutrient intake, ensure adequate growth and development, and prevent weight loss.
- Follow-up and monitoring of symptoms can prevent development of severe malnutrition, which requires clinical care.

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5. Physical Activity

- Improves body composition and quality of life
- Can stimulate appetite, increase energy, improve circulation, reduce joint stiffness, and soothe muscle aches and wasting
- Can include simple exercise such as walking

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6. Psychosocial Support

- Is an important part of nutrition care and support
- Helps address fear, guilt, and need for self-esteem and acceptance
- Is especially effective through peer support

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7. Food Security

- Adolescent orphans may be exposed to exploitation, abuse, and risk of HIV when trying to obtain food for themselves or siblings.
- Discrimination in household may lead to food insecurity.
- Food access gaps, sources, and options should be assessed.
- Adolescents should be referred and linked to services to strengthen food access and availability.

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8. Safer Sex and Reproductive Health Services

- Adolescents may engage in sexually risky behavior without adequate knowledge, information, and services to protect themselves.
- Risk of HIV infection increases because sexual encounters are often unplanned.
- Adolescents need information about abstinence, condoms, and safer sex practices is needed.
- Programs should be youth friendly and offer supportive services.

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Challenges for Nutrition Care and Support of HIV-Infected Adolescents

- Psychosocial issue
- Food insecurity
- Adult-focused HIV education and services
- Gender inequity

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Conclusions

- Rapid physical growth in adolescence increases energy and nutrient requirements.
- HIV compromises the nutrition of adolescents and increases vulnerability to infection.
- Adolescents are vulnerable to chronic energy deficiency and iron and vitamin A deficiency but are rarely a priority group for nutrition interventions.
- Adolescent-friendly nutrition and HIV care and support should promote adequate nutrient intake and help manage diet-related symptoms of HIV and drug-related complications.

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East, Central and Southern African Health Community