

Nutrition assessment, counselling and support for adolescents and adults living with HIV

A PROGRAMMING GUIDE

FOOD AND NUTRITION IN THE CONTEXT OF HIV AND TB



UNAIDS / JC2628 (English original, July 2014.)

Copyright © 2014.
Joint United Nations Programme on HIV/AIDS (UNAIDS).

All rights reserved. Publications produced by UNAIDS can be obtained from the UNAIDS Information Production Unit.

Reproduction of graphs, charts, maps and partial text is granted for educational, not-for-profit and commercial purposes as long as proper credit is granted to UNAIDS: UNAIDS + year. For photos, credit must appear as: UNAIDS/name of photographer + year. Reproduction permission or translation-related requests—whether for sale or for non-commercial distribution—should be addressed to the Information Production Unit by e-mail at: publicationpermissions@unaids.org.

The designations employed and the presentation of the material in this publication do not imply the expression of any opinion whatsoever on the part of UNAIDS concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries.

UNAIDS does not warrant that the information published in this publication is complete and correct and shall not be liable for any damages incurred as a result of its use.

ACKNOWLEDGEMENTS

The development of this programming guide was coordinated by Fatiha Terki, Saskia de Pee, Joan Manuel Claros, Quinn Marshall and Lydia DuRant from the World Food Programme (WFP) Policy Division, Nutrition and HIV Service. The programming guide was designed and written by the WFP, in close cooperation with staff from the Albion Centre, the Joint United Nations Programme on HIV/AIDS (UNAIDS) and the United States President's Emergency Plan for AIDS Relief (PEPFAR). In addition, Chris Duncombe (World Health Organization—WHO) and Pamela Fergusson (Food and Nutrition Technical Assistance II) made technical contributions. The Thai Red Cross AIDS Research Centre (TRCARC) provided case studies. Inputs were received from Amanda Justice, Belinda Meggitt, Charmaine Turton, Julian Gold, Lia Purnomo and Simon Sadler (Albion Centre); Praphan Phanuphak (TRCARC); and Eyerusalem Kebede Negussie, Francesco Branca and Maria del Carmen Casanovas (WHO). The programming guide benefited greatly from initial contributions from Nils Grede and Francesca Duffy (WFP), and from the vision and continued support of Martin Bloem (WFP).

TABLE OF CONTENTS

Foreword	8
Acronyms	10
Introduction	11
Objectives and audience	11
A note on terminology	12
Background	12
Chapter 1 HIV, AIDS and TB	15
Key messages	15
What is HIV?	15
What is AIDS?	16
What is TB?	18
When should PLHIV begin antiretroviral therapy?	19
What is comprehensive HIV prevention, treatment, care and support?	21
What is the rationale for including nutrition and food support in comprehensive care programmes?	24
What is the role of food and nutrition support in achieving universal access and adherence in lifelong chronic HIV treatment and care?	25
Chapter 2 Nutrition, and HIV and TB	26
Key messages	26
Introduction	26
What is the evidence for the role of nutrition in TB incidence?	27
Why are food and nutrition interventions needed during HIV and TB treatment?	27
What interventions are required to restore health and nutritional status among adolescents and adults living with HIV and with active TB?	28
What are the nutritional needs of people living with hiv and patients with active TB?	29
<i>Energy intake</i>	29
<i>Protein intake</i>	30
<i>Fat intake</i>	31

<i>Micronutrient intake</i>	31
<i>General nutrient intake</i>	31
What are the nutritional needs of acutely undernourished adults?	32
What kind of food and nutrition support should be provided to adolescents and adults on antiretroviral therapy or receiving tb treatment?	32
What is the role of nutrition support to enable access to health services?	33
Chapter 3 Nutrition assessment, counselling and support	35
Key messages	35
How does nacs fit into HIV or tb prevention, treatment, care and support services?	35
What are the objectives of NACS?	37
What is Nutrition Assessment?	38
What is Nutrition Screening?	38
What is a detailed Nutrition Assessment?	39
What are the objectives of Nutrition Assessment?	39
When is a Nutrition Assessment conducted?	39
What is involved in a Nutrition Assessment?	40
Which nutrition assessments are used for adolescents and adults?	42
What is Nutrition Counselling?	45
What is Nutrition Education?	46
What are the objectives of Nutrition Education?	46
What methods are used in Nutrition Education?	46
What is Individual Nutrition Counselling?	46
What are the objectives of Nutrition Counselling?	47
What are the key messages in Nutrition Counselling?	47
What are the general nutrition recommendations for plhiv and people receiving tb treatment?	47
How can Nutrition Counselling be made more effective?	49
How can nacs be integrated into treatment, care and support for hiv and tb?	50

How can linkages be made between health sectors and communities?	51
Who is responsible? What are the possible roles of the different stakeholders? (100)	52
Considerations for NACS interventions	54
What human resource capacity is needed?	55
What operations management capacity is needed? (102)	56
Chapter 4 provision of nutritious food	57
Key messages	57
Introduction	57
Who should receive a food supplement in addition to NACS?	59
For how long should a food supplement be given?	59
What supplements could be provided individually and programmatically?	60
<i>Nutrient density</i>	61
<i>Practicality</i>	61
<i>Acceptability</i>	61
<i>Sharing</i>	61
<i>Cost-effectiveness</i>	62
Should household members be included or just the patient?	63
How is household support targeted? How long should it last?	64
Annex I Stages of Change: A model for targeting nutrition counselling	67
Annex II Case studies by the Thai Red Cross AIDS Research Centre	68
Case study 1: Anaemia	68
Case study 2: Malnutrition, injecting drug use and TB	70
Case study 3: Dyslipidaemia	72
Case study 4: Overweight/obesity	74
References	77

FOREWORD

This programming guide prepared by the World Food Programme (WFP), the United Nations Programme on HIV/AIDS (UNAIDS) and the U.S. President's Emergency Plan for AIDS Relief (PEPFAR) provides practitioners with useful information for planning and implementing food and nutrition support as part of a comprehensive treatment, care and support programme for adults and adolescents living with HIV. It serves as a resource for governments, UN organizations, donors, civil society, and other organizations providing support to countries.

The AIDS response has provided an important benchmark for global leadership, highlighting what can be accomplished when strong partnerships involving governments, donors, multilateral organizations, the private sector, communities, people living with HIV, advocates, non-governmental organizations, and civil society are formed. PEPFAR, the Global Fund to Fight AIDS, Tuberculosis and Malaria (GFATM), UNAIDS and WFP continue to play a key role in developing these critical partnerships.

As a result of advances in access to antiretroviral therapy (ART), people living with HIV are now living longer and healthier lives. Research has indicated that HIV treatment, particularly the initiation of early treatment, is important for long-term survival and for HIV prevention. In 2013, almost 13 million of the approximately 35 million people living with HIV had access to life-saving treatment. However, only 37 percent of people living with HIV are on treatment. Sub-Saharan Africa is the most affected region, with approximately 70 percent of all people living with HIV residing there. Long term adherence will be important to individual health and decreasing transmission. Reported data from Low Middle Income Countries (LMIC) show a negative trend in ART adherence over time, wherein 81 percent of people initiating ART were still retained in care at 24 months and 73 percent at 60 months. Only 65 percent of people living with HIV in sub-Saharan Africa (SSA) who are enrolled on ART remain on treatment three years later. Despite comparable retention rate in high-income countries, there is still substantial room for improvement in adherence in LMIC/SSA.

UNAIDS' *Treatment 2015* provides a framework for scaling up HIV treatment and identifies several challenges that impede treatment coverage and adherence. More than half of all people living with HIV are unaware of their status and a substantial number of people diagnosed with HIV are never assessed for ART. Additionally, due to low uptake of services and loss to follow-up between testing and treatment initiation, a significant proportion of people start treatment late or do not start treatment.

Food and nutrition for people living with HIV plays a key role in improving retention and treatment outcomes. Most importantly, it reduces mortality risk among people living with HIV who are malnourished (body mass index <18.5). Currently, malnourished people living with HIV are two to six times more likely to die when starting ART compared to people with optimal nutritional status. Given that the HIV epidemic is often most severe in food-insecure settings, food and nutrition assistance provides critical support to people and helps promote access and adherence to treatment and care in these resource-constrained settings.

WFP's recent work in the AIDS response links clinical services with community-based food and nutrition services. These programme linkages aim to improve adherence and treatment effectiveness while enhancing prevention efforts. PEPFAR recognizes the linkages between clinical services and income, food and nutrition support, with care and treatment for people living with HIV/AIDS. Sustaining progress made and supporting the work toward a shared vision of "Zero new HIV infections, Zero discrimination and Zero AIDS-related deaths," requires strong linkages with other sectors including social protection, nutrition and food security, and education. This programming guide is a resource for designing and implementing such comprehensive programs that integrate food and nutrition support as part of comprehensive treatment, care and support.



WFP Executive Director



UNAIDS Executive Director



U.S. Global AIDS Coordinator

ACRONYMS

AIDS	acquired immunodeficiency syndrome
BMI	body mass index
DOTS	directly observed treatment, short course
FANTA	Food and Nutrition Technical Assistance
FBF	fortified blended flours
HIV	human immunodeficiency virus
IEC	information, education and communication
IMAI	Integrated Management of Adolescent and Adult Illness
MUAC	mid-upper arm circumference
NAC	nutrition assessment and counselling
NACS	nutrition assessment, counselling and support
NGO	nongovernmental organization
PEPFAR	United States President's Emergency Plan for AIDS Relief
PLHIV	people living with HIV
RNI	recommended nutrient intake
RUTF	ready-to-use therapeutic food
TB	tuberculosis
UNAIDS	Joint United Nations Programme on HIV/AIDS
WFP	United Nations World Food Programme
WHO	United Nations World Health Organization

INTRODUCTION

This programming guide provides practical guidance for the planning and implementation of food and nutrition support as part of treatment, care and support programmes for human immunodeficiency virus (HIV) and tuberculosis (TB). Food and nutrition support can be a component of programmes that address either HIV or TB. However, it is advisable for HIV and TB to be addressed at the same time and for linkages between the programmes to be formed, as the support is often being provided to the same individuals. Food and nutrition support includes nutrition assessment, counselling and support, collectively known as NACS.

The programming guide also provides an overview of some aspects of food assistance. It aims to be a common resource for national governments; cooperating nongovernmental organizations (NGOs); and staff of the World Food Programme (WFP), World Health Organization (WHO), Joint United Nations Programme on HIV/AIDS (UNAIDS), United States President's Emergency Plan for AIDS Relief (PEPFAR), Food and Nutrition Technical Assistance III (FANTA III) and other agencies providing technical assistance as part of HIV and TB prevention, treatment, care and support programmes. Because the areas of targeting, implementation, and monitoring and evaluation have been addressed in the handbook *Food assistance programming in the context of HIV (1) and the Monitoring and evaluation guide for HIV and TB programming (2)*, these topics will not be covered in depth here.¹

Objectives and audience

This programming guide summarizes the biological, behavioural and contextual rationale for food and nutrition interventions as part of HIV and TB prevention, treatment, care and support programmes, and how these interventions can be implemented in a variety of settings.

More specifically, the objectives of this programming guide are to:

- increase understanding of the role of food and nutrition in the context of HIV and TB treatment in adolescents and adults;
- help build the skills of policy-makers and programme managers in integrating food and nutrition support into the comprehensive response to HIV and TB; and
- provide information on the implementation of food and nutrition support as part of HIV and TB programmes.

This information may be useful to a broad audience, including:

- national and subnational authorities (governments and policy-makers);
- programme managers, and national and international organizations;
- staff of WFP, WHO, UNAIDS and other United Nations cooperating partners; non-governmental organizations (NGOs); associations of people living with HIV (PLHIV); community members; and people working in HIV and TB treatment, care and support programmes; and

¹ The WFP Strategic Plan 2014–2017 has been approved, and all changes relevant to HIV and AIDS will be incorporated into the monitoring and evaluation guidelines.

- donors, including PEPFAR and the Global Fund to Fight AIDS, Tuberculosis and Malaria.

A note on terminology

Because many different organizations implement food and nutrition programmes in conjunction with HIV care and treatment services, terminology is not always used in a standardized way.

This programming guide considers comprehensive food and nutrition interventions as comprising three main elements: nutrition assessment, counselling and support (NACS). Nutrition assessment—including anthropometry, biochemical, clinical, dietary and household food security—is key to informing clinical management of PLHIV or patients with TB, and determining the appropriate support for the individual and their household.

Counselling, which may be provided to individuals or in group sessions, includes education linked to promotion of specific behaviours and actions. In some publications, NACS has been described as a combination of NAEC (nutrition assessment, education and counselling) and support; this programming guide considers education as an integral component of counselling and therefore uses NACS without referring separately to education.

Support consists of providing nutritious food to malnourished individuals, based on anthropometric entry and exit criteria (low body mass index or low mid-upper arm circumference). This is sometimes referred to as food by prescription, which emphasizes that therapeutic and supplementary feeding may be prescribed and provided to individual PLHIV or patients with TB as a critical component of comprehensive care and treatment, contributing to nutritional recovery and clinical improvement. Support can include additional nutrient supplementation (e.g. micronutrient supplements) and safe water treatment. It might also include transfers or other assistance to households that have undergone an income shock from the burden of caring for PLHIV, often coupled with the temporary or permanent loss of production, assets and income. Finally, support may include a variety of livelihood activities that aim to give affected households the tools to meet their basic needs, including food, so that they do not have to rely on long-term income transfers or food assistance.

Background

In many countries, national policy frameworks for HIV and tuberculosis (TB) have started to include food and nutrition support. Food and nutrition programmes are increasingly being developed and implemented as part of a comprehensive response to the HIV epidemic. Such programmes target the individual, but may also support households. For the individual, support is often in the form of prescription of specialized food products as medicine to treat people with acute malnutrition, or to supplement the diet of people with

clinical malnutrition. The aim of household support is to mitigate the impact of the illness on the household and ensure food security for the family. Support for households may be in the form of household food rations, often consisting of staple foods,² cash or vouchers. Both individual and household support can increase adherence to care and treatment.

Food and nutrition interventions are not stand-alone activities; they should be integrated as a key component of a minimum health-care package. They should empower people living with HIV (PLHIV) and patients with TB to manage, improve and maintain their nutritional status autonomously by giving them the knowledge and tools to do so. This requires broadly defined food and nutrition support, which encompasses not just support in the form of food supplements, but also nutrition assessment and counselling.

National frameworks need to address the HIV epidemic and TB in a comprehensive manner. Among major donors, there is currently a shift away from traditional vertical funding focused on a single disease towards multidisease funding streams with broader objectives and strengthening of health systems. Integrated HIV, TB, food and nutrition interventions can achieve both disease-specific and broader public health objectives. They should also be seen as ways of increasing investment return for existing HIV and TB treatment, care and support programmes.

Food and nutrition support can reduce the risk of morbidity and mortality through its impact on uptake of treatment, retention in care and adherence to treatment, as well as through reducing malnutrition. Food and nutrition support is also important for PLHIV who are not yet eligible for antiretroviral therapy. The 2013 World Health Organization (WHO) consolidated guidelines on the use of antiretrovirals for treating and preventing HIV infection (3) provide detailed guidance on when to start antiretroviral therapy in adults and adolescents (see Table 1). Targeted food and nutrition support for PLHIV and TB should be accompanied by counselling to improve treatment knowledge and preparedness, as well as to mitigate the impact of HIV on the household.

This programming guide provides comprehensive guidance on integrating food and nutrition support into HIV and TB programming, but it may need to be adapted to local context. The programming guide should enable appropriate decisions about planning and allocating available food and non-food resources to address the nutritional needs of PLHIV and TB patients in treatment, care and support programmes. The programming guide highlights the relevance of nutrition assessment, counselling and support (NACS), the often-neglected foundation on which food and nutrition support should be built.

The main focus of this programming guide is food and nutrition interventions for PLHIV and patients with TB, or more specifically, the following three target groups: adolescents and adults living with HIV; adolescents and adults with active TB; and adolescents and adults with both conditions. In this programming guide, the term 'PLHIV' refers to adolescents and adults living with HIV, and does not include children. Needs of other members of their households are also considered. Although it is not a central topic, this programming guide

² Staple foods are foods that are regularly consumed in a community or society and from which people obtain most, or a significant proportion of, their calorie requirements—for example, rice, maize, wheat, tubers or lentils.

also addresses the role that food and nutrition support plays in a comprehensive response to the HIV epidemic and TB.

The World Food Programme and the Albion Street Centre developed the programming guide in close collaboration with the Joint United Nations Programme on HIV/AIDS (UNAIDS) and the United States President's Emergency Plan for AIDS Relief. The Albion Centre is a WHO Collaborating Centre for Capacity Building and Health Care Worker Training in HIV/AIDS Care, Treatment and Support.

Development of the programming guide started in 2009, when WHO began a process to review the evidence for the role of food and nutrition support to prevent TB infections, and to improve the health status of TB patients and PLHIV. A guideline development group, the Nutrition Guidance Expert Advisory Group, was established for two years to review available evidence and draft guidelines for the nutritional care of patients with TB and PLHIV (including pregnant and breastfeeding women living with HIV), and for prevention of mother-to-child transmission of HIV. The guidelines for the nutritional care of patients with TB have been published (4). These provide guidance on the principles and evidence-informed recommendations for nutritional care and support for TB patients. Guidelines for an integrated approach to nutritional care of HIV-infected children (6 months – 14 years), and on HIV and infant feeding have also been published (5, 6), and systematic reviews of the evidence have been conducted to inform guidelines on the effects of nutrition interventions for PLHIV. Guidelines on the use of vitamin A supplementation during pregnancy for reducing the risk of mother-to-child transmission of HIV were also published; they noted that vitamin A supplementation as a public health intervention is not recommended for reducing the risk of mother-to-child transmission of HIV (7).

The programming guide will require updates on an ongoing basis, and a revised version is expected when new WHO recommendations are published.

Not all of the interventions described in this programming guide will be appropriate in every country and setting, and the guidance may need to be adapted to the local context. The scientific evidence provided in this programming guide is not exhaustive, nor is the list of suggested actions. Additional research on the continuum of implementation is required. This entails addressing the efficacy and safety of interventions (proof of concept), how these interventions work in real-world settings (proof of implementation), and how they can be integrated into health systems in a sustainable way (informing scaling up). Many programming guides already exist, particularly on the broader questions of nutrition assessment, education, counselling and support. This programming guide is not intended to replace them, but refers to and builds on them.

The programming guide is divided into four chapters:

- Chapter 1: HIV, AIDS and TB;
- Chapter 2: Nutrition, and HIV and TB;
- Chapter 3: Nutrition assessment, counselling and support; and
- Chapter 4: Provision of nutritious food.

CHAPTER 1 HIV, AIDS AND TB

Key messages

- Comprehensive HIV and tuberculosis (TB) prevention, treatment, care and support programmes are needed to improve the well-being of infected individuals and affected households at all stages of infection.
 - As antiretroviral therapy coverage increases in many countries, focus will gradually shift from the urgent response of enrolling people for treatment to a chronic disease approach, focused on improving adherence to treatment and retention in care—losing a person to follow-up not only increases mortality risk but also means that the investment made to date in that person’s health is lost.
 - Undernutrition in adolescents and adults increases early mortality and delays recovery from HIV-related disease and TB. In the longer term, it may also result in the need to manage chronic diseases, such as high blood pressure, diabetes and dyslipidaemia.
 - As part of the continuum of care, nutrition assessment and counselling (NAC) should be included in the comprehensive package of treatment and care, to support nutritional status and health. In specific situations, support—in the form of nutritious food, and household and/or livelihood support—may also be required (NACS).
 - In resource-limited settings, food and nutrition support are key enablers of accessing health services, and can support returning to a productive, quality life in the community.
 - Countries need assistance with framing and subsequently implementing national policies and guidance for integrating NACS as part of HIV and TB programming among adolescents and adults.
-

What is HIV?

HIV mainly infects cells of the immune system—CD4 T-cells and macrophages, which are key components of the cellular immune system—and destroys or impairs their function. Infection with HIV results in the progressive deterioration of the immune system, leading to “immuno-deficiency” (8).

The most common modes of transmission of HIV are (9):

- unprotected vaginal or anal sex with an HIV-infected person;
- sharing contaminated syringes, needles or other contaminated sharp instruments;
- transmission from an HIV-infected woman to her child during pregnancy, childbirth or breastfeeding; and
- blood transfusion with HIV-infected blood.

In a person living with HIV, the immune system is deficient when it can no longer fulfil its role of dealing with infections and diseases. Immunodeficient people are more susceptible to a wide range of illnesses, infections and diseases, most of which are rare or do not occur among immune-competent people, and they are also much more likely to develop TB. Illnesses associated with immunodeficiency are known as opportunistic infections because they take advantage of the weakened immune system (9).

Tremendous success has been achieved in the response to HIV in the past decade. Nearly 10 million of the 35.3 million people living with HIV are receiving treatment today. This represents 34% of the 28.3 million people who were eligible for treatment in 2013. The overall number of new HIV infections decreased by 33% from 2001 to 2012, and the number of deaths from AIDS declined by 30% from 2005 to 2012 (10).³ Enabling policy frameworks have accelerated progress in combatting the epidemic.

However, HIV remains one of the great challenges of our times. Issues of access to services, utilization of services and continuum of care (including retention in care and adherence to treatment) need to be addressed. A large number of eligible people who are in need of antiretroviral therapy do not start treatment because of low uptake of HIV testing, and losses between testing and initiation of treatment (11). A systematic review from sub-Saharan Africa estimates that only 65% of people living with HIV (PLHIV) who start antiretroviral therapy remain on treatment after three years (12); therefore, programmes that achieve high retention rates and good long-term adherence are needed to provide models for other programmes in similar contexts (13).

What is AIDS?

AIDS is an epidemiological definition based on clinical signs and symptoms. It is caused by HIV, and, if it goes untreated, will ultimately lead to death. There are various symptoms associated with HIV infection, as well as an array of opportunistic infections at various stages of the disease (14).

Many PLHIV have no obvious signs or symptoms of the disease (i.e. they are asymptomatic) for many years following HIV infection, and might not even know that they are HIV-positive. However, as HIV infection progresses, the immune system weakens, and the person is at an increased risk of developing serious illnesses, including opportunistic infections that affect the entire body with a wide array of symptoms (8). The natural history of HIV infection and its progression to AIDS are described in **FIGURE 1**.

The World Health Organization's (WHO's) clinical staging system for HIV-related disease in adolescents and adults is described below. It uses clinical parameters, such as signs and

3 The 2013 UNAIDS Global Report (p. 4) states: "Globally, an estimated 35.3 (32.2–38.8) million people were living with HIV in 2012. An increase from previous years as more people are receiving the life-saving antiretroviral therapy. There were 2.3 (1.9–2.7) million new HIV infections globally, showing a 33% decline in the number of new infections from 3.4 (3.1–3.7) million in 2001. At the same time the number of AIDS deaths is also declining with 1.6 (1.4–1.9) million AIDS deaths in 2012, down from 2.3 (2.1–2.6) million in 2005". Taking into account the 875 000 people receiving antiretroviral therapy in high-income countries, a total of 10.6 million people were receiving antiretroviral therapy as of December 2012.

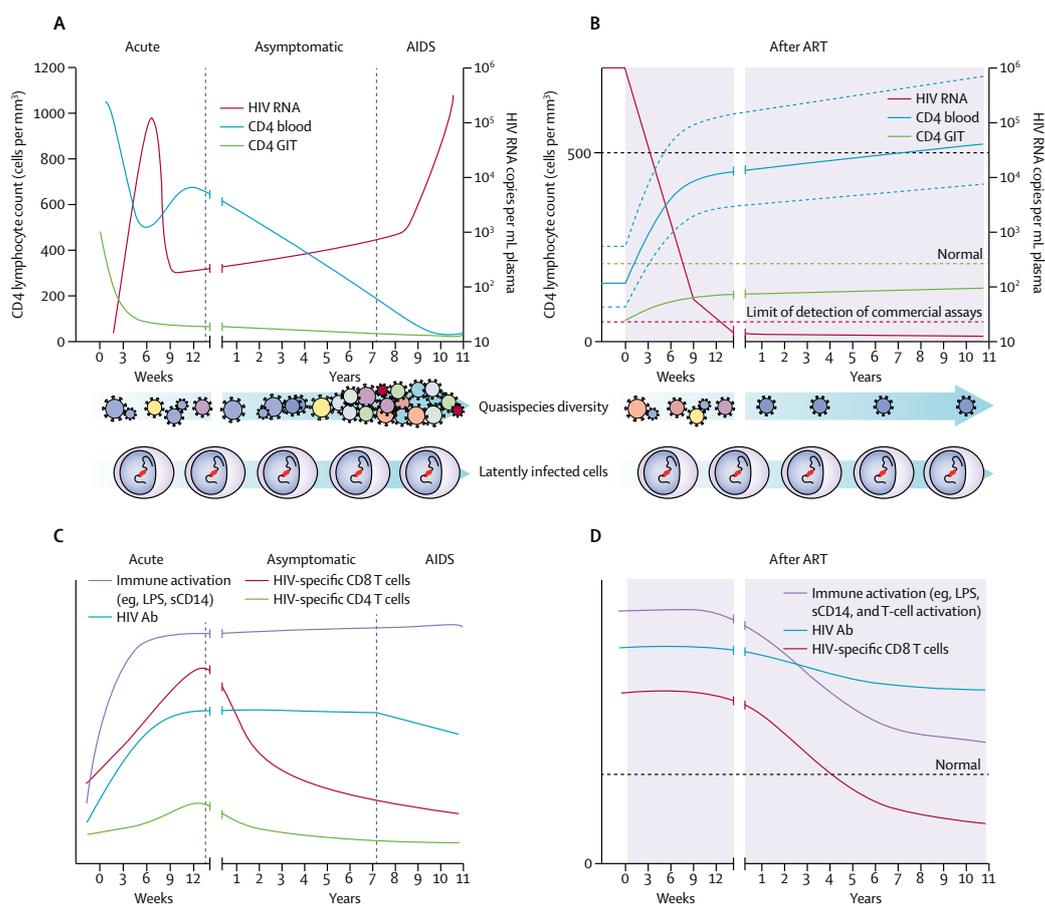


Fig. 1. Natural history and progression of HIV infection

(A): CD4 T cells are progressively lost in blood and the gut (rapidly depleted in the gut). The acute response to HIV infection causes a dramatic increase in markers of immune activation © and production of non-neutralising antibodies and HIV-specific CD4 and CD8 T cells that are associated temporally with a decrease in HIV RNA in blood. After antiretroviral therapy (B), HIV RNA decreases and CD4 T in blood cells increase while recovery of CD4 T cells in the gut is reduced. (D) With reduction of HIV RNA and viral antigens, HIV-specific T cells decrease after antiretroviral therapy and antibody persists in all patients. Immune activation decreases after antiretroviral therapy but in most patients remains significantly increased compared with healthy controls. GIT=gastrointestinal tract. LPS=lipopolysaccharide (15)
Source: Maartens (15)

symptoms, HIV-related opportunistic infections and associated conditions. In settings where CD4 testing is not routinely available, this system is used to guide clinical decision-making for the management of PLHIV (3).

There are four WHO clinical stages (3):⁴

- Clinical stage 1 involves asymptomatic or generalized swelling of the lymph nodes.
- Clinical stage 2 includes unexplained weight loss of <10% of body weight, minor mucocutaneous manifestations and recurrent upper respiratory tract infections.
- Clinical stage 3 includes weight loss of >10% of body weight, unexplained chronic diarrhoea, unexplained persistent fever, oral candidiasis, severe bacterial infections, pulmonary TB and acute necrotizing inflammation in the mouth; some people at clinical stage 3 have AIDS.
- Clinical stage 4 includes some opportunistic infections or cancers related to HIV; everyone at clinical stage 4 has AIDS.

⁴ The clinical staging of HIV disease in adolescents and adults can be found in Annex 1 of WHO (3).

What is TB?

TB is usually caused by the bacterium *Mycobacterium tuberculosis*. TB is the world's leading bacterial cause of death in humans and the second leading cause of death from infectious disease after the HIV epidemic (16). Furthermore, TB is the leading cause of mortality among PLHIV (17). HIV and TB coinfection has become a significant burden and challenge in many countries.

In 2012, an estimated 8.6 million people developed TB, and 1.3 million died from the disease (including 320 000 deaths among HIV-positive people) (18). An estimated 1.1 million (13%) of the 8.6 million people who developed TB in 2012 were HIV-positive. About 75% of these cases of coinfection were in Africa. Most TB cases and deaths occur in men, but TB is among the top three killers of women worldwide. There were an estimated 410 000 TB deaths among women in 2012, including 160 000 HIV-positive women. Half of the HIV-positive people who died from TB in 2012 were women. Of the estimated 8.6 million new TB cases worldwide in 2012, 2.9 million were women.

TB is most often spread through contaminated droplets in the air when a person with pulmonary TB coughs or sneezes. Approximately one third of the world's population is infected with TB, and 95% of them have the asymptomatic, noncontagious, latent form of TB (19). Around 5% of people will develop active, usually contagious, TB immediately after initial exposure. This is called primary progressive disease. The risk of developing primary progressive TB is higher in people who are undernourished or have a compromised immune system (due to HIV, for example). Undernutrition is both an important risk factor for, and a common consequence of, TB. It is therefore a common comorbid condition for people with active TB, and is associated with increased risk of mortality and poor treatment outcomes. Evidence shows that undernutrition is a risk factor for progression from TB infection to active TB. When present at the time of diagnosis of active TB, undernutrition is a predictor of increased risk of death and TB relapse (4). The 2013 WHO guideline on nutritional care and support for patients with tuberculosis recognizes the effect of undernutrition on TB, and acknowledges that nutrition assessment and care are critical components of improving rehabilitation and quality of life (4).

Fifty percent of adults in sub-Saharan Africa, and South and South-East Asia are infected with latent TB. Although noncontagious, people with immune systems weakened by HIV are at a higher risk of the infection reactivating and causing active TB, so this is an enormous pool of individuals at risk (4). The situation is further complicated by widespread malnutrition, increased mobility of people, and the emergence of multidrug-resistant and extensively drug-resistant TB.

Like HIV infection, undernutrition lowers immunity, increasing both the risks of activation of latent TB and primary progressive TB. Undernourished people or those with a recent weight loss of more than 10% of their body weight are at increased risk of reactivation of latent TB. Malnutrition is significantly associated with increased mortality among both PLHIV and TB

patients, and should be treated concurrently with both HIV and TB (4). For both HIV and TB, treatment is a prerequisite for nutritional recovery, in addition to intake of nutrients required for rebuilding tissues, which is constrained in food-insecure households.

When should PLHIV begin antiretroviral therapy?

WHO currently recommends that adolescents and adults begin treatment based on clinical staging (described in the previous section) and the CD4 count (see **FIG. 2**). If the clinical signs and symptoms correspond to those of clinical stages 3 and 4, antiretroviral therapy is indicated regardless of the CD4 count (3). However, all pregnant and breastfeeding women with HIV should initiate treatment with a triple antiretroviral drug combination, and this should be maintained for at least the duration of the risk period for mother-to-child transmission.

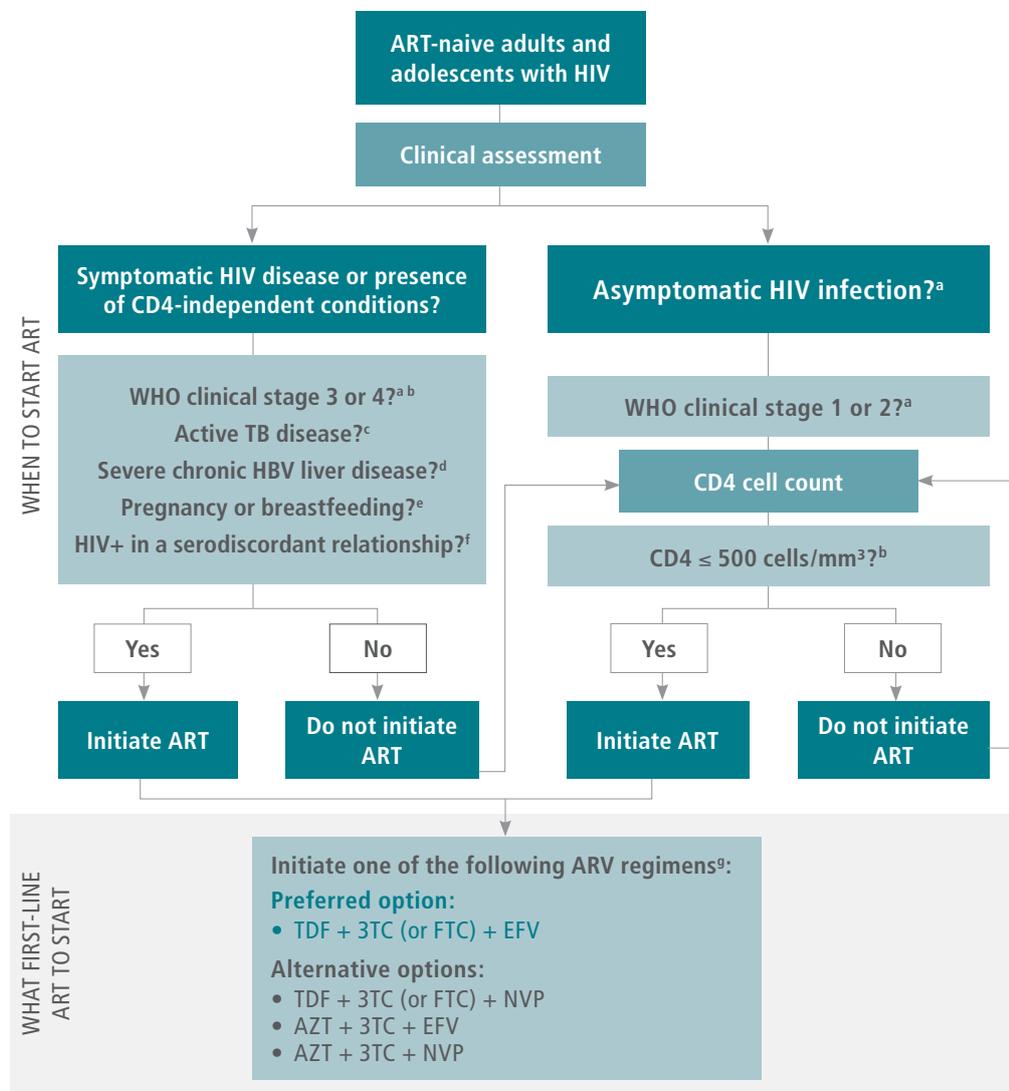
Standard antiretroviral therapy consists of at least three antiretroviral drugs to suppress viral replication and stop the progression of HIV (3). When a person knows that they are HIV-positive, clinical examination and specific blood tests can estimate the stage and progression of the infection, and the extent to which antiretroviral therapy, if started, will be effective in controlling the virus. Two blood tests often used in HIV management are the CD4 cell count test and the HIV viral load test (3).

The CD4 cell count test measures the number of CD4 T-cell lymphocytes in the bloodstream; these cells are vital for an effective immune response to infection. A normal CD4 count for an HIV-negative person will range between approximately 500 and 1200 cells per cubic millimetre (mm^3) of blood. A person with a CD4 count below 350 cells/ mm^3 is at greater risk of contracting HIV-related opportunistic infections and diseases (20, 21).

The HIV viral load test estimates the number of copies of the HIV RNA per millilitre of blood. It is used to monitor treatment response; effective antiretroviral therapy should result in a lowering of viral load (viral suppression) to an “undetectable” level (e.g. less than 50 copies per millilitre) (3).

In 2013, the threshold for CD4 count was raised from 350 to 500 cells/ mm^3 in light of evidence showing that earlier initiation of treatment can reduce long-term morbidity and mortality in PLHIV (3). Currently, many PLHIV are not tested until they show the first symptoms of advanced HIV infection or AIDS, with CD4 counts far below even the previous threshold of 350. As a result, many are underweight. As people start treatment at a higher CD4 count threshold (<500 cells/ mm^3), it is likely that most will not be symptomatic, and it can be anticipated that the predominant focus on malnutrition and nutrition support for PLHIV initiating antiretroviral therapy may need to change significantly.

PLHIV are at increased risk of metabolic syndrome, diabetes or cardiovascular diseases. This is due to both the HIV infection itself and adverse events associated with some antiretroviral drugs (22). Nutrition assessment, counselling and support (NACS) are important during



^aAnnex 1 lists the WHO clinical staging for HIV disease.

^bART initiation in individuals with severe or advanced symptomatic disease (WHO clinical stage 3 or 4), regardless of CD4 cell count, or with CD4 count ≤350 cells/mm³, regardless of clinical symptoms, should be prioritized.

^cActive TB disease refers to the time when TB breaks out of latency and causes disease. Latent TB infection refers to the period of time when the immune system has been successful in containing the *Mycobacterium tuberculosis* and preventing disease.

^dSevere chronic liver disease includes cirrhosis and end-stage liver disease and is categorized into compensated and decompensated stages. Decompensated cirrhosis is defined by the development of clinically evident complications of portal hypertension (ascites, variceal haemorrhage and hepatic encephalopathy) or liver insufficiency (jaundice).

^eFor details on ARVs for pregnant and breastfeeding women with HIV (Option B and Option B+), see Annex 3 and sections 7.1.2, 7.1.3 and 7.2.2.

^fA HIV-serodiscordant couple is a couple in which one of the sexual partners is HIV-positive and one is HIV-negative. Although one partner is currently HIV-negative, this does not mean that this partner is immunized or protected against getting HIV in the future.

^gFor adolescents weighing less than 35 kg, refer to the algorithm for children in annex 4 which indicates the appropriate first-line ARV regimen options.

Fig. 2. WHO criteria for initiation of antiretroviral therapy in adolescents and adults

Source: WHO (3).

the early period of treatment and in the long term. For PLHIV who start treatment with a low body mass index (BMI), the main focus is on rapid weight gain and return to normal BMI through a healthy, balanced diet and treatment, with the overall goal of reducing the risk of illness and death. As for people who are not infected with HIV, proper nutrition is important for managing chronic noncommunicable diseases such as insulin resistance and dyslipidaemia.

In addition to the WHO key recommendations (20), several factors can be considered when initiating treatment:

- **Patient consent and understanding of what antiretroviral therapy is and its possible side effects.** Not all PLHIV are eligible for antiretroviral therapy, and not all who are eligible choose to take antiretroviral therapy even when clinically indicated. Before consenting and starting antiretroviral therapy, patients need to understand what it is, its benefits and its side effects.
- **Adherence.** Once begun, antiretroviral therapy should not be discontinued. It is therefore important that the person is ready to start such treatment and to adhere to it for life.
- **Support.** PLHIV may sometimes face barriers to adhere to treatment because of forgetfulness, change in daily routine, treatment fatigue, pill burden and drug side effects. Patients benefit from support, especially during the initial stages of treatment, ideally from someone who is also on antiretroviral therapy and has experience with treatment. Family members and peers can play a supportive role if they are aware of the individual's diagnosis.
- **Treatment follow-up.** It is important to monitor treatment response, clinical improvement, weight gain and decline in viral load. The treatment regime may need to be changed as a result of adverse side effects or treatment failure.

What are comprehensive HIV prevention, treatment, care and support?

HIV prevention, treatment, care and support services are needed at all stages of infection. HIV care and support encompasses a comprehensive set of services, including nutritional, psychosocial, physical, socioeconomic and legal care and support. These are essential to the well-being of both PLHIV and other members of their households, and should be provided regardless of the infected person's ability to access, and eligibility to start, antiretroviral therapy (23).

The number of PLHIV accessing antiretroviral therapy is growing, and the number eligible for treatment is also increasing, with the change in the WHO eligibility criteria. However, important challenges remain in ensuring that people who start treatment stay on it. In resource-limited settings, several factors can prevent people from accessing treatment for both HIV and TB (see the box for country-specific examples) (24–28).

Country examples from Ethiopia and Uganda on barriers to adherence to antiretroviral therapy

A study conducted in Ethiopia (24) showed that lack of food and nutrition support was the second most cited reason for failure to continue treatment. A number of other studies have reported that food insecurity is an important barrier to drug and treatment adherence in underresourced settings in general, including for TB.

Research in Uganda (26) showed that:

- treatment increased appetite and led to “intolerable hunger in the absence of food”
- side effects of antiretroviral therapy were exacerbated by the presence of underlying anaemia
- participants believed “they should skip doses or not start on antiretroviral therapy at all if they could not afford the added nutritional burden”
- costs of food and medical expenses led people either to default from treatment or to give up food and wages, and medication was sometimes forgotten while working in gardens or plots.

The following barrier categories have recently been proposed (29).

Economic barriers—the resource situation of the individual, including:

- food insecurity;
- lack of physical access to testing and health-care services; and
- cost of health care, including direct costs of medications, diagnostics and consultation fees; and indirect costs, such as transport and incidental costs.

Social norms—interaction of the individual with household members and other members of society, including:

- gender relations;⁵
- lack of adequate communication with health professionals;
- difficulty in disclosing HIV status or presence of active TB infection;
- laws that create service barriers for PLHIV; and
- HIV- and TB-related stigma and discrimination.

Physiology—effects of illness and treatment on body function (e.g. side effects, appetite).

Psychology—the psychological situation and knowledge of the individual, including personal interpretation of the above factors.

⁵ Evidence shows that men generally have limited access to HIV testing, care and treatment services; they are less retained in care than women. In some settings, AIDS-related mortality is higher among men living with HIV than among women living with HIV. At the same time, women and girls are in almost all contexts more susceptible to HIV infection, often as a result of unequal power relationships within society and the household, and/or greater economic dependency.

Challenges with access and adherence to treatment should be addressed through comprehensive care—sometimes referred to as the continuum of care—which includes various health-care, welfare and social support services. These should focus holistically on both the medical and socioeconomic determinants of access and adherence, and can combine health-service, community and household delivery platforms.

Details of the components of comprehensive care are provided below.

Key elements in HIV prevention, treatment, care and support services:

- Prevention of HIV transmission, including prevention of mother-to-child transmission during pregnancy, delivery and breastfeeding.
- Reproductive health services, particularly prenatal and antenatal care to assist pregnant and lactating women, provision of condoms, and treatment of sexually transmitted infections.
- Access to HIV testing (including provider-initiated testing and counselling, and client-initiated testing and counselling), behaviour change programmes and antiretroviral therapy.
- For people receiving care and treatment for HIV and TB who are clinically malnourished, especially in food-insecure contexts, food supplements may be required for a limited period in addition to antiretroviral therapy, to ensure that appropriate foods are consumed to support nutritional recovery (that is, food by prescription) (3, 30).

Examples of social and economic support:

- Food assistance for the households of PLHIV or TB patients who are on treatment, where appropriate, especially when the most productive members of the household are unable to manage their day-to-day activities owing to illness; nutritious food provided to individuals on treatment for nutritional recovery also acts as a “buffer” as they prepare to re-engage in income-generating activities.
- Peer support and community-based support groups.
- Livelihood support and training, microfinance, vocational training and programmes that help HIV-affected households maintain or rebuild their income, savings and overall livelihood security.

Examples of clinical care and treatment (3):

- Diagnosis and treatment of opportunistic infections, including diarrhoea, sexually transmitted infections, TB or malaria, which can all worsen nutritional status.
- Provision of prophylaxis (prevention) for opportunistic infections, including cotrimoxazole prophylaxis (CPT) and isoniazid preventive therapy (IPT).
- Provision of antiretroviral therapy, TB treatment and follow-up services.
- Patient counselling and education.

- Nutrition assessment, counselling and support (NACS), including management of individuals who are malnourished.⁶

What is the rationale for including nutrition and food support in comprehensive care programmes?

HIV has dramatic consequences for entire communities, especially where malnutrition and food insecurity are already prevalent. Of the 2 billion people suffering from micronutrient deficiencies, many are in countries with high HIV and TB prevalence, and high levels of undernutrition. In resource-limited settings, where food insecurity affects many households, people are more vulnerable to high-risk sexual behaviour that may increase their risk of HIV transmission. HIV infection then increases vulnerability to undernutrition by exacerbating poverty and food insecurity, as a result of additional expenditures on accessing medical care, and the often simultaneous loss of income due to prolonged illness and stigma. Psychosocial factors—depression and alcohol use—may also have adverse effects on HIV-related outcomes (31). Individuals may resort to selling assets, leading to long-term damage to the household's economic sustainability. Such asset erosion can also occur during the treatment phase, when the costs associated with accessing services, adhering to treatment and maintaining adequate food consumption have to be met. As income decreases, households will often purchase poorer quality, less nutritious foods, limiting the consumption of nutrients by all household members (32).

The negative impacts of malnutrition, HIV and TB reinforce each other (33). This vicious cycle is described in more depth in Chapter 2. PLHIV require more calories than people who are HIV-negative. At the same time, HIV and associated opportunistic infections undermine the immune system, limiting nutrient intake, absorption and use. In the absence of treatment, undernutrition weakens the immune system even further, which increases susceptibility to infections, lowers quality of life and increases mortality risk. Because of the significant association between low BMI and mortality among both PLHIV and TB patients (34–36), patients should be treated for all three conditions (HIV, TB and malnutrition) concurrently.

Rationale for food and nutrition considerations in HIV care and treatment programmes:

- Low BMI is associated with higher mortality during the early phases of antiretroviral therapy.
- Food and nutrition can improve adherence to treatment and retention in care.
- Food and nutrition can support recovery and return to a productive life.

⁶ While this programming guide focuses mostly on adults and adolescents, NACS would have to be provided to children as well (i.e. growth monitoring and basic child health services to promote the health of infants and young children, and clinical management of severely malnourished children).

Mortality risk is particularly high during the first few months of treatment and is inversely proportional to BMI: PLHIV on antiretroviral therapy with a low BMI are more likely to die than PLHIV with a normal BMI (34–36). A BMI below 18.5 is a sign of undernutrition and an independent predictor of early mortality within six months of initiation of antiretroviral therapy. For this reason, nutritional recovery in the early phase of treatment is imperative. Some studies show an association between early weight gain when receiving antiretroviral therapy and improved treatment outcomes (37, 38). Improving nutritional status requires a combination of antiretroviral therapy; treatment and control of opportunistic infections, enabling the body to make good use of nutrients and re-establish appetite; and a diet that meets nutrient requirements in terms of energy needs and micronutrient content.

Malnourished PLHIV, especially in food-insecure contexts, may require food supplements, in addition to antiretroviral therapy, to ensure that appropriate foods are consumed to support nutritional recovery (3). In studies among PLHIV in Haiti, food assistance was associated with improved food security, increased BMI and improved adherence to clinic visits at 6 and 12 months (39). Most studies have found that providing food to food-insecure patients when they initiate antiretroviral therapy or TB treatment improves adherence to antiretroviral therapy (40). Research on the clinical benefits of different types of food supplementation for PLHIV—that is, to treat undernutrition or support treatment adherence—is urgently needed to inform global policy (41).

What is the role of food and nutrition support in achieving universal access and adherence in lifelong chronic HIV treatment and care?

Access to antiretroviral therapy is increasing in resource-limited settings. As treatment coverage expands, focus of treatment will gradually shift from an urgent response of enrolling people for treatment to a chronic disease approach, which focuses on improved adherence to lifelong treatment and retention in care. Losing a patient to follow-up not only increases mortality risk but also means that the investment made to date in that patient's recovery is lost.

Appropriate dietary and nutrition management is essential for all people at all stages of HIV. In some settings, food and nutrition interventions are significantly connected with treatment uptake, making them essential components in attaining the goal of universal access to treatment and care. For PLHIV who are already on treatment, adequate nutrition counselling can greatly assist in controlling food and drug interactions (e.g. the bioavailability of certain medication might be altered by the type of food), and treatment side effects. PLHIV in food-insecure households might find it particularly difficult to take up or adhere to antiretroviral therapy if they have to choose between purchasing food and accessing treatment services that could involve significant transport costs. Additionally, individuals might not tolerate the side effects of antiretroviral therapy on an empty stomach, or may fear the return of an appetite that they might not be able to satisfy with the food they have available. In these cases, many PLHIV may require food supplements to complement their home diet and meet nutrient requirements.

CHAPTER 2 NUTRITION, AND HIV AND TB

Key messages

- Food and nutrition support is essential in managing HIV infection before and during antiretroviral therapy, as well as for managing tuberculosis (TB) infection and treatment.
- Adequate calorie and nutrient intake, combined with treatment, is needed to manage malnutrition and maintain good nutritional status.
- Food and nutrition support is provided to:
 - enhance the impact of antiretroviral therapy, particularly for early recovery and return to a productive, quality life;
 - enable adolescents and adults living with HIV and with active TB infection to seek earlier diagnosis and access treatment; and
 - promote treatment adherence and retention in care.

Introduction

Nutrition is important at all stages of HIV and TB infection. The vicious cycle of undernutrition and HIV, which also applies to TB and other infections, is shown in **FIG. 3**. HIV affects the immune system, increasing the risk of opportunistic infections and diseases. In turn, infection increases nutritional needs while increasing nutrient losses, and reducing intake and absorption of nutrients. The ensuing deterioration of nutritional status affects the immune system and body strength, and the cycle continues with disease progression and further worsening of nutritional status. This chapter discusses the relationship between HIV or TB infection and nutrition. It also addresses ways to reduce and reverse this deteriorating cycle

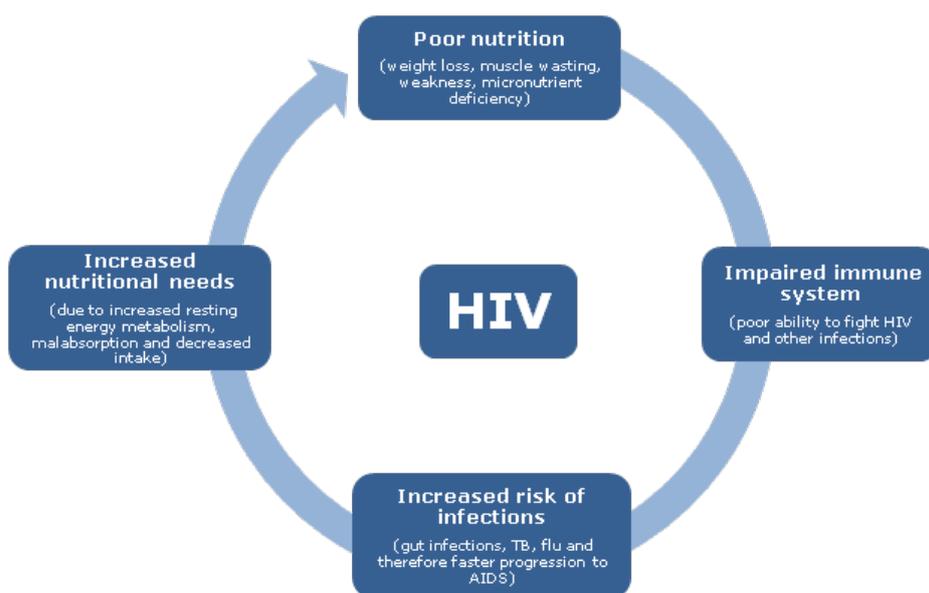


Fig. 3. The vicious cycle involving HIV infection and undernutrition

Source: Adapted from Regional Centre for Quality of Healthcare (100).

with a combination of medical treatment and good nutrition. The focus is on resource-limited settings.

What is the evidence for the role of nutrition in TB incidence?

Approximately one third of the world's population and one half of all adults in sub-Saharan Africa, and South and South-East Asia are infected with TB and therefore at risk of developing active TB. Undernutrition, in addition to HIV infection, increases the risk of active TB in people with latent TB infection. Good nutrition is therefore important, especially for people who are in contact with someone with active TB (including health workers and members of patients' households). Observational studies from World War I, before TB drugs were available, show how TB incidence in Denmark fell when the quality of the diet improved after food exports ceased. This was also seen in British prisoners of war who received extra food from the Red Cross, compared with Russian prisoners of war who did not (38). In both cases, a lower TB incidence was observed when the consumption of dairy foods, vegetables, fruits and meat, in particular, was higher.

This illustrates that nutrition, and specific nutrients in particular, support the immune system, preventing people from developing common colds and influenza, and also active TB. Similarly, good nutrition helps maintain good health among people living with HIV (PLHIV) who are not yet eligible for antiretroviral therapy (42).

Why are food and nutrition interventions needed during HIV and TB treatment?

In resource-limited settings, the HIV epidemic and TB infections are often highest where undernutrition is already prevalent. Many patients first present to the clinic undernourished and in an advanced stage of disease, and undernutrition is associated with high mortality in the early months of treatment (34–36). The faster that nutritional recovery can be achieved through nutritional support, in combination with antiretroviral therapy or TB treatment, the better.

For food-insecure families, receiving food or other support (vouchers, cash or transport) can be very important in compensating for lost income and alleviating costs related to seeking care, including a diagnosis. Awareness of HIV status is linked with prevention, accessing treatment and care, and adherence to treatment. Receiving food and other support is particularly important at the beginning of treatment when people are still recovering from opportunistic infections and undernutrition, and regaining the ability to earn an income.

As adolescents and adults living with HIV stay on treatment for life, adequate nutrition remains important, but the nature of nutrition challenges changes. After many years of treatment, they may face an increased risk of high blood pressure, diabetes, heart disease, reduced bone density and/or dyslipidaemia. Many may have been at risk of these conditions irrespective of their HIV infection, and the HIV infection, as well as its ongoing treatment,

may increase their risk (22). A healthy diet can contribute to managing these conditions, and regular monitoring is important.

Although TB patients, whose treatment is finite, do not face the same longer term health issues, they often struggle to rebuild lean body mass (mostly muscle tissue) while on treatment and shortly afterwards; this phenomenon is also observed among people recovering from long periods of other illnesses (43). For both HIV and TB, nutrition plays an important role in maintaining or improving health.

What interventions are required to restore health and nutritional status among adolescents and adults living with HIV and with active TB?

FIG. 4 summarizes how HIV and malnutrition reinforce each other, and how malnutrition is a consequence of poverty and food insecurity, both of which are very common in resource-limited settings. It also shows the different pathways through which HIV affects nutrition, including food intake, nutrient absorption and metabolism.

It is important to remember that, in PLHIV and TB patients, it is the *combination* of medical treatment and improved food intake that allows for nutritional recovery. Medical treatment is required for HIV infection and opportunistic infections. Treatment of infections improves nutrient absorption and metabolism, although it may also have adverse metabolic consequences. Treatment thereby paves the way for food and nutrition support to have a greater impact on rebuilding tissues and improving nutritional and health status.

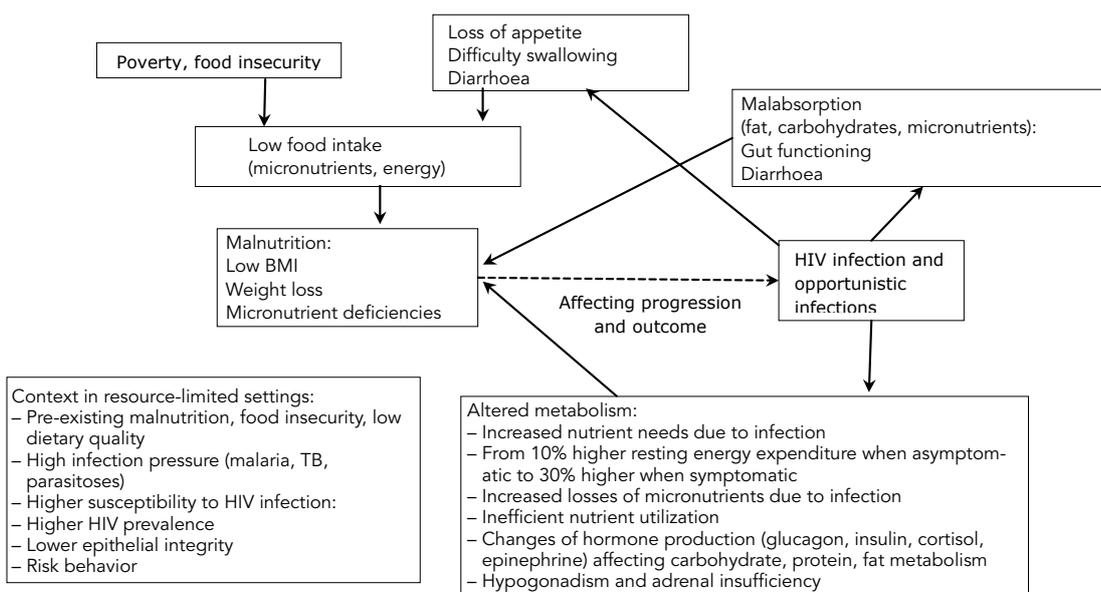


Fig. 4. Relationship between HIV and malnutrition

Source: De Pee S, Semba RD (38).

The more advanced the disease stage, the more challenging it is to manage HIV (including opportunistic infections and other diseases), to treat factors that affect food intake (such as mouth ulcers and loss of appetite) and to restore nutritional status.

What are the nutritional needs of people living with HIV and patients with active TB?

To provide effective nutrition counselling and support, health providers need to be aware of the increased nutritional needs of adolescents and adults living with HIV and TB infection who are receiving treatment. **TABLE 1** shows the macronutrient intake guidance from the World Health Organization.

Energy intake

A 10% increase in energy intake is recommended during asymptomatic HIV infection to make up for increased resting energy expenditure (44). However, it is important to note that weight loss during HIV infection is mainly a result of reduced food intake as a consequence of reduced appetite (45). Careful study (in developed countries) of the energy balance of asymptomatic PLHIV has shown that reduced physical activity often compensates for the increased energy needs of resting metabolism (46), meaning that there may not be a negative energy

Table 1. WHO recommended macronutrient intake for adolescents and adults living with HIV

Nutrient/population group ^a	Recommendation ^b
Energy	
Asymptomatic HIV+ adults	Increase of ~10%
Adults with symptomatic HIV infection or AIDS (including pregnant/lactating women)	Increase of ~20–30%
Asymptomatic HIV+ children	Increase of ~10%
Children experiencing weight loss (regardless of HIV status)	Increase of ~50–100%
Children with severe acute malnutrition	No change from WHO guidelines
Protein	
All population groups	No change indicated in the relative proportion of protein, although absolute quantities would increase with increased energy intake (10–12% of total energy intake)
Fat	
Individuals who are HIV or HIV+ but not taking ARVs	No change indicated (>17% of total energy intake)

ARV: antiretroviral drug; HIV+: HIV-positive; HIV-: HIV-negative.

^a Although this programming guide does not address children, we have left the recommendations for children here for completeness.

^b Compared with normal dietary requirements recommended by WHO.

Source: WHO (44).

balance or need to consume more energy. In other words, once physical activity is reduced, energy intakes may not need to be much higher than when the person was not infected with HIV. Monitoring weight changes is the best indication, at the individual level, of whether energy needs and intake are aligned.

However, if people are involved in physical labour and unable to afford a reduction in physical activity, and if meeting normal energy requirements is already difficult, increasing energy intake by 10% during asymptomatic infections is reasonable advice. During periods of symptomatic infection, energy expenditure increases by 20–30%, and therefore the recommendation is to increase energy intake by 20–30% during symptomatic infection and shortly after it (during the convalescence period) (45). Energy requirements of PLHIV on antiretroviral therapy are not well known and are likely to vary according to clinical condition. However, they are very unlikely to be lower than for people without HIV infection or higher than during symptomatic infection. Monitoring weight is the best way to determine whether an individual is meeting their energy needs.

It is important to note that certain life stages have increased recommended energy intakes that need to be added to the increased requirement due to HIV infection. In adolescence, requirements for energy are highest during the period of peak growth, particularly in boys, who gain a greater amount of height and lean body mass than girls (47).

The recommendations for increased energy intake at different life stages are shown in **TABLE 2** (48).

Protein intake

The recommended percentage of energy intake from protein is the same for PLHIV as for HIV-negative people. However, when energy intake is increased, the total amount of protein should also be higher for PLHIV. Furthermore, to treat undernutrition, it is important that the protein sources provide enough of the essential amino acids. This means that there should

Table 2. Increased energy requirements at various life stages

Life stage	Increased energy requirements (kcal/day)
Pregnancy, first trimester ^a	85
Pregnancy, second trimester ^a	285
Pregnancy, third trimester ^a	475
Lactation (first 6 months), ^b well nourished, good gestational weight gain	505
Lactation (first 6 months), ^b undernourished, poor gestational weight gain	675

^a Additional energy will be required for adolescent and undernourished pregnant women; these requirements should be reduced if pregnant women are overweight or obese.

^b Energy requirements for milk production after six months are highly variable but should be considered.

be different sources of protein in the diet, including some with a high protein digestibility corrected amino acid score, such as soybeans or animal source foods, including dairy.

Fat intake

Recommendations for fat intake are the same for PLHIV as for people who are HIV-negative: 15–30% of energy intake should be from fat (49). Some PLHIV may have to increase their fat intake to achieve this level. To increase energy intake during convalescence, eating energy-dense foods, such as fatty foods and foods with a higher sugar content (e.g. fruit), may help to keep bulk relatively low so that energy intake can be higher. It is important to note that PLHIV should preferentially consume unsaturated rather than saturated fats. As a rule of thumb, oils and fats that are liquid at room temperature (20–25 °C) have a lower content of saturated fat. PLHIV should eat foods that are dense in a range of nutrients, including micronutrients.

Micronutrient intake

Because micronutrients are important for the immune system and other body functions, maintaining an adequate intake is very important for adolescents and adults living with HIV or with active TB. Although several studies have assessed the impact of micronutrient supplements among PLHIV, the composition of these supplements has varied widely. As a result, there is currently no definitive evidence on whether PLHIV should increase (or reduce) their micronutrient intake; which micronutrients they should consume more or less of; or which ‘cocktail’ of micronutrients would be best (38, 50). Therefore, the WHO recommendation to ensure consumption of 1 recommended nutrient intake (RNI) per day is still valid (44, 45). (RNI values are established by WHO and the Food and Agriculture Organization of the United Nations.) The South African Academy of Science recommends an intake of 1–2 RNI per day because of higher needs during infection and the likelihood of pre-existing deficiencies. Ensuring that these recommendations are met is particularly important for PLHIV because of the role of micronutrients in supporting the immune system and other body functions. Many people are unlikely to achieve the recommended intakes, especially when their diets lack diversity and do not include many animal source foods, fortified foods, fruits or vegetables. Micronutrient supplements may therefore be required.

General nutrient intake

Recommended nutrient intake depends on disease stage, age, physiological status (pregnancy or lactation) and physical activity. Furthermore, people consume foods rather than nutrients. To translate nutrient needs into food-based guidance, food preferences, as well as access to food, must be taken into account. Where undernutrition is widely prevalent, food insecurity and poor dietary diversity are likely to be problems, and meeting food-based guidance is often difficult. This is the reality for many people in resource-limited settings. Therefore, the sections below focus on the goal and form of possible food and nutrition support.

It is important to note that nutrient intake recommendations will be revised to take into account relevant new evidence.

What are the nutritional needs of acutely undernourished adults?

WHO recommendations for treatment of malnutrition in adults are not specific to PLHIV. However, severely malnourished adults (body mass index—BMI—of less than 16) should receive a therapeutic food that is nutritionally equivalent to F100 therapeutic milk. For initial treatment, people 19–75 years old should consume 40 kcal/kg/day of this therapeutic food, and people 15–18 years old should consume 50 kcal/kg/day.

According to WHO, moderately malnourished adults can be given supplementary foods such as fortified blended foods, compressed bars, biscuits or lipid-based nutrient supplements (51–53). Most specialized food products for treating severe acute malnutrition were formulated for children. For adults, it is best to use a product that is adapted to their taste preferences and has a reduced content of some nutrients (in particular, iron, zinc, copper and vitamin A) because adults with severe acute malnutrition have higher energy needs than children and therefore have to consume a higher absolute amount of the product.

What kind of food and nutrition support should be provided to adolescents and adults on antiretroviral therapy or receiving TB treatment?

As discussed above, good nutrition, composed of adequate calories and nutrients, is essential to all PLHIV (before and during antiretroviral therapy) and to people on TB treatment. This applies both to resource-adequate and to resource-limited settings. Nutrition assessment, counselling and support (NACS) should be universal. It should be tailored to the nutritional needs and circumstances of the individual patient receiving antiretroviral therapy, before and during different stages of treatment (early, later and stabilized), or TB treatment.⁷

Some patients may not put nutrition counselling advice into practice because they lack access to appropriate foods for economic or availability reasons. In these cases, food support might be provided, with a specific focus on nutritious foods, including fortified foods that can be added to the usual diet.

Most nutrition support programmes for adolescents and adults living with HIV and with active TB provide food and nutrition support when treatment is initiated, usually to support the recovery of lost body weight. To recover weight, patients need to eat specific foods that provide the nutrients required for rebuilding tissues (muscle mass and fat mass) and restoring body functions. Support for treatment initiation and adherence may require specific foods to manage side effects, including nausea and lack of appetite. PLHIV may also require support to offset the opportunity costs of accessing treatment, and compensate for their loss of income

⁷ Approximately half of all adults in sub-Saharan Africa and South and South-East Asia are infected with TB, making it imperative that the nutritional status of the general population is also prioritized.

and livelihood following prolonged illness. This support can be in the form of food, as well as cash or vouchers (e.g. for transport or food) (54).

Ready-to-use therapeutic food (RUTF) is often prescribed for severely malnourished adults (BMI <16), but many adults are unable to consume large amounts of RUTF. Some programmes therefore prescribe RUTF in combination with a fortified blended food such as corn–soya blend (CSB) (54).

When specialized food products are provided to help people recover lost weight and return to a normal BMI (18.5–25.0), this support is usually stopped when BMI has become normal. Antiretroviral therapy is a lifelong treatment, whereas TB treatment lasts for six months, depending on national guidelines and treatment response to a first- or second-line treatment regimen.

The impact of food and nutrition support on treatment success depends on many factors (see FIG. 5). It is important that these factors are taken into account when programme impact on undernutrition and treatment outcome is being evaluated.

What is the role of nutrition support to enable access to health services?

As mentioned above, food support also enables access to diagnosis, especially for TB, and treatment initiation and adherence. This is mainly because it offsets the opportunity costs, such as transport costs, of gaining access to treatment (55).

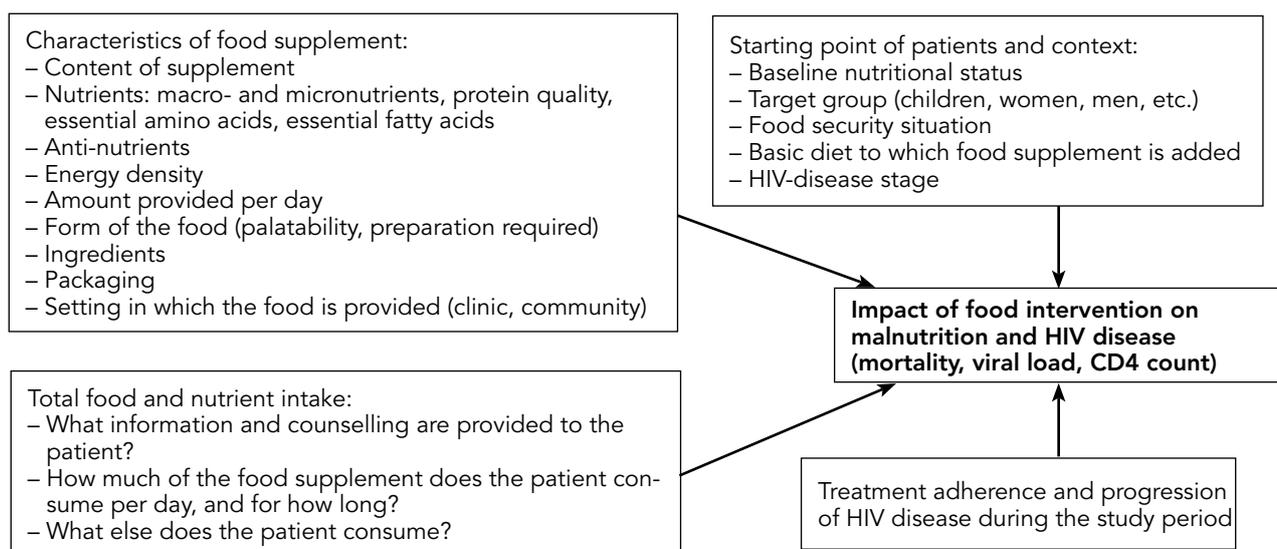


Fig. 5. Factors affecting the impact of food support interventions on malnutrition and HIV disease outcome

Source: De Pee S, Semba RD (38).

Compensation for real and opportunity costs can be very important in helping people to access health care. This compensation can be provided in different forms, including cash, vouchers for food or transport, and a family ration. For PLHIV, such support may focus on the initial treatment phase, when they may need to make frequent visits to clinics and their clinical condition makes it difficult to work steadily to earn income. In some settings, TB patients receive such support throughout the treatment period to improve access to services, because treatment takes place over a much shorter period.

For equity and clinical reasons, specialized food products are prescribed to treat malnutrition on the basis of strict anthropometric entry and exit criteria (low BMI or low mid-upper arm circumference). Without these criteria, food-insecure people who are not malnourished might argue that they should also be eligible for this kind of food support. At the same time, specialized food products provided to treat malnutrition may serve as incentives for initiating or adhering to treatment, as can other household food support.

While incentives play an important role in increasing uptake of antiretroviral therapy and initial adherence, they are also important for promoting universal access to treatment. On the service provision side, health systems need to bring quality and reliable care closer to people. On the demand side, people need to seek services. How long food support is provided depends on improvement in nutritional status (in the case of specialized food products), the patients' ability to earn a living and the opportunity costs of accessing treatment.

Key messages

- Nutrition assessment, counselling and support (NACS) is an organizing framework of comprehensive nutrition services. It emphasizes the strengthening of health systems and the linking of nutrition with other relevant sectors and stakeholders along a continuum of care.
 - NACS improves the quality of care and aims to decrease morbidity and mortality associated with HIV and tuberculosis (TB) by improving or maintaining nutritional status, improving treatment adherence and helping to prevent nutrition-related chronic diseases, such as metabolic syndrome, cardiovascular disease and diabetes.
 - The NACS approach can be integrated into the continuum of care, and engage people living with HIV (PLHIV) and patients with TB in the delivery of nutrition services.
 - Countries should adopt policies and procedures that clearly outline how NACS services are to be delivered within each national context as an integral part of health services. The range and nature of service needs to be adjusted to each context, as appropriate.
 - Staff who deliver nutrition services should be adequately trained and mentored to give clear, tailored and effective messages to address the person's individual nutritional needs.
-

Chapters 3 and 4 address the incorporation of nutrition into programme design, specifically focusing on the NACS framework. NACS aims to decrease HIV- and TB-related morbidity and mortality, while improving the quality of care at each stage of the continuum of care.

Chapter 3 discusses the different components of NACS and how they fit within comprehensive HIV and TB care programmes, as well as the broader policy framework of nutrition interventions. It also considers the programme requirements and supportive interventions that are needed to integrate NACS into treatment, care and support.

Chapter 4 covers the provision of food support interventions (the “S” in NACS).

How does NACS fit into HIV or TB prevention, treatment, care and support services?

NACS should be considered an integral part of HIV and TB treatment, care and support. It has the potential to support treatment, promote adherence to therapy and improve overall health. The use of nutrition interventions contributes to increased adherence to antiretroviral therapy and can support recovery of PLHIV and patients with active TB, and improve the prognosis of TB (56, 57). NACS programmes assist individuals and their families with making dietary changes that promote long-term health and improve quality of life (58, 59). The introduction of safety-net schemes, including travel vouchers, cash transfers and food support, can reduce the cost for patients with HIV and/or TB and their families (57).

8 This chapter was prepared by the Albion Centre. It has been added in part from Family Health International (85), to which Albion Centre staff contributed their technical expertise. Readers with a nutrition background wishing to apply this information are referred to this text as a guide.

Evidence shows that mortality during the early months of treatment is inversely proportional to nutritional status, measured by body mass index (BMI). Although no specific studies have been undertaken, indirect evidence suggests that accelerating nutritional recovery may reduce early mortality (34, 35). NACS is particularly important in resource-limited settings, where undernutrition and food insecurity are more prevalent (3, 60).

The specific NACS model can be tailored to the nutritional needs of the adolescent and adult population, the implementation environment, and available financial and human resources. Nutritional assessment (anthropometry, and clinical and dietary assessment), counselling and support should be an integral component of HIV care; it should be conducted at enrolment in care and monitored during all HIV care and treatment. Malnourished HIV patients, especially in food-insecure contexts, may require food supplements for a finite period, in addition to antiretroviral therapy (3). Sometimes support in the form of food, cash or voucher transfer can support treatment adherence and help the household recover from the economic shock of having a chronically ill member (see Chapter 4 for further details).

Depending on the model, NACS is often initiated briefly by health-care providers in an ad hoc manner; however, comprehensive nutrition assessment and interventions are integral to the standard treatment, care and support approach. Following good clinical practices, individuals are first screened for nutritional concerns and then referred for further assessment by a nurse-nutritionist, nutritionist or dietician. In a country lacking sufficient nutritionists, a variety of health workers and health volunteers, such as peer educators, can be trained to perform effective nutrition assessment and counselling. Peer educators or health workers can perform screening during the initial visit. Tools and techniques that may be helpful when communicating with recipients include visual tools, using a variety of venues and opportunities to deliver promotional information, and mass media campaigns that repeat the promotional messages delivered by lay health workers (61). Lay health workers who provide promotional services need training in counselling and communication.

FIG. 6 outlines a model of interventions for the nutrition management of adolescents and adults living with HIV or with active TB infection. The model shows the significance of nutrition screening to identify people at risk of poor nutritional health. The nutrition assessment can provide the basis for nutrition counselling and determine whether food assistance is required.

NACS is important at all stages of HIV infection and TB (42, 63), although the type of nutritional problems addressed tends to change over time. In a clinically stable person living with HIV, before the start of treatment, good nutrition helps to maintain good health (42). Once treatment has started, NACS can focus on restoring nutritional status—this is a high priority because of the increased risk of mortality among patients with low BMI during the early phase of treatment (37). For PLHIV on long-term antiretroviral therapy, NACS may be useful in the prevention and/or management of conditions such as diabetes and cardiovascular disease (64).

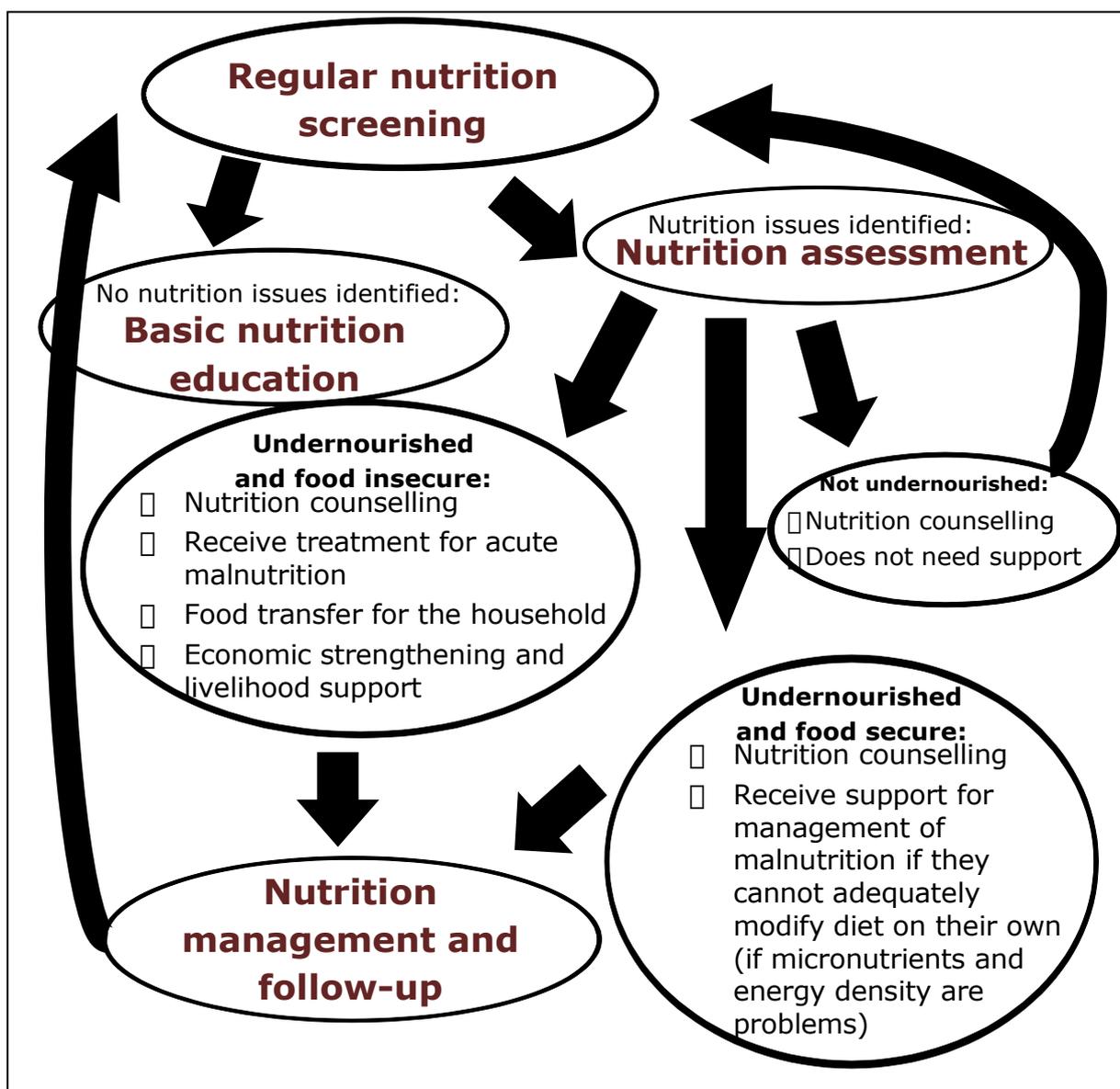


Fig. 6. A model of nutrition interventions in treatment, care and support for adolescents and adults living with HIV and TB (62)

Source: Family Health International (62).

Targeted nutrition strategies are designed by assessing the individual's needs and tailoring an intervention to suit their specific requirements. NACS can be curative and/or preventive. For clients whose clinical, biochemical or anthropometric status shows nutritional issues, the objective is to improve nutritional status. For those with no nutritional issues on initial assessment, the goal is to reinforce or develop healthy eating habits to prevent nutritional issues from developing.

What are the objectives of NACS?

The objectives of NACS are to assist the individual to:

- achieve and maintain a healthy weight;
- achieve and maintain adequate macro- and micronutrient intake;

- prevent food-related illness, including foodborne infections and contamination;
- identify and manage undernutrition-related conditions; and
- increase overall quality of life.

What is nutrition assessment?

A nutrition assessment is an interpretation of information obtained from dietary, biochemical, anthropometric and clinical studies. Nutrition assessment systems are made up of surveys, surveillance or screening. In clinical practice, all of these systems have been used. Most commonly, nutrition screening is used to identify clients at risk, followed by a detailed assessment (65).

What is nutrition screening?

Nutrition screening is a generalized tool that identifies PLHIV and patients with active TB who should receive NACS (42, 66). It involves questionnaires, checklists or scaled instruments, which compare an individual's measurement with predetermined risk levels of “cut-off” points (65). If people at risk of undernutrition or already undernourished can be identified, early interventions may prevent the onset or worsening of undernutrition (42).

Screening tools can be integrated into both inpatient and outpatient clinical procedures, or offered in the home by trained health workers, community and home-based care workers, or peer educators. In the inpatient setting, the tool is administered on admission; in the outpatient setting, it is administered as part of an initial consultation, often by a trained volunteer or clinic receptionist (47). Alternatively, it is implemented during a field visit, where it forms the basis of a referral for a detailed nutrition assessment. The screening tool generally identifies symptoms associated with undernutrition, such as weight loss, diarrhoea and loss of appetite. The tool also addresses issues such as food insecurity, and pregnancy or lactation. Depending on the target population, it may include identification of people at risk of chronic conditions, such as metabolic syndrome. Most tools attempt to identify unintended weight loss, impaired food intake, increased nutritional losses and current body weight (47).

A well designed screening tool is a quick, reliable and cost-effective way of identifying people who are nutritionally at risk (67). The outcome of the screening will be influenced by the validity⁹ and reliability¹⁰ of the screening tool. The tool is designed in consultation with the people who will be implementing it, to ensure that it is appropriate to the nutritional risks of the target population, does not cause additional stigma and discrimination, and is simple to administer. Language and literacy level of the client are considered during the design of the tool. Ideally, a tool is validated in the population where it will be used (66). Currently, few validated HIV screening tools have been developed for resource-limited settings.

9 Validity measures how closely the tool answers the questions it was designed to answer.

10 Reliability measures the consistency of the tool—in other words, when measured again, will the answer be the same?

Where screening occurs, it is important to ensure that procedures are in place to refer people for a detailed nutrition assessment. If no additional services are available, the screening tool is not used unless staff are trained in how to administer the tool and proceed with the next steps. In many cases, nutrition screening is not performed, and the treating doctor or health worker will refer the client directly for NACS.

Although many people would benefit from a detailed nutrition assessment and counselling, where resources are limited, screening can help to identify individuals with nutritional issues (or at risk for nutritional issues) and those who need immediate attention to reduce the burden on the health-care system.

What is a detailed nutrition assessment?

A detailed nutrition assessment is a comprehensive analysis of the nutrition status and assessment of the biological, physiological, social and psychosocial factors that may contribute to the client's current or long-term health. A detailed assessment allows the health worker to determine if there truly is a nutrition problem, to name the problem and to determine its severity (68). Nurse-nutritionists, nutritionists, dieticians or other health workers or volunteers trained in nutrition usually perform the nutrition assessment.

What are the objectives of nutrition assessment?

The objectives of nutrition assessment are to:

- determine the nutritional status of an individual;
- develop an individualized nutrition care plan to support the clinical management of PLHIV and patients with TB;
- identify whether a specific nutrition intervention, beyond general nutrition education, is needed and, if so, what type; and
- determine eligibility for nutrition and food assistance for undernourished PLHIV or patients with TB.

When is a nutrition assessment conducted?

A nutrition assessment is conducted:

- when a risk factor, such as low BMI or food insecurity, is identified during a nutrition screening;
- soon after a diagnosis of HIV infection, if nutrition screening is not available;
- at periodic intervals, depending on the stage of a person's HIV infection;¹¹ and

11 Asymptomatic PLHIV: 1–2 times per year; symptomatic PLHIV: 2–6 times per year (85).

- when initiating or changing antiretroviral therapy and/or directly observed treatment, short course (DOTS) regimens.

What is involved in a nutrition assessment?

One method used to assess nutritional status is the “ABCDEF” approach (63, 69), which involves the following components:

- **Anthropometry:** includes measures of body composition, height, weight, weight change, BMI, mid-upper arm circumference (MUAC), waist circumference, waist-to-hip ratio, and lean and fat tissue. In children, it includes measurements of length/height, weight and MUAC (70). (See the section on nutrition assessments of adolescents and adults, below.)
- **Biochemical:** identifies deficiencies and abnormalities in the blood, including anaemia, and indicators of lipid, protein and glucose metabolism. These measures include haemoglobin, albumin, triglyceride, total cholesterol, low-density lipoprotein, high-density lipoprotein, iron and biomarkers of micronutrients. A biochemical assessment also may include screening for diseases such as diabetes and cardiovascular problems. Many of these tests are expensive, and results need to be interpreted by a trained health worker. Where resources are limited, these tests are not essential to nutrition assessment.
- **Clinical:** involves a clinical assessment of the client to examine signs and symptoms of abnormalities such as dehydration, oedema,¹² undernutrition and ascites;¹³ taste changes and swallowing difficulties (71); the condition of the skin, fingernails and hair; fatigue; and whether a woman is pregnant or breastfeeding. The client’s medical history—including stage of disease, medication and treatments—is also essential information to be collected at this time (71).
- **Dietary intake:** involves an assessment of an individual’s or family intake of particular foods, nutrients, herbal preparations and other supplements. The assessment looks at patterns of food consumption, dietary diversity and specific dietary preferences. If human resources allow, mental health should be considered in this component. A variety of methods are used to assess dietary intake; they vary in their accuracy and difficulty, in terms of client recall and recording. These approaches include (47):
 - 24-hour recall—the client is asked to recall all the foods and liquids consumed in the previous 24-hour period. This method is highly subjective because of the variability of an individual’s diet from day to day, and season to season.
 - Usual food intake—the clinician asks clients to recount the range of food “usually” eaten at various times during the day. Although this method captures more foods than the 24-hour recall, it can be unreliable because of inaccuracies in clients’ recall. Good questioning skills are needed to obtain useful information.

¹² Swelling.

¹³ Swelling in the abdomen.

- Food frequency questionnaires—these tools ask clients to report the frequency of consumption of specified foods and food groups over a period of time, usually daily, weekly or monthly. Questionnaires vary in their complexity, and may be subject to underreporting or overreporting, as quantification of intake can be difficult. Language and literacy must also be considered when administering any written questionnaire.
- Food records and diaries—clients are asked to keep a record of all foods and drinks consumed over a specified period of time, usually three or four days. Although this method is considered the most accurate, the food diary is subject to significant sources of error, including underreporting or overreporting of particular foods, and supplies insufficient data on mixed meals (foods and recipes containing more than one ingredient). Food diaries are often difficult for clients to complete, particularly for those with limited literacy. The use of pictures or drawings can reduce this barrier. Food diaries are often used in research trials that require a greater level of accuracy.

The information gained using the above four approaches can provide simple or more complex data. To quantify dietary intake accurately, specific quantities of each food consumed need to be assessed. The method for doing this depends on how food quantities are measured. For example, the usual food intake approach uses country-specific measures, such as large or small bowls, food cup measures, or other measures that individuals are familiar with. The health worker or community worker then compares this with a standard serving size or weight of the food to estimate intake. Food records and diaries often involve the client measuring each food, using cups and spoons, or weighing each food. Alternatively, food frequency questionnaires that reflect the composition of the usual diet can be designed to give a rough estimate of energy intake.

The data are then used to assess the diet. A simple approach would be to calculate the number of servings from each food group and make a comment on dietary diversity, total energy intake and nutrients in the diet, but this approach is likely to be inadequate or excessive. Alternatively, food composition tables or computer programs can be used to analyse the specific nutrient composition of the diet.

- **Exercise or physical activity:** collects information from the client about physical activity, including activities of daily living, work and structured exercise. It is important to understand a client's level of physical activity to determine the amount of energy expended over the course of a day. A balance needs to be struck between energy expenditure and energy intake needed to maintain or establish a healthy weight. This is achieved by adjusting either energy intake or energy expenditure. Physical activity is also important to maintain or rebuild muscle mass. The International Physical Activity Questionnaires (IPAQ) provide a set of well-developed instruments that can be used internationally to obtain comparable estimates of physical activity (72–74). Consideration should be given to whether a woman is

pregnant or breastfeeding, in view of the increased energy demands of these life stages.

- **Family/household:** assesses poverty, illness or disability in the family, which may affect the family's capacity to obtain and/or prepare food. Aspects of the immediate family or household, such as food preferences, food purchase, food preparation and food storage should be determined. The general level of vulnerability to food insecurity should be assessed in all cases; a detailed household food security assessment can also be included in this component. In addition, information about the family history of illness and disease—in particular, diseases with a genetic component, such as diabetes and cardiovascular disease—can be established at this time.

Other important indicators for gaining a thorough understanding of factors that influence individual or household intake of food include:

- assessment of nutritional knowledge;
- psychosocial and lifestyle factors that may affect food intake, including mental health, alcohol use, smoking, drug use, household factors, religious beliefs and cultural practices,¹⁴ and, in the context of HIV, social issues such as risk behaviour (e.g. sex work, drug use), social isolation, stigma and discrimination;
- interactions between medications and food consumption, and prevention of food- and water-related illness; and
- nutrition-related “quality of life” measurements, using tools developed and validated in various countries and regions around the world, including WHO-QOL HIV (75) and MOS-HIV (76); it is important to check the cultural and social relevance of existing tools before using them in a new context.

For assessment of food security, information from the detailed assessment can be used to gather some of the data required. In particular, dietary intake information can be linked with other measures of food security. Further information on food security assessments can be found in existing guidance (1, 77).

Which nutrition assessments are used for adolescents and adults?

BMI is considered to be the best indicator of malnutrition in adolescents and adults. MUAC is also used, and there is new evidence of its strong association with BMI. In a review, Food and Nutrition Technical Assistance III (FANTA III) and the United States Agency for International Development found that the cut-offs for low MUAC are relatively consistent among adult populations (ranging from 20 cm to 24 cm); they were slightly more variable in studies on pregnant women (ranging from 20.0 cm to 28.9 cm) (70).

¹⁴ Culture is often a very important determinant of typical diet. It is essential that health workers are familiar with the typical diet of people from different cultures that access their services, so that they will not make recommendations that are not appropriate for their clients.

Adolescents

Adolescents living with HIV could have acquired HIV infection perinatally or become infected during adolescence. Opportunistic infections and other symptoms result in faltering growth and reduced length and height in almost all HIV-positive children (6). For adolescents, nutrition assessment using anthropometry is usually conducted as an initial approach, along with physical examination if in a clinical setting.

Anthropometry assessment of undernutrition is complicated in adolescents, because of changes in body proportion with age and pubertal development, and ethnic differences in body size and shape (78, 79). For children and adolescents, BMI differs by age and gender. The Integrated Management of Adolescent and Adult Illness (IMAI) District Clinician guidelines recommend using BMI-for-age as the best indicator of malnutrition. In children and adolescents 5–19 years of age, BMI-for age is calculated using reference tables—for example, the World Health Organization (WHO) BMI-for-age charts—once BMI has been calculated (BMI = weight in kilograms divided by the square of height in metres). **TABLE 3** provides recommendations for defining nutritional status in children and adolescents 5–19 years of age (53, 80). The BMI and BMI-for-age look-up tables from FANTA (81) are a quick reference for health-care providers to assess nutritional status of children and adolescents, in order to provide needed NACS. A recent review suggests that low MUAC can be used to identify individuals (adolescents, pregnant women and other adults) at increased risk of adverse outcomes (70).

Table 3. Classification of nutritional status in children and adolescents 5–19 years, and adults who are not pregnant or postpartum

BMI-for-age	Classification
<-3 SD	Severe thinness
<-2 SD	Thinness
-2 SD to +1 SD	Normal
+1 SD to +2 SD	Overweight
>+2 SD	Obesity
Classification of non-pregnant or non-postpartum adults	
BMI	Classification
<16.0	Severe thinness
16.0–17.0	Moderate thinness
17.0–18.5	Mild thinness
<18.5	Underweight
18.5–24.99	Normal
25–29.9	Overweight–pre-obese
>30	Obesity

SD: standard deviation
Source: World Health Organization (53).

There are no agreed MUAC cut-off values for people older than 5 years of age. In the IMAI guidelines, severe malnutrition in adolescents and adults is indicated by the presence of an MUAC less than 160 mm or an MUAC of 161–185 mm plus one of the following (70):

- pitting oedema to knees on both sides;
- inability to stand; or
- sunken eyes.

WHO guidance gives further information about an integrated approach to the nutritional care of HIV-infected children (6 months – 14 years) (6). The WHO growth reference indicators (5–19 years) (82) provide further information relating to growth, growth charts and catch-up growth.

Adolescents—pregnant or lactating

Weight gain in pregnant or lactating adolescents should be significant to ensure that the energy needs for growth and pregnancy are being met. Increases in height can still occur during adolescent pregnancy. Therefore, weight gain is slightly greater in many adolescent pregnancies than in adult pregnancies. Nutritional requirements are higher during lactation than in pregnancy. BMI monitoring is advised, and, as suggested by WHO, a cut-off point of 20.3 could be used at one month postpartum, with a progressive return to standard adult cut-off at six months (78). For pregnant adolescents, height should be measured at each visit (83). A cut-off point of MUAC <22 cm has been used in 2000 adolescent girls in India that showed significantly lower mean haemoglobin levels when compared with MUAC >22 cm (70).

Pregnant adolescents with HIV are at particularly high nutritional risk. Because there is currently no agreed MUAC cut-off for the diagnosis of adolescent undernutrition during pregnancy, the MUAC recommendations for pregnant adults should be used. FANTA III found that low cut-off MUACs in pregnant women are significantly related to higher risk of poor birth outcomes and poor maternal health, including low infant birth weight, preterm labour, maternal anaemia and postpartum uterine infections (endometritis–myometritis) (70).

Adults—non-pregnant and non-postpartum

Measurement of weight and height allows the calculation of BMI, as follows:

$$\text{BMI} = \text{weight in kg}/(\text{height in m})^2$$

BMI is the most commonly used measure of adult malnutrition in HIV care and treatment programmes in developing country contexts. Table 3 provides an interpretation of BMI in adults. BMI measures must be used with caution in individuals with altered fluid balance, pregnancy, high muscle mass or high visceral fat. BMI does not account for body composition changes (e.g. changes in body fat distribution and bone mass) that can occur with the use of

some antiretroviral medications (84). Similarly, measuring weight alone does not indicate the amount of muscle loss, which can occur at a more rapid rate than total weight loss in PLHIV with progressive or late-stage HIV infection. Visual observation for signs of muscle wasting is important when weight alone is used as index of malnutrition (85).

FANTA III has analysed the use of MUAC in adults and its correlation with BMI. It found that most available evidence generated by studies used an MUAC cut-off of 23 cm (<20 cm for those with TB) for adults, and that there is an equally strong association with malnutrition with BMI <18.5 (odds ratio = 21.2) (70).

Adults—pregnant or lactating

Nutrition assessments include screening for anaemia or iron deficiency before and after pregnancy. Nutritional requirements are higher during lactation than in pregnancy. Given their additional nutritional needs, pregnant and lactating women may be at greater risk than other groups in the population.

In pregnant women, BMI is not accurate, as weight gain is not related to nutritional status. The total amount of weight gained and rate of weight gain during pregnancy, and postpartum weight loss, can be monitored and compared with pre-pregnancy anthropometric measures. Healthy, well nourished women usually gain 10–14 kg during pregnancy; this gain increases the probability of delivering full-term infants with an average birth weight of 3.3 kg, and reduces the risk of fetal and maternal complications (48). Preferably, weight is measured at six weeks after delivery and subsequently at 2–3-month intervals (83).

MUAC is recommended as the preferred nutritional index for pregnant women, but should be interpreted with caution (83). MUAC does not change significantly through pregnancy. Suggested cut-off points to identify at-risk individuals vary by country and range from 210 to 230 mm. Since cut-offs are ill-defined, changes over time are a more appropriate indicator (86). MUAC may be used as a criterion for entry into a food support programme. Sphere guidelines recommend 210 mm as an appropriate cut-off for selection of women at risk during emergencies (87).

What is nutrition counselling?

In the NACS framework adopted in this programming guide, nutrition counselling may consist of nutrition education, normally delivered in group settings, or individualized counselling. The latter is considered a “supportive process, characterized by a collaborative counsellor–patient relationship, to set priorities, establish goals, and create individualized action plans” (88). Nutrition education alone for PLHIV or patients on TB treatment is not always enough to improve their nutritional status. People face many barriers in improving their nutrition, including cost, time, family responsibilities and illness. However, education may present other unique benefits, such as the creation of peer support networks through group interaction.

What is nutrition education?

Nutrition education is a planned information exchange that is designed to improve or maintain the nutritional well-being of individuals, groups and populations (89). It is a formal process to instruct or train a client, with the aim of assisting the client to manage or modify food choices and eating behaviour (88). Education sessions are often presented in a group setting, and involve the provision of nutrition information by trained staff to PLHIV and/or patients on TB treatment. Education focuses on nutritional needs, dietary practices, healthy eating, the nutrient content of foods, meal planning, food hygiene, food preparation and storage, child growth and nutrition, and symptom management.

What are the objectives of nutrition education?

The objectives of nutrition education are to:

- increase knowledge about nutrition and its importance in health maintenance;
- improve skills in the preparation and selection of nutritious foods; and
- assist in changing food consumption practices.

When nutrition education is provided in a group setting, a positive group dynamic can benefit participants—for example, in building supportive peer relationships.

What methods are used in nutrition education?

Nutrition education messages can be delivered to individuals or presented in small group education sessions aimed at individuals, their families or the broader community. Although individuals respond differently to various methods of education, adults learn best when they are actively involved in the learning process (90). Nutrition education sessions may take the form of cooking classes, demonstrations or group presentations. Trained peer educators can be the most appropriate people to deliver these messages, with the support of health workers, if needed. Education sessions can be supplemented by written nutrition information, also known as information, education and communication material (91). For people with low literacy, information is best presented using pictures or symbols.

What is individual nutrition counselling?

Individual nutrition counselling is an intervention in which a service provider (health or community worker) helps a patient to develop strategies to address their nutrition goals and overcome their personal barriers. Nutrition counselling has been shown to improve body weight for PLHIV and patients with active TB, especially when provided early in the disease process (60, 92). Counselling strategies are based on the results of the nutrition assessment—as well as clinical symptoms and side effects experienced—and are targeted to address the individual needs identified in the nutrition assessment. The nutrition counselling process involves developing a specific management plan that takes account of the broad range of

factors that influence food intake. Consideration should be given to cultural and family background, food preferences, available budget and dietary practices. Specially formulated foods should be recommended if food-based recommendations are unlikely to be effective. The nutrition plan should be developed in a partnership between the health worker or dietician and the adolescent or adult living with HIV or active TB, and based around the negotiation of outcomes agreed by both.

What are the objectives of nutrition counselling?

The objectives of nutrition counselling are to:

- develop an individual nutrition strategy to address the nutrition requirements of PLHIV and people with TB, identified during the assessment;
- facilitate behaviour change with regard to nutrition and food; and
- provide ongoing, individualized support and guidance in the maintenance phase of behaviour change.

What are the key messages in nutrition counselling?

Nutrition counselling addresses the specific needs of the person, as identified during the nutrition assessment. **TABLE 4** provides a guide to key areas that should be covered during the asymptomatic and symptomatic phases of the disease process (42, 45, 93, 94). Messages are usually tailored to suit the person's specific cultural, family and social situation (63, 95, 96).

What are the general nutrition recommendations for PLHIV and people receiving TB treatment?

The following nutrition recommendations (45, 99) are general guidelines for asymptomatic PLHIV that should be addressed through the NACS process. Specific recommendations for symptomatic PLHIV are beyond the scope of this section—these recommendations must be adapted to the individual, given their specific health requirements.

The recommendations in this programming guide vary only slightly from dietary recommendations for a healthy individual, the main difference being that a higher caloric intake is recommended to provide the body with the additional energy required in any state of infection. Although the dietary recommendations are similar to those for a healthy person, they are more critical for PLHIV or patients receiving TB treatment. This reflects the link between nutritional status and the immune system, and the increased risk of chronic disease such as diabetes and cardiovascular disease for PLHIV who have been on long-term antiretroviral therapy.

The recommendations for critical nutrition actions are as follows (99):¹⁵

- Get weighed regularly, and have weight recorded.

¹⁵ These are FANTA III project recommendations, unless otherwise noted.

Table 4. Areas to address in nutrition counselling

Asymptomatic phase of HIV and non-malnourished patients receiving TB treatment	Symptomatic phase of HIV infection—PLHIV on antiretroviral therapy	Undernourished people receiving TB treatment
<p>Nutrition counselling focuses on:</p> <ul style="list-style-type: none">• healthy eating, meal planning and nutritious diet to maintain weight, lean body mass, and normal growth and development in adolescents;• achieving optimal intake of macro- and micronutrients;• educating PLHIV or patients receiving TB treatment and their families on water and food safety with regard to purchasing, handling, preparing and storing foods;• promoting physical activity and exercise, particularly weight-bearing exercise for bone mass growth in adolescents;• food budgeting and cooking;• identifying and addressing related issues, such as smoking, alcohol and illicit drugs that affect food intake and absorption;• preventing nutritional side effects of long-term antiretroviral therapy, such as higher risks of developing diabetes or cardiovascular disease;• for adolescents, paying additional attention to specific nutrients (e.g. calcium, vitamin D, vitamin A, iron), if warranted;• ways of achieving adequate weight gain and preventing anaemia during pregnancy;• and food safety.	<p>Nutrition counselling focuses on:</p> <ul style="list-style-type: none">• support and advice for symptom management, addressing any nutrition-related complications, such as diarrhoea, weight loss, loss of appetite, problems in chewing and swallowing, and nausea and vomiting;• preventing weight loss and potential wasting;• referring moderately and severely undernourished adolescents and adults to specific programmes;• providing nutrition counselling on simple dietary changes to increase the absorption of antiretroviral drugs; and• managing side effects of antiretroviral therapy.	<p>Nutrition counselling focuses on:</p> <ul style="list-style-type: none">• the assessment of the person's nutritional status;• appropriate counselling based on their nutritional status at diagnosis and throughout treatment;• treating severe acute malnutrition in adolescents (5–19 years) and adults, including pregnant and lactating women, with active TB in accordance with the WHO recommendations for management of severe acute malnutrition;• treating moderate malnutrition in clients who fail to regain normal BMI after two months of TB treatment, and those losing weight during TB treatment; they should also receive nutrition assessment and counselling, and, if indicated, be provided with locally available nutrient-rich or fortified supplementary foods, as necessary to restore normal nutritional status;• providing nutrient-rich or fortified supplementary foods to pregnant women with active TB and moderate undernutrition, or with inadequate weight gain to achieve an average weekly minimum weight gain of approximately 300 g in the second and third trimesters;• providing nutrient-rich or fortified supplementary foods to clients with active multidrug-resistant TB and moderate undernutrition, to restore normal nutritional status;• providing all pregnant women with active TB with multiple micronutrient supplements containing iron, folic acid, and other vitamins and minerals, according to the United Nations multiple micronutrient preparation;• providing calcium supplementation to pregnant women with active TB and low calcium intake, to prevent pre-eclampsia;• providing iron, folic acid, and other vitamins and minerals to all lactating women with active TB;• ensuring that intake of iron does not exceed a level beyond that needed to correct iron deficiency;• providing pyridoxine (vitamin B6) supplementation with isoniazid therapy in areas where diets are low in vitamin B6; and• managing TB-induced side effects.

BMI: body mass index; PLHIV: people living with HIV; TB: tuberculosis; WHO: World Health Organization
Sources: World Health Organization (4, 44, 98); Raiten et al. (83); United States Agency for International Development (97).

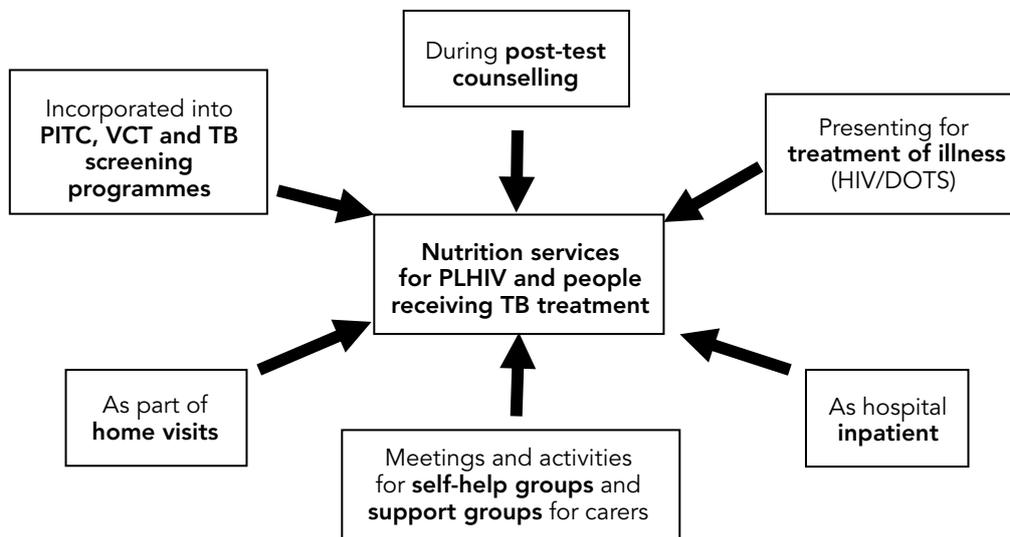
- Where possible, eat regular daily meals.
- If weight is lost, increase energy intake by consuming more meals, snacks and energy-dense foods.
- Eat a variety of foods, and increase the intake of nutritious foods.
- Eat staple foods with every meal; these are foods that are traditional to the diet and can be stored for long periods, such as rice, wheat and maize.
- Eat legumes every day, if possible.
- Eat foods from an animal source regularly.
- Eat vegetables and fruit every day.
- Increase consumption of micronutrient-rich foods to achieve an intake of 1 recommended nutrient intake (RNI). If one cannot afford this, taking a multivitamin/mineral supplement that provides 1 RNI may be helpful.
- Drink plenty of clean and safe (boiled or treated) water.
- Avoid habits that can lead to poor nutrition and poor health (e.g. alcohol, smoking, stress, “junk food” and lack of sleep).
- Maintain good hygiene and sanitation, and good dental and oral health, to avoid infections that may affect food intake.
- Get exercise whenever physically possible.

How can nutrition counselling be made more effective?

Below are some recommended behaviours that increase the effectiveness of nutrition counselling (42,93,100):

- The health worker is nonjudgemental and tries to understand the client’s emotional and personal situation. They invite the client to have a family member present, particularly the person who is responsible for food within the household.
- The health worker individualizes nutrition counselling and involves PLHIV and patients with active TB in the decision-making process. The client is viewed as an “equal partner” in the counselling session and is asked to set their own objectives. Objectives are recorded, and progress is checked at the next visit.
- The health worker collaborates with PLHIV or patients receiving TB treatment and, where applicable, their families or carers, to identify potential barriers to improving nutrition status and discuss possible solutions. Barriers may include limited financial resources, food insecurity, restrictions due to cultural traditions or linguistic preference, lack of literacy skills, and physical or intellectual disability.
- The health worker bases interventions on the “stage of change” model (101) to enhance motivation and achieve long-lasting behaviour change.
- The health worker provides practical suggestions and recommendations that the person and their family will be able to carry out. Nutrition strategies are adapted to the local context, taking into consideration the person’s medical history, culture,

Fig. 7. Opportunities for the integration of NACS into HIV and TB services



DOTS: directly observed treatment, short-course; PITC: provider-initiated testing and counselling (52);¹⁵ VCT: voluntary counselling and testing

finances, available foods, household conditions, individual beliefs about food and diet, and other supports available in their community.

- The health worker organizes follow-up visits or, where possible, establishes links to a multidisciplinary team or other services for PLHIV or patients on TB treatment facing special challenges.

How can NACS be integrated into treatment, care and support for HIV and TB?

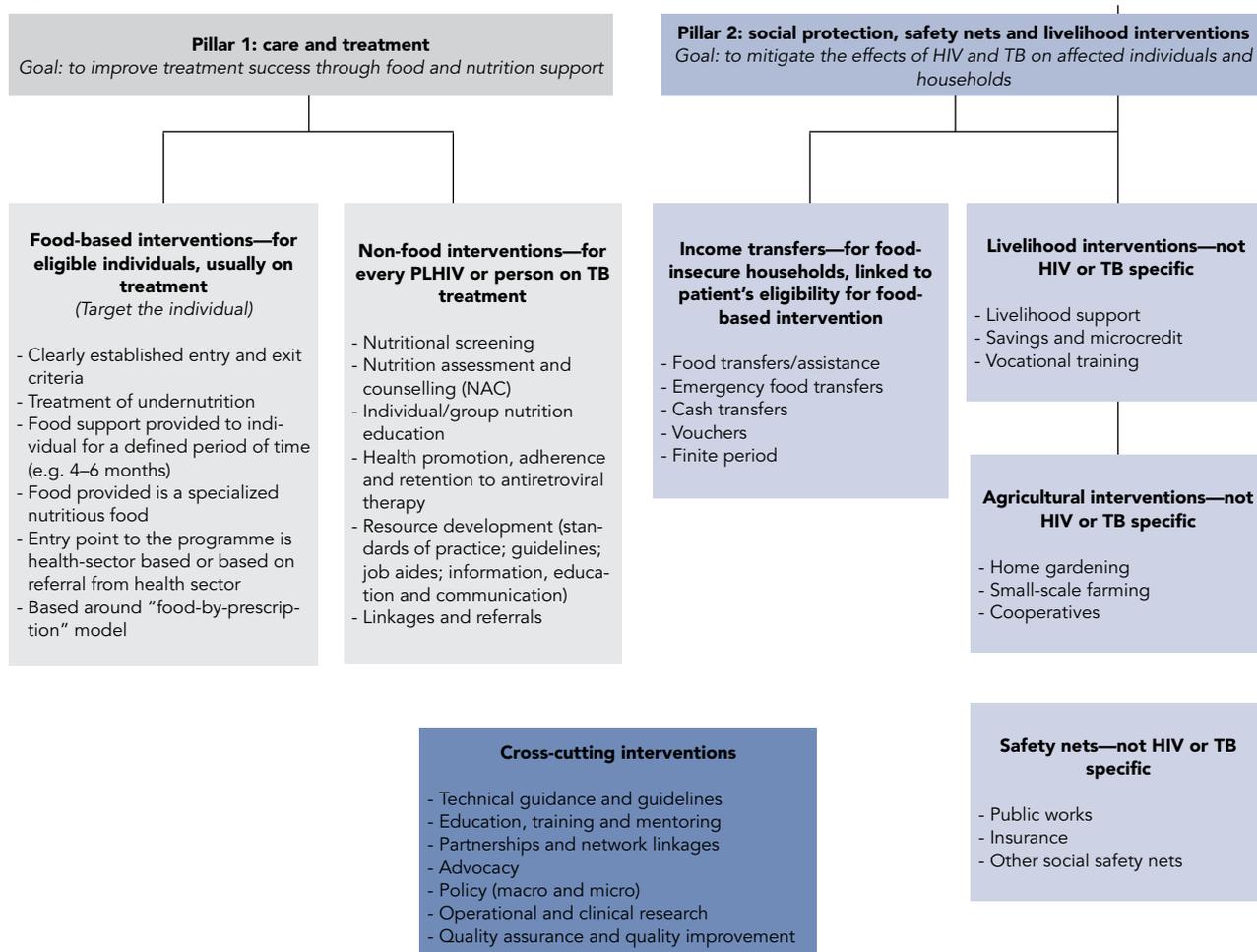
NACS can be incorporated into existing clinical services or facilities to promote nutrition for PLHIV and people receiving TB treatment. **FIG. 7** highlights a number of opportunities for adaptation of existing activities to include a nutrition component.

NACS programmes can be more effective when they are integrated with community-based outreach programmes. Because community-based outreach services work directly with households, they often have a better understanding of the social and lifestyle factors that may influence a person’s health and nutritional status, and can refer clients to livelihood support.

Individuals or households in need of nutrition support may be identified through the nutrition screening or assessment. However, vulnerable individuals or households may be unable to attend health services because of financial or logistic barriers; therefore, developing strong partnerships with community support groups can be a vital way to identify individuals

16 WHO and UNAIDS strongly support the continued scale-up of client-initiated HIV testing and counselling, but recognize the need for additional, innovative and varied approaches. Evidence from both industrialized and resource-constrained settings suggests that many opportunities to diagnose and counsel individuals at health facilities are being missed, and that provider-initiated HIV testing and counselling facilitates diagnosis and access to HIV-related services.

Fig. 8. Food and nutrition interventions in HIV and TB treatment, care and support



and households that are in need of additional support. In addition, engaging local- and national-level community support groups in comprehensive NACS training and service provision might increase the acceptability and success of these interventions.

Close collaboration between the health sector and communities (or community services) is critical in the planning and implementation of NACS programmes. **FIG. 8** shows the intersection between NACS, food-based interventions and the community sector. Pillar 1 outlines the nutrition-based interventions provided under treatment and care, and Pillar 2 lists the social support mechanisms. Both are required to reduce the effects of HIV and TB.

How can linkages be made between health sectors and communities?

There is no one-size-fits-all ‘place’ where NACS should be integrated in the context of HIV and TB. It has been argued that community-based therapeutic care and management, which

have been successful in management of severe acute malnutrition in children under 5 years of age, should be adapted for adolescents and adults. Some argue that placing nutrition rehabilitation into clinical settings for HIV care and treatment programmes may not be appropriate. Others advocate that clinic-based programmes that integrate food and nutrition security are a natural extension of clinical services. The real answer may lie in the middle. Comprehensive programmes need the strengths of both the health sector and communities to be leveraged, and different contexts may require different approaches.

Although the health sector is best placed to provide the expertise needed to address clinical undernutrition, there is also a vital role for the community in prevention and treatment of undernutrition. Activities such as provision of livelihood support are best coordinated at the community level. The challenge for the health sector is to form linkages and partnerships with community structures that are better placed to address the household issues of poverty and food insecurity. Forging linkages between the health facility and the community is essential because both play a unique role, with different yet complementary objectives. Involving community outreach workers and sometimes 'expert patients', who are based at the health facility, should be encouraged to strengthen these linkages.

A continuum of comprehensive care to patients and their households can be achieved through an adequate referral system between health facility and communities. However, more research is needed into how best to link treatment services based in the health facility with community-based care and support activities. Nutrition support and livelihood activities can take place partly in the community, as part of HIV-specific and HIV-sensitive services.

For PLHIV and patients with active TB to receive adequate food and nutrition services, two-way linkages must bridge the divide between the health and community sectors. Finite food and nutrition assistance to patients starting treatment should be linked with community-based services or broader social protection activities that are sensitive to the needs of PLHIV and recovering TB patients.

Who is responsible? What are the possible roles of the different stakeholders?

Working with a range of stakeholders ensures that the design of NACS programmes uses available resources, and increases programme acceptability and sustainability.

The ministry of health is responsible for integrating nutritional services into standard health-sector protocols, and developing policies and procedures. The health-care sector is generally responsible for providing HIV and TB treatment services through district-level health facilities. It is usually aware of the social and economic issues faced by households affected by HIV or TB, and the negative effect that these issues can have on treatment. The positive effect of nutrition interventions for individuals and households affected by HIV and TB also needs to be understood. Engaging with national bodies and advocacy groups for PLHIV is key to promoting the integration of NACS into comprehensive treatment, care and support for PLHIV and patients receiving TB treatment.

At the national level, universities can develop curricula that train health workers in NACS to support the workforce in the implementation of nutrition services. At the regional level, NACS can be integrated into health facilities; and use of information, education and communication (IEC) materials can support nutrition education. District-level hospitals are ideally positioned to integrate nutrition services, as they usually provide treatment, care and support for PLHIV and people receiving TB treatment. In practice, however, government health services are often overstretched in their delivery of medical services and may not have the capacity to include NACS, even if they are technically able to do so.

In many countries, nongovernmental organizations and faith-based organizations play an important role in the provision of health services. Many of these agencies have developed significant experience in HIV and TB treatment, care and support programmes, and provide food and nutrition as a component of existing interventions. These programmes tend to be based in community and home settings, often quite distinct from the health sector, which makes them an ideal entry point for the provision of nutrition services to affected individuals in communities. It is important that these services are linked to government-led efforts, and work in line with national guidelines and policies.

TABLE 5 summarizes nutrition interventions that can be developed at different levels of society to support NACS programmes. Consideration needs to be given to the current

Table 5. Opportunities for integrating NACS services or skills development

Level of responsibility	Nutrition interventions that can integrate NACS
National	
<ul style="list-style-type: none"> • Government, and line ministries • District and specialist hospitals • Universities and other education facilities 	<ul style="list-style-type: none"> • Nutrition and HIV/TB policy development • Individually tailored inpatient and outpatient dietary advice and support • Food-based interventions • Care provider education and curriculum development
Regional and local	
<ul style="list-style-type: none"> • Government • Community hospitals • District health centres • Ambulatory care centres • Local health posts 	<ul style="list-style-type: none"> • Individual and group nutrition education and counselling • IEC resource development • Nutrition research (clinical and social) • Health/community worker training
Community based	
<ul style="list-style-type: none"> • Home-based care • NGO • Community-based organization • PLHIV self-help groups 	<ul style="list-style-type: none"> • Individual and group nutrition education and counselling • Food security projects • Food distribution projects • Volunteer and PLHIV peer education

IEC: information, education and communication; NACS: nutrition assessment, counselling and support; NGO: nongovernmental organization; PLHIV: people living with HIV

cultural, social and political context of the country to determine what nutrition interventions can be provided at each level of service.

Considerations for NACS interventions

The provision of NACS, which is integral to the well-being of PLHIV and patients on TB treatment, relies on effective service delivery. The integration of NACS requires careful consideration of available resources.

TABLE 6 provides an outline of the equipment and human resources needed to provide NACS. Human resource considerations include numbers of staff or peer educators, their current roles and responsibilities, and their technical capacity. Management staff will be need to manage

Table 6. Overview of implementation considerations for NACS programmes

Intervention	Locations	Equipment requirements	Human resource requirements
Nutrition assessment	<ul style="list-style-type: none"> Hospital inpatient and out-patient departments Outreach clinic In the home 	<p>Essential equipment</p> <ul style="list-style-type: none"> Weighing scales, height and length measures, tape measure Paper, ruler or string BMI tables Optional equipment (if available) MUAC tapes Skin-fold callipers Bioelectrical impedance analysis machine (can be integrated in weighing scales) Laboratory equipment for biochemical testing Calculator Computer with anthropometric software (Anthro software) 	<ul style="list-style-type: none"> Doctors Nurses, dieticians, nutritionists, health workers Trained community health workers Adolescents and adults living with HIV Peer volunteers or educators
Nutrition education	<ul style="list-style-type: none"> Community settings Health-care facilities 	<p>Optional equipment (depending on education mode)</p> <ul style="list-style-type: none"> Cooking equipment and facility IEC materials Health promotion materials Food models 	<ul style="list-style-type: none"> Peer volunteers or educators Community health workers Nurse or nutritionist
Nutrition, and adherence and retention counselling	<ul style="list-style-type: none"> Hospital inpatient and out-patient departments Community health centres Other community settings In the home 	<p>Optional equipment (if available)</p> <ul style="list-style-type: none"> Food models IEC materials 	<ul style="list-style-type: none"> Nurses Dieticians Nutritionists Trained health workers

IEC: information, education and communication; MUAC: mid-upper arm circumference; NACS: nutrition assessment, counselling and support

Table 7. Capacity considerations for the effective delivery of NACS

Factor	Potential issue	Strategy	Management requirements
Human resources	<ul style="list-style-type: none"> • Technical capacity • Head count or staff time 	<ul style="list-style-type: none"> • Provide competency-based training and ongoing mentoring for all staff and volunteers working in NACS • Generate policies and procedures that outline client flow, average appointment times and maximum case load per clinician • Monitor the provision of services and ensure that service provision meets the baseline requirements • Use external resources to provide nutrition education—for example, volunteers or peer educators, complementing health-care worker interventions 	<ul style="list-style-type: none"> • Adequate funding and allocation of staff • Policies that outline minimum competency required for staff • Advocacy to national bodies to develop NACS curriculum to integrate into existing and new training institutions • Provision of ongoing mentoring to clinical staff to ensure quality of service provision • Work in partnership with the community sector
Operations management, including quality assurance and quality improvement	<ul style="list-style-type: none"> • Lack of system policies and procedures • Lack of standards of practice for clinical care 	<ul style="list-style-type: none"> • Develop systems, policies and procedures programming guide, and operational guidelines • Develop evidence-informed standards of practice for delivery of services 	<ul style="list-style-type: none"> • Dedicated human resources to establish and implement policies and procedures • Ongoing monitoring and evaluation • Advocacy to national bodies to establish national standards of practice and guidelines

NACS: nutrition assessment, counselling and support

the operational complexity of NACS programme delivery, monitoring and evaluation. Human resources are further discussed in the next section.

What human resource capacity is needed?

The human resources required for each level of intervention are outlined in **TABLE 7**. The technical capacity of staff and the time that they are available to deliver NACS services needs consideration.

Technical capacity

Different levels of competency are required to implement an effective NACS programme. Nutrition assessment and dietary counselling call for specific technical skills, including the ability to perform and analyse anthropometric measures, interpret biochemical analyses, link clinical symptoms to diet and use specific counselling techniques. Ideally, trained nurses, dietitians, nutritionists, counsellors or doctors perform these tasks. In the absence of such staff, other health-care workers can be given training and mentoring to develop their technical capacity in these areas. For high-quality care and service, ongoing mentoring and technical

support are required to assist health workers to perform these skills competently. In the longer term, it is crucial that food and nutrition topics are included in the curricula for relevant health-sector staff.

Nutrition education provides an overview of nutritional issues, often in an informal setting such as a group meeting or camp. It provides an opportunity for greater involvement of PLHIV, or people currently or previously receiving TB treatment, who can share their personal experiences to provide practical applications for the information. Technical staff can lead these sessions; training and ongoing mentoring with peer educators will increase the effectiveness and sustainability of these interventions.

Head count or staff time

Lack of time is one of the greatest barriers to effective nutrition interventions. Too often, personnel providing these services already have heavy workloads. As a result, they are unable to dedicate adequate time to properly understand the causes of nutrition issues and address these with the client and their family. Where nutrition services are integrated into existing clinical services, they may be competing for time and priority with other clinical services. It may be preferable to have staff dedicated to NACS, whose time will be reserved for these services. Advocating to the ministry of health can be useful to ensure that policies and procedures are developed that define staff roles and responsibilities, as well as their training needs.

What operations management capacity is needed?

Many NACS programmes lack policies and procedures that clearly outline the operational management, including quality assurance and quality improvement, required to care for PLHIV and patients receiving TB treatment (100). Operations management should address policies, procedures, client flow, and evidence-informed standards of practice for the design and delivery of nutrition interventions. System policies and procedures should also outline the roles and responsibilities of health workers and other key players in the provision of training and ongoing mentoring for service providers, the production of IEC materials and health promotion messages, the provision of supplies and equipment, and quality improvement measures. Guidelines for caregivers and PLHIV should also be available.

Evidence-informed standards of practice are usually developed for different target groups at different stages of the disease process. These documents address the likely symptoms and possible interventions, taking into account the country context, including the availability of, and access to, treatment and food-based interventions (100). National guidelines help in addressing major local variations, while district or provincial guidelines address issues at these levels.

Key messages

- Nutrition interventions targeting people living with HIV (PLHIV) or patients with tuberculosis (TB) should include nutrition assessment and counselling (NAC) in all cases. They can be augmented with support (the “S” in NACS), if required, to support treatment outcomes, treatment adherence and return to quality life, and to mitigate consequences of the illness for the household.
 - To support treatment, special nutritious foods and micronutrient supplements can be provided to achieve a faster recovery of nutritional status. Entry and exit criteria for nutritious food support should be based on nutritional status, using anthropometric measurements, such as a body mass index (BMI) of less than 18.5. This support should be finite in time (until BMI has improved—approximately six months).
 - The actual choice of food for malnourished PLHIV is context specific. Criteria to consider are nutrient density, practicality, acceptability, likelihood of sharing among household members, cost-effectiveness and availability of the preferred food(s).
 - Household support aims to alleviate increased care burdens and reduced household income due to illness, and could take the form of food, cash or vouchers.
 - Both nutrition support for malnourished individuals and household support aim to reduce barriers to taking up, and adhering to, treatment.
 - Nutrition support to malnourished individuals and household support should be finite in time and may have the same duration. Broader HIV-sensitive social protection mechanisms should address poverty issues, including those of PLHIV and TB patients. HIV-specific interventions in general and food transfers in particular should not be seen as an alternative to these broader mechanisms.
-

Introduction

Ensuring access to an adequate quantity and quality of food can contribute to improved treatment outcomes and a better quality of life. Ample evidence suggests that PLHIV and people infected with TB face significant barriers to taking up and adhering to treatment. These barriers include stronger side effects when taking antiretroviral therapy on an empty stomach, the perception that treatment increases appetite, and inability to bear the costs of seeking treatment; these costs include transport costs, costs of medicine to treat opportunistic infections and the opportunity cost of not working (40).

Whether PLHIV and TB patients can and will gain access to a healthy diet that meets their dietary needs depends on whether they have access to adequate products, understand their needs and make a conscious decision to meet them. Access implies both physical access to, and availability of, the food products, as well as having the financial resources to purchase them on a regular basis.

If carried out properly, NAC should provide the necessary knowledge for PLHIV and TB patients to manage their diet. Physical access can be limited in remote areas where markets may not be very functional. It may also be adversely affected by poor health or stigma. The main barrier, however, for many people on antiretroviral therapy and directly observed treatment, short course (DOTS) is financial. In high-prevalence settings, PLHIV face similar socioeconomic challenges to the remainder of the population; however, the disease often leads to a further deterioration in socioeconomic status. Affected households tend to lose income when members of working age are infected, while also facing higher expenses for care.

Evidence from Djibouti, Mozambique and Zambia (103) showed that the average household, regardless of HIV status, could not afford 100% of its dietary needs, in terms of both macro- and micronutrient requirements, even if households used their entire income on food.

Studies from sub-Saharan Africa have shown that when one or both heads of the household are HIV-positive, the result is a drop in production and income, resulting from the household's reduced labour force and a shift in spending from food to medicine. Moreover, families often purchase poorer quality, less nutritious food as incomes decrease, which affects availability and subsequent use of nutrients (32).

A study from Uganda documented how households respond to the impact of HIV and AIDS on their food security status (104, 105). The study showed that the HIV epidemic has increased the inability of affected households to gain access to an adequately nutritious diet. Various coping mechanisms identified in the households of PLHIV may contribute to poor adherence to treatment and poor quality of life for all household members.

In many countries, HIV and TB treatment and care programmes provide food supplements to patients who cannot afford a diet that is adequate in terms of both quantity and quality (38, 106). There is broad agreement on the need to provide nutritious foods to malnourished PLHIV who start antiretroviral therapy. Organizations such as the World Food Programme (WFP), the United States President's Emergency Plan for AIDS Relief (PEPFAR), and Food and Nutrition Technical Assistance III (FANTA III) are already implementing HIV and TB programmes that include nutrition support and also often household support.

The best method of providing support may not be 'one size fits all': programmes differ in their objectives, the modality chosen (food versus vouchers versus cash), the location of implementation (health sector versus community), the inclusion or exclusion of household members, and the entry and exit criteria.

The following issues are addressed below:¹⁷

- who should receive a food supplement in addition to NACS;
- how long such a supplement should be supplied;
- which supplement to provide; and

¹⁷ The information in this section is a reflection of the current state of programming among many organizations.

- whether to include household members or to focus only on the patient.

Who should receive a food supplement in addition to NACS?

Being underweight puts PLHIV and TB patients at higher mortality risk. Therefore, any food and nutrition intervention should focus on helping them return to normal weight as soon as possible. During the assessment, anthropometric measurements (BMI, mid-upper arm circumference—MUAC, and hip and waist circumference) are taken according to national protocols, which also define the cut-offs to trigger the provision of a food supplement.

World Health Organization (WHO) guidelines consider an adult to be severely acutely malnourished when BMI is below 16, and moderately acutely malnourished when BMI is below 18.5. In adolescents, BMI-for-age is used. For pregnant women, MUAC is used instead of BMI. MUAC can also be used for other adults if resources are limited. (See Chapter 3 for additional details.)

For PLHIV or TB patients who are assessed to be undernourished on the basis of these criteria, it might be necessary to give a food supplement in conjunction with treatment, for a specified period, to accelerate nutritional recovery. Targeting based on food security imposes a significant cost and burden on programme managers and becomes less critical when the duration of support is finite—the objective is to improve nutritional status and anthropometric measurements. Some programmes use a variety of questionnaire tools to assess the individual food security status of each patient, but more often to decide whether the patient's ration should be complemented with a household food basket, which also helps prevent ration sharing (107, 108).

There are no established therapeutic guidelines for the management of weight loss and wasting in HIV-positive patients. WHO guidance for the treatment of malnutrition in any adult, irrespective of HIV infection status, is also being applied to malnourished PLHIV. The current guidelines recommend that PLHIV consume the same proportion of total energy from protein (12–15%), fat and carbohydrates as people who do not have HIV, but to increase total energy intake by 10–30% in adults, depending on clinical status. One recommended nutrient intake (RNI) of vitamins and minerals should also be consumed, preferably through a healthy diet, but a micronutrient supplement may be considered. Some countries, such as South Africa, recommend 1–2 RNIs (38).

For how long should a food supplement be given?

Many people, regardless of HIV status, are poor and need food assistance. PLHIV and TB patients may have been malnourished before becoming HIV-positive, and the disease often compounds this pre-existing undernutrition. Furthermore, while undernutrition always affects the immune system negatively, for PLHIV on antiretroviral therapy and TB patients, it increases the risk of opportunistic infections and treatment failure.

HIV and TB programmes should provide a supplementary food product until the patient has recovered from undernutrition, or for as long as their BMI or MUAC remains below the cut-off point. However, national protocols need to define the exact criteria for graduation from the food transfer to minimize the risk of relapse. In many cases, two consecutive monthly results above the cut-off are required for someone to graduate from the food transfer. Some countries use a slightly higher BMI for graduation than for programme entry to account for any inaccuracies in measurement, while others are now using percentage of weight gained as the exit criterion. States such as pregnancy and lactation are also considered. For example, if a patient is eligible for a supplementary food at any point in pregnancy, they will not be graduated until completion of pregnancy; if they are lactating, a reassessment can be made after the six months exclusive breastfeeding period.

Regardless of the criteria used, the food transfer needs to be closely linked to the clinical protocol of NACS so that progress can be monitored using periodic assessments. Giving food alone, without adequately assessing nutritional status, prevents impact from being tracked and will almost certainly mean that graduation will not occur in a timely manner. It also creates equity issues. Programmes that do not include individual counselling risk failing to empower the patient to improve their nutritional status using the tools they have been given. Therefore, a programme that lacks either nutrition assessment or counselling will ultimately lead to an inefficient use of resources.

All food supplements need to be seen as a component of medical treatment with a view to improving clinical outcomes. In some settings, the term “food by prescription” has been used to describe such programmes, although this is not the only model that has been used in addressing food support (the ‘S’ of NACS). Even though the patient may be poor and food insecure, the food transfer ceases when the strict medical need for it, as established in the assessment, ceases to exist.

It has been argued that graduating beneficiaries who are poor and food insecure leads to a risk of a high percentage of relapses. Although anecdotal data about such relapses are available for some countries, it should be emphasized that the initial malnutrition was a result of a combination of factors, primarily the disease. If patients adhere to treatment, it can therefore be assumed that a relapse will be unlikely, even if they are food insecure. There is some evidence that some patients receiving antiretroviral therapy continue to lose weight despite receiving NACS, including food support. The causal pathways leading to such continued wasting, which occur in a minority of patients, are not yet well understood, and further research is required (38). Food insecurity may affect some people’s ability to adhere to treatment, which in turn indirectly increases their risk of relapse in nutritional terms (40, 109).

What supplements could be provided individually and programmatically?

The type of food supplement to provide depends on the dietary needs of the patient, which are a function of gender, age, physical activity levels, and disease and nutritional status. Chapter

2 provides a detailed explanation of how HIV and TB affect food intake and metabolism. The nutrition assessment should determine an individual's needs as a function of the above factors. This will mean, for example, that severely acutely malnourished individuals will require specially formulated therapeutic foods.

For all patients, under the current WHO recommendations, 1 RNI of micronutrients should be ensured; in many low-income countries, this requirement is not routinely met through the regular diet.

Although individual needs differ, most programmes cannot tailor their food supplementation to each individual patient. Consequently, programmes typically distinguish between severely and moderately malnourished patients, and apply different protocols to each.

With regard to the items to include in the food ration for moderate acute malnutrition, programmes have a choice between so-called ready-to-use therapeutic foods (RUTFs), precooked fortified blended flours (FBFs), and a standard food basket that often includes a staple (maize, wheat or rice), pulses, oil and sugar. The optimal choice of food should consider the following criteria.

Nutrient density

When starting antiretroviral therapy, patients often suffer from conditions that make food intake difficult, such as lack of appetite and oral thrush. This makes it harder for them to reach their required caloric intake. As in the case of small children, nutrient-dense foods can make food intake easier. Nutrient-dense foods can be fortified pastes based on peanuts, chickpeas or other bases. Alternatively, fortified blended foods such as corn or wheat soy blend are used. These cereal–legume blends are fortified with micronutrients, and adding oil and sugar can increase their energy density.

Practicality

Some foods require preparation, while others do not. If access to cooking fuel is a concern, a ready-to use or precooked food may be the appropriate choice.

Acceptability

There is much anecdotal evidence that programmes struggle because beneficiaries do not like the food provided or find it too monotonous. Since local tastes differ, programmes need to assess carefully what foods will be most acceptable. It may be useful to provide a mix of at least two products to give some variety, which may also increase appetite. Given their high caloric needs, adults may struggle with a diet that is too monotonous.

Sharing

The term “food by prescription” implies that the role of food is therapeutic, or that food is part of medical treatment, with the purpose of accelerating nutritional recovery and

ensuring the treatment's success. Just as patients should not share their medication with a healthy person, patients should consume the food instead of sharing it with other household members. However, food is not like medicine, since all household members must eat, and, especially in food-insecure households, the temptation to share is great. Although more research is needed, anecdotal evidence shows that RUTFs, especially when distributed through the health sector and pitched as part of individual treatment, may be less likely to be shared than other foods that require preparation in the family pot. Many programmes try to account for sharing by increasing the ration size. While potentially effective, this can be more costly.

It is critical for patients, and ideally their household members, to be counselled on the significance of not sharing the food to ensure that the potential nutritional benefit is not diluted. Many PLHIV may not adequately understand the importance of the food for their recovery. Even with this counselling, however, it might still be unrealistic to rule out sharing completely, and programmes should therefore consider also providing a transfer to households deemed food insecure.

Cost-effectiveness

Resources are finite; therefore, often a trade-off between programme reach and richness is required. In the case of HIV, programme designers with finite resources must choose between a cheaper food basket to reach more beneficiaries and more expensive, potentially better food for fewer patients. RUTFs tend to be about three times as expensive as FBFs on a weight basis, not counting programme costs. This means that, even when the FBF ration is doubled, as occurs in many WFP programmes to account for sharing, the cost may be lower than when RUTFs are provided. However, few studies have been carried out into the comparative effectiveness of RUTFs and FBFs; it appears that RUTFs and FBFs provide the same nutritional outcome in the medium term, but that nutritional recovery is faster with RUTFs than with FBFs in the short term (110, 111). This may mean that the two products are equally effective overall, but RUTFs have more potential to reduce mortality risk during the early phase of treatment, if recovery from malnutrition is faster. Although some evidence points in this direction, it has not been proven by any study sufficient in sample size to detect statistically significant differences in mortality. In terms of cost-effectiveness, if sharing is more likely with FBFs and if RUTFs produce results faster, RUTFs may be more cost-effective despite the higher price. Future studies should compare the two on a “treatment basis”—that is, what is the total cost of achieving nutritional recovery with each product, and how does the cost of treatment compare between the two?

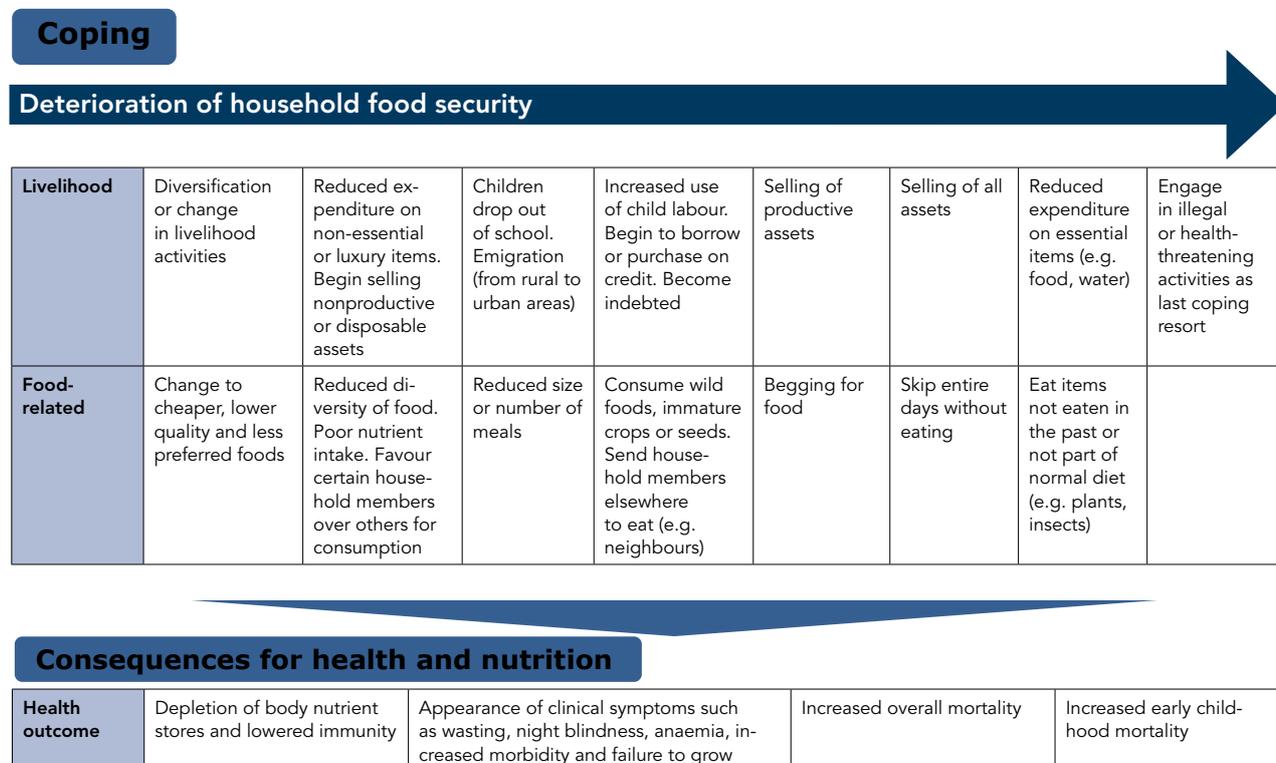
It is crucial for good programmes to link counselling closely with the provision of food for the malnourished. It is often prohibitively costly to provide patients with fresh foods, such as vegetables and fruits, or animal-source foods. However, patients receiving a transfer can be advised to spend the freed-up income on such products.

Should household members be included or just the patient?

Households affected by HIV or TB, in addition to often being food insecure at the outset, go through a double shock: they temporarily lose the income from a productive adult who is now sick and also face the additional cost that treatment imposes. It is known from programmes not related to HIV that households have a variety of options to cope with income shocks. Many are detrimental, and their effects may be difficult to reverse. Migrating, taking children out of school, reducing the number of meals or selecting less-preferred foods all have detrimental consequences on the household (112), as can be seen in **FIG. 9**, with the household's descent into stress and distress.

One undesirable way of coping is to share the food ration initially intended for the client. Most HIV and DOTS patients live in households, many of which are poor and food insecure. When all household members are hungry, it may be hard for patients who depend on their household for their care not to share the food ration. But if they do share, patients will no longer receive the intended macro- and micronutrients unless the rations have been increased to account for such sharing.

Fig. 9. Effect of food insecurity and inequality on exposure to HIV



Source: adapted with permission from Klotz et al. (113) and Eggersdorfer et al. (114), Chapter 2, p. 31, 'Food security and nutrition: linkages and complementarities' by Marie Ruel.

This presents programme designers with a difficult choice: either accept sharing and the fact that outcomes may be compromised or increase the ration size to account for sharing. Some programmes use food security as a criterion to decide who should receive an individual or a household food transfer. This assessment may not always be warranted, given the finite duration of both interventions (support to the patient and to the household) and the challenge to ascertain the level of food security. In addition, all targeting inevitably comes with an inclusion and an exclusion error, both of which present an additional cost. It makes little sense to tie the patient's food transfer to food security status, because patients will qualify only when they are malnourished. Nutritional status should be considered as a better indicator of need than food security.

The new WHO consolidated guidelines for HIV state that malnourished HIV patients, especially in food-insecure contexts, may require food supplements, in addition to antiretroviral therapy, to ensure that appropriate foods are consumed to support nutritional recovery (3). Therefore, it may be most cost-effective, in a low-income and food-insecure context, to also provide a household ration for a finite period of time. This ration could be given as food, vouchers or even as a cash transfer.

Many programmes complement the patient food transfer with a household ration. This ration is meant to prevent any negative coping behaviour, while also ensuring that patients consume their own supplementary food in full. It may be beneficial to make a clear separation between the patient's needs and the household's needs. The food assistance provided to the patient is part of treatment, and its purpose is to improve treatment success by improving nutritional status. Since patients cannot be expected to understand what product is right for them and such products may not always be available for purchase, the food transfer to the patient is usually in kind. For the household, the support provided is an income transfer—it could be food, vouchers or cash.

If programme designers decide to add a household component to the support, they need to decide how to target households, and when to start and stop such support.

How is household support targeted? How long should it last?

Targeting is important to ensure the efficient use of resources. However, it is always a difficult and costly exercise, since the household's needs must be measured according to objective criteria. This is usually done by measuring proxy indicators for household food security—for example, the household food consumption score, the household food insecurity access scale or different versions of a dietary diversity score (77, 107, 108, 115). Despite intense efforts to target, there will inevitably be inclusion and exclusion errors—that is, households that should receive support owing to their food insecurity are mistakenly excluded, while others that would not need such support are included. In short, while targeting is critical, it does come with a cost and may not always deliver fully accurate results.

As a result, programme designers trade off the cost of targeting (both the resources invested in targeting and the cost of inclusion and exclusion errors) against the cost of erring on the side of including all households with an HIV or TB patient who receives food by prescription in the programme for a finite period of time. Precise targeting may be more expensive than being overly inclusive in deciding on the household support component. Furthermore, there is currently no evidence to suggest that food sharing is not an issue in food-secure households, or that the reasons for food sharing are solely need. For example, when food is prepared in a single pot for the entire household, preparing a separate meal for an HIV-positive household member may not be practical.

It may be preferable to tie the household food support to the support provided to the patient. This will mean that all households with an undernourished HIV-positive member qualify for as long as that household member is undernourished. The nutritional status of the patient would thus become the proxy indicator to measure whether the household is going through a shock that may induce food insecurity. Household support would cease as soon as the patient stops receiving nutritious food in addition to NACS.

Providing such support to the household is meant only to prevent the household from engaging in negative coping behaviours, some of which are described above. In view of its preventive nature, assessing a household's food security status may have little value in predicting how vulnerable the household may be to a rapid deterioration in its food security. Targeting based on food security status may, therefore, make limited sense.

Household support cannot, and does not aim to, pull the household out of poverty. Many households are poor and in need of assistance, regardless of the HIV status of any of their members. Governments need to design programmes specifically aimed at helping households to overcome food insecurity. Equity issues would arise if households with PLHIV were to continue to receive support, even after the patient has recovered from acute illness and is able to return to work.

Household support presents an opportunity for referral of the household to other programmes providing psychosocial support, training to acquire new skills, microfinance or other forms of livelihood support.

Programme designers may decide to include a household support component that is tied to the provision of nutritious food to the patient, in terms of entry and exit to the programme. This may provide the opportunity to link with other community-based or state-sponsored programmes aimed at improving people's livelihoods in more general terms. The objective of such a household component is to protect the household from the income shock it faces and to temporarily allow some of its members to care for the HIV-positive person. The household food support component is not intended to provide a long-term food security solution at household level. Broader social protection mechanisms targeting the poor regardless of HIV status need to be put in place.

More “permanent safety nets” must be designed in HIV-sensitive ways—in other words, not singling out PLHIV or TB patients. Instead, their needs, as well as barriers such as stigma and discrimination, must be taken into account when designing the entry and exit criteria, programme modalities and so forth.

Many programmes have implemented a household component of this kind. Since the type of support for households often differs from what is provided to patients, according to very different objectives (nutritional for the patient versus income transfer and protection for the affected household), the two transfers do not need to be implemented with the same supply chain and through the same mechanism. The health sector is typically already stretched with providing food to patients. Providing the household support through communities can create opportunities to link the health sector to community networks.

In some cases, programmes have even chosen to “outsource” the distribution of the nutritional supplement to communities through a referral system, thereby easing the logistics burden on the health sector. Having two separate distribution mechanisms and channels in place is possible in theory; however, it also increases complexity and may prevent programme implementers from maximizing synergies and creating a one-stop shop for programme beneficiaries.

In all cases, food support should be finite and tied to clear clinical objectives, directly for the patient and indirectly for the household. It should never replace NACS, which—as long as they have the financial means—really empowers PLHIV to manage their own condition in the medium and long term. In contrast, food support can only be a short-term intervention to reduce mortality and morbidity.

ANNEX I STAGES OF CHANGE: A MODEL FOR TARGETING NUTRITION COUNSELLING

This model describes behaviour change as a process of passing through a sequence of six different motivational stages: pre-contemplation, contemplation, preparation, action, maintenance and termination. It has been used by counsellors in a range of contexts (e.g. drugs and alcohol, and sexual health) to target interventions or the counselling “pitch” to best meet the patient’s current beliefs or stage. By using this approach, counsellors can determine the best strategies for different patients, depending on the stage they are at, in terms of their readiness to change their behaviour. This model may help in understanding a person’s readiness to make dietary changes. It is also useful for encouraging individual behavioural change.

TABLE A1 outlines the different stages, the counselling goals for each stage and the specific strategies to achieve these goals. During all nutrition counselling, the broader systems affecting individuals should also be considered, and any barriers to, or resources from, these systems should be explored.

Table A1. The stages of change model for targeting nutrition counselling

Stage	Description	Goal	Strategies
Pre-contemplation	<ul style="list-style-type: none"> Is unaware of problem and has not thought about change Has no intention of changing behaviour in near future 	<ul style="list-style-type: none"> Increase awareness of need for change Personalize information on risks and benefit 	<ul style="list-style-type: none"> Assess knowledge, attitudes and beliefs Build on existing knowledge Discuss personal aspects and health consequences of poor diet
Contemplation	<ul style="list-style-type: none"> Recognizes a need to change but is in a state of ambivalence Is sometimes concerned about diet 	<ul style="list-style-type: none"> Increase motivation and confidence to perform recommended behaviour 	<ul style="list-style-type: none"> Explore ambivalence Identify problematic behaviours and prioritize behaviours to change Discuss motivation. Identify perceived barriers and possible solutions Encourage support network Suggest small, achievable steps to make changes
Preparation	<ul style="list-style-type: none"> Wants to improve diet Has some confidence they can change their diet Intends to take action in near future (in the next 30 days) and may have taken some behavioural steps in this direction 	<ul style="list-style-type: none"> Initiate change by eliciting a firm commitment and developing a specific action plan 	<ul style="list-style-type: none"> Negotiate specific, measurable, achievable, realistic, time-bound (SMART) goals Assist in developing a concrete action plan Praise small changes that client may have already attempted Explore practical steps to succeed
Action	<ul style="list-style-type: none"> Has made overt changes to behaviour within the past six months 	<ul style="list-style-type: none"> Commit to change 	<ul style="list-style-type: none"> Reinforce decision and self-confidence. Assist with self-management, feedback, problem solving and social support Discuss relapse and coping strategies Provide information and skills to support change
Maintenance	<ul style="list-style-type: none"> Has been engaging in the new behaviour for more than six months Is continuing to make effort in managing their dietary intake in line with nutrition plan 	<ul style="list-style-type: none"> Reinforce commitment and continue changes or new behaviours 	<ul style="list-style-type: none"> Reinforce positive benefits of nutrition plans Help prevent relapse and plan follow-up to support changes Assist in coping, avoiding relapses and finding alternatives
Termination	<ul style="list-style-type: none"> The ultimate goal 		<ul style="list-style-type: none"> Self-efficacy and self-management

Case study 1: Anaemia

Jan is a 30-year-old female and has been living with HIV for six years. She has been on an AZT/3TC/NVP antiretroviral therapy regimen for four years. She is married and lives with her family in the northern part of Thailand. She is a housewife who does not work. Her husband works as an employee in a paper factory. Recently, she has had poor appetite and feels weak. She has been referred to a nutritionist because she looks pale, and her recent haemoglobin is 9.0 g/dL. The following information details the steps taken and observations made by the nutritionist.

Nutrition assessment

1.1 Anthropometric measurement

Current weight (with coat and shoes): 46.5 kg
 Usual weight: approx. 45 kg
 Height: 152 cm
 Ideal body weight = height – 105 cm = 47 kg
 BMI: 19.56 kg/m²

Key points: Optimum weight

1.3 Clinical assessment

Physical examination: mild pale conjunctiva
 Temperature 37.5 °C
 BP 110/70 mm/Hg
 Pulse 72/min
 Currently on antiretroviral therapy: AZT/3TC/NVP since 2006
Other symptoms: poor appetite

Key points: Poor appetite and anaemia (no notable family history of anaemia or thalassemia)

1.2 Biochemical assessment

CD4 cells: 220 cells/mm³ (normal range 700–900 cells/mm³)
 Hb: 9.0 g/dL (normal range in women 12–16 g/dL)
 Hct: 29.5 g/dL

Key points: Low Hb and CD4 cells

1.4 Dietary assessment

Dietary intake from dietary recall:
Breakfast: a cup of black coffee with teaspoon of sugar, fried dough (1 piece)
Morning snack: ½ orange
Lunch: Chinese noodles with 5 meatballs
Snack: 1 can of sparkling water
Dinner: Soup with vermicelli and minced pork and 2 ladles of rice

Estimated energy intake from dietary recall = 603 kcal, total protein 17 g/day
 Energy distribution: CHO:Protein:Fat = 73%:11%:16%

Estimated energy requirement by using Mifflin equation time by activity factor

Energy requirement:
 = [(10 × W) + (6.25 × H) – (5 × A) – 161] × activity factor = [(10 × 47) + (6.25 × 152) – (5 × 30) – 161] × 1.2 = 1524 kcal/day
 w: weight in kg, h: height in cm, a: age
 1.2 = activity factor for sedentary lifestyle
 Total protein = 1–1.2 g/kg/day = (1 × 47) to (1.2 × 47) = 47–56 g/kg/day

Key points: Inadequate calorie intake, improper energy distribution, low protein intake and high CHO intake, few micronutrient-rich foods

Nutrition diagnosis

1. Inadequate calorie and protein intake due to nausea and poor appetite.
2. Nausea, vomiting and poor appetite related to side effects of antiretroviral therapy.
3. Anaemia related to inadequate protein consumption or side effects of antiretroviral therapy.

Nutrition intervention

Goals

1. Increase energy and protein intake to meet energy and protein requirements.
2. Increasing nutrient density of the diet by diversifying it (more fruits, vegetables, fortified foods).
3. Stimulate appetite.

Nutrition education and counselling¹⁸

1. Educate the client about nutrition knowledge, and food sources of protein and iron:
 - Provide advice on food sources for energy and protein-rich local foods.
 - Rice and starchy foods (rice, noodles, sweet potato, taro, pumpkin).
 - Meats, legumes and dairy products.
 - Fruits.
 - Nuts.
2. Provide advice on increasing the amount of rice or starchy foods and meats by two times to meet energy and protein requirement (e.g. adding egg or meats into soup or fried rice). Another option could be to have sweet potato or sweet pumpkin with sugar cane cream as a snack:
 - Have fruits, nuts or soybean as a snack or cook them as a dessert.
 - Have more vegetable dishes.
 - Have more dairy product intake in the morning or evening.
 - Choose healthy snacks and drinks.
 - Have three main meals and two to three snacks per day.
 - Have food with high iron content (i.e. red meat, egg yolk, vegetables).
 - Have a food source of vitamin C (i.e. green leafy vegetables, or fruits such as guava or oranges) with a meal or after a meal to increase iron absorption.
3. Advise on strategies to stimulate appetite:
 - Do light exercise to stimulate appetite.

¹⁸ In practice, these two processes go together. "Education" looks at nutrition knowledge or information, and "counselling" is most likely the process of assessing the stage of change of the client, and encouraging or supporting the client to take the nutrition knowledge they have obtained and apply it to their life.

- Try different foods, find the most palatable and mix diet.
- Choose sour foods or fruits, chewing gum.
- Avoid food with strong, nauseating smells.

Monitoring and evaluation

1. F/U Hb/Hct lab.
2. Record diet to evaluate energy and nutrient intakes.
3. Review nutrition knowledge.

Case study 2: Malnutrition, injecting drug use and TB

A new 35-year-old male client living with HIV has been referred for a nutrition assessment at the clinic and is seeing a nutritionist for the first time. He has recently been diagnosed with HIV after going to the hospital with TB infection. The client has been identified as being “very thin” and therefore has been referred for nutrition assessment, education and counselling. He looks underweight. Medical staff are concerned about initiating treatment because of his visible malnutrition.

Nutrition assessment

1.1 Anthropometric measurement

Current weight: 40.4 kg
Usual weight: approx. 53 kg
Height: 160 cm
BMI: 15.8 kg/m²
MUAC: 20.4 cm

Key points: Low BMI (BMI < 16.5 = severe malnutrition)

1.3 Clinical assessment

Physical examination: a new PLHIV client diagnosed with HIV after presenting with TB. TB medication has been started. Antiretroviral therapy has not been started
Temperature: 37.4 °C (mild fever)

Exercise: limited due to fatigue, low physical activity

Family history: no notable family history of CHD or diabetes

Low income: approx. \$10 per week (economic problems, which relate to poor diet intake and nutrition insecurity)

Other symptoms:

- Sunken eyes, obviously dehydrated
- Persistent, unproductive cough
- Poor appetite
- Often feels fatigued
- Client too malnourished to commence antiretroviral therapy
- Evidence of scarring on arms consistent with injecting drug use; patient reports sporadic drug use, often sharing with friends

Key points: Unproductive cough and poor appetite would affect eating habits

1.2 Biochemical assessment

CD4 cells: 10 cell/mm³ (normal >500 cells/mm³)
Hb: 10.2 g/dL (normal range for male 13.2–16 g/dL)
Albumin: 30 (normal 32–50 mg/dL)

Key points: Low CD4, slight anaemia and low albumin

1.4 Dietary assessment

Dietary intake from dietary recall:

Breakfast: rice (2 portions), stir-fried pork and kale (1 tablespoon pork, ½ cup kale)

Lunch: rice noodles, fried with pork, kale, egg and dark soy sauce

Dinner: rice (2 portions), green curry with chicken (1 tablespoon chicken, ½ cup eggplant)

Estimated energy intake from 24-hour recall = 1275 kcal, total protein 30 g/day

Energy distribution: CHO:Protein:Fat = 46%:12%:42%

Eating habit: buys street food: fried food, snacks and sweet drinks, does not like raw vegetables

Energy requirement

Basal metabolic rate (BMR) for men = $10 \times \text{ideal body weight (kg)} + 6.25 \times \text{height (cm)} - 5 \times \text{age (y)} + 5$

Ideal body weight for this client = $\text{height (cm)} - 100 = 160 - 100 = 60 \text{ kg}$

BMR for this client = $(10 \times 60) + (6.25 \times 160) - (5 \times 35) + 5 = 1430 \text{ kcal/day}$

Total energy requirement = $\text{BMR} \times \text{activity factor} = 1430 \times 1.2 = 1716 \text{ kcal/day}$

Add 50% for HIV-symptomatic person with malnutrition = $1716 + 858 \text{ kcal} = 2574 \text{ kcal/day}$

Protein requirement: $1-1.4 \text{ g/kg/day} = 53-74 \text{ g/day}$

Key points: Low calorie intake, low protein intake and imbalanced calorie distribution

Nutrition diagnosis

1. Severe malnutrition related to unintentional weight loss, poor appetite and low food intake.
2. Food insecurity due to socioeconomic problems.

Nutrition intervention

Goals

1. Increase weight by 2–4 kg (5–10% of current weight) within three months.
2. Minimize the risk of weight loss.
3. Promote adequate dietary intake and adequate lean body mass.
4. Enhance overall quality of life.

Nutrition education and counselling

1. Educate client on nutrition knowledge, including core food groups, role of each food group on human body function, sources of high-energy foods in local area.
2. Emphasize the relationship between underweight and health outcome and risk of morbidity.
3. Discuss strategies with the client to achieve the goals:
 - Eat regularly, eat high-nutrient and energy-dense foods (e.g. local fruits or snacks between meals).
 - Increase overall macro- and micronutrient intake through increased portion sizes.
 - Change the environment of eating: eat with family or friends.
 - Increase energy density of meals by adding or tailoring the dish with eggs, beans, corn, pumpkin, nuts, meat, etc.
 - Avoid overconsumption of low-energy foods such as diet soft drinks, tea and coffee.
 - If available, consider food supplementation (e.g. nutrient powdered milk or nutritious energy bars).

Lifestyle strategies

1. Light regular exercise to stimulate appetite: walking 5–10 minutes three times per day.
2. Following recovery from the fever, do resistive exercise to maintain and rebuild muscle mass.

Referral

1. Refer to relevant health-care professionals for further investigation of possible factors of weight loss.

2. Refer to a social worker because of socioeconomic problems.

Monitoring and evaluation

1. Monitor body weight every month or at subsequent visits.
2. Monitor biochemistry in three months.

Case study 3: Dyslipidaemia

Dang is a 42-year-old male who has been living with HIV (stage C2) for more than 17 years. Since 2003, his treatment regimen has consisted of D4T/3TC/NPV. During 2010, he started suffering from lipoatrophy that was due to the side effects of antiretroviral therapy. The medication was changed to TDF/FTC/EFV (since 15 July 2010). He lives with his wife, who is also HIV-positive. He works as a volunteer at the Thai Red Cross AIDS Research Centre. He recently found out that he has a high blood lipid level, so the doctor has referred him to the nutritionist to control his diet and change his lifestyle to reduce blood lipid levels.

Nutrition assessment

<p>1.1 Anthropometric measurement Current weight: 82 kg Highest weight: 90 kg; lowest weight: 60 kg Height: 174 cm Ideal body weight = height – 105 cm = 69 kg BMI: 28 kg/m² (obesity stage I) Waist circumference: 95 cm (greater than normal range for Asian male population (<90 cm))</p> <p>Key points: Obesity, abdominal obesity</p>	<p>1.2 Biochemical assessment CD4 cells: 512 cells/mm³ (normal >500 cells/mm³) HIV RNA: <40 copies/mL (normal <50 copies/mL or undetectable) Hb: 9.0 g/dL (normal range: women 12–16 g/dL; men 13.2–16 g/dL) Hct: 29.5 g/dL Total cholesterol: 298 mg/dL (normal <200 mg/dL) Triglyceride: 187 mg/dL (normal <150 mg/dL) HDL-cholesterol: 35 mg/dL (normal for male >40 mg/dL) LDL-cholesterol: 216 mg/dL (normal <130 mg/dL) FBS: 95 mg/dL (normal range 70–110 mg/dL)</p> <p>Key points: Hypercholesterolaemia, high LDL-cholesterol, hypertriglyceridaemia</p>
<p>1.3 Clinical assessment Physical examination: overall the client is doing well (his father had diabetes; therefore there is a risk for diabetes) Temperature: 36.5 °C BP: 114/77 mm/Hg Pulse: 82/min Antiretroviral therapy in the past: D4T/3TC/NVP (2003 to 15/7/2010) Currently on antiretroviral therapy: TDF/3TC/EFV (15/7/2010 to present) Other symptoms: lipodystrophy at cheeks and buttocks Sedentary life style and low physical activity</p> <p>Key points: Lipodystrophy in the cheeks and buttocks. This is caused by the antiretroviral therapy and does not respond to dietary interventions.</p>	<p>1.4 Dietary assessment Dietary intake from dietary recall: Breakfast: 1 large bowl of egg–pork porridge (2½ ladles of rice, 1 boiled egg with gravy and 2 tablespoons of pork); 1 cup of tea with milk and 2 pieces of fried dough Lunch: 4 ladles of rice and green curry with chicken (2 tablespoon of chicken, 2 tablespoons of coconut milk), 4 tablespoons of fried pork and 1 can of soda Snack: 1 cup of ice-coffee (cream with condensed milk and sugar) and 2 pieces of Thai sweet cake Dinner: Thai pork noodles with soup (2 ladles of noodle, 2 tablespoons of pork, 12 pork balls and ½ ladle of vegetables) Snack: 4 pieces of crackers and sweet milk Estimated energy intake from dietary recall = 2650 kcal, total protein 17 g/day Energy distribution: CHO:Protein:Fat = 54%:14%:32%</p> <p>Eating habit: buys street food: fried food, snacks and sweet drinks, does not like raw vegetables</p> <p>Energy requirement Basal metabolic rate (BMR) for men: $10 \times \text{ideal body weight (kg)} + 6.25 \times \text{height (cm)} - 5 \times \text{age (y)} + 5$ Ideal body weight for this client = height (cm) – 100 = 174 – 100 = 74 kg BMR for this client = $(10 \times 74) + (6.25 \times 174) - (5 \times 42) + 5 = 1623 \text{ kcal/day}$ Total energy requirement = BMR \times activity factor = $1623 \times 1.2 = 1948 \text{ kcal/day}$ Add 10% for HIV-asymptomatic person = $1948 + 195 \text{ kcal} = 2143 \text{ kcal/day}$ Protein requirement: 1–1.4 g /kg = 74–103 g/day</p> <p>Key points: Excessive caloric intake, high fat and sugar intake, low dietary fibre intake; can have vegetables, but prefers them cooked</p>

Nutrition diagnosis

1. Obesity due to high caloric intake with high fat content and low physical activity.
2. Dyslipidaemia due to obesity, high caloric intake, low dietary fibre intake and low physical activity.
3. Risk of chronic disease (cardiovascular disease, diabetes and hypertension).

Nutrition intervention

Goals

1. Reduce weight by agreed patient target: 3–6 kg within three months (5– 10% of current weight).
2. Optimize blood lipid profile to be within the normal range.
3. Reduce the risk of cardiovascular disease and diabetes.
4. Increase overall quality of life.

Nutrition education and counselling

1. Educate client on nutrition, including core food groups, role of each food group on the body.
2. Emphasize the relationship between dyslipidaemia or obesity and cardiovascular disease and diabetes.
3. Discuss strategies with the client to achieve the goals:
 - Lifestyle and eating behaviour changes.
 - Reduce calorie intake and balance it with physical activity to achieve and maintain a healthy body weight.
 - Consume a diet rich in vegetables and non-sweet fruits.
 - Choose whole grain and high fibre.
 - Consume fish, especially oily fish, at least twice a week.
 - Limit intake of saturated fats to <7% of energy, trans-fat to <1% of energy, and cholesterol to <300 mg/day by choosing lean meats and vegetables, and low-fat dairy products, and reducing baked products.
 - Eat boiled, steamed, baked, roasted or grilled food instead of deeply fried food.
 - Avoid drinking alcohol and smoking.
 - Exercise regularly: at least 30 minutes per day, three times per week.

Monitoring and evaluation

1. Follow up after 1–3 months to see the change in body weight, eating patterns and lifestyle.
2. Follow up on blood lipid levels after six months, and then bi-annually.

3. Refer to physician to consider lipid-lowering agent if LDL-cholesterol level is still higher than 160 mg/dL after lifestyle and eating changes have been modified for six months.

Case Study 4: Overweight/obesity

Pai is a 34-year-old female who has been living with HIV for five years. She has been on antiretroviral therapy for three years. Now she is on the second-line antiretroviral therapy regimen AZT/3TC/LPV/r. She is married and lives with her husband in Bangkok. She is a housewife who does not work. She has a fairly sedentary lifestyle. Her husband is a carter in the company. Her family lives in Khon Kaen in the north-east of Thailand. She has been referred to the nutritionist to try to reduce her weight.

Nutrition assessment

1.1 Anthropometric measurement

Current weight: 59 kg
Usual weight: approx. 58 kg
Height: 155 cm
Waist circumference: 95 cm (greater than normal range for Asian female population (<80 cm))
Hip circumference: 90 cm
BMI: 24.5 kg/m² (obesity stage I)
Waist:hip ratio (WHR): 1.06

Key points: Overweight and abdominal obesity

1.2 Biochemical assessment

CD4 cells: 452 cells/mm³ (normal >500 cells/mm³)
Total cholesterol: 180 mg/dL (normal <200 mg/dL)
Triglyceride: 107 mg/dL (normal <150 mg/dL)
HDL-cholesterol: 35 mg/dL (normal for adult >40 mg/dL)
LDL-cholesterol: 216 mg/dL (normal <130 mg/dL)
FBS: 95 mg/dL (normal range 70–110 mg/dL)

Key points: Normal range

1.3 Clinical assessment

Physical examination: overall the client is doing well
Temperature: 36.5 °C
BP: 140/85 mm/Hg
Pulse: 79/min
Currently on antiretroviral therapy: AZT/3TC/LPV/r
Sedentary lifestyle and low physical activity

Key points: Higher blood pressure

1.4 Dietary assessment

Dietary intake from dietary recall:
Breakfast: 2 portions sticky rice, 4 tablespoons fried pork
Morning snack: 1 piece butter cake, 400 mL ice coffee (1 teaspoon coffee, 2 tablespoons sugar, 2 tablespoons condensed milk)
Lunch: 3 ladles rice with stir-fried chicken and ginger (4 tablespoons chicken, 1 tablespoon ginger), bitter cucumber soup with pork rib (2 tablespoons pork, 1 tablespoon bitter cucumber)
Snack: 350 mL cola, potato chips (1 big pack, 3 servings per pack)
Dinner: sausage (rice and pork) north-eastern style, fried (¼ cup rice, 1 tablespoon mung bean noodle, 6 tablespoons pork), 6 teaspoons fried fish
Snack: a cup of yoghurt with seeds

Estimated energy intake from 24-hour recall = 2400 kcal, total protein 70 g/day,
Energy distribution: CHO:Protein:Fat = 40%:22%:38%

Energy requirement

Basal metabolic rate (BMR) for women
= $10 \times \text{ideal body weight (kg)} + 6.25 \times \text{height (cm)} - 5 \times \text{age (y)} + 161$
Ideal body weight for this client = $\text{height (cm)} - 105 = 155 - 105 = 50 \text{ kg}$
BMR for this client
= $(10 \times 50) + (6.25 \times 155) - (5 \times 34) + 161 = 1508 \text{ kcal/day}$
Total energy requirement = BMR \times activity factor
= $1508 \times 1.2 = 1810 \text{ kcal/day}$
Add 10% for HIV-asymptomatic person (Annex 2) = $1810 + 180 \text{ kcal} = 1990 \text{ kcal/day}$
Protein requirement: $1-1.4 \text{ g/kg} = 50-70 \text{ g/day}$

Key points: Excessive caloric intake, with high fat intake, low dietary fibre intake

Nutrition diagnosis

1. Overweight.
2. High risk of metabolic syndrome related to waist circumference >80 cm in female and WHR >0.8 in female.
3. High blood pressure (BP >120/80 mmHg).

Nutrition intervention

Goal

1. Reduce weight by agreed patient target: 3–6 kg within three months (5–10% of current weight).
2. Promote an adequate dietary intake.
3. Reduce risk factors for cardiovascular disease and diabetes.
4. Improve overall quality of life.

Nutrition education and counselling

1. Emphasize the relationship between obesity and risk factors such as cardiovascular disease, diabetes and other metabolic complications.
2. Reduce energy intake:
 - Reduce size of meals.
 - Increase high fibre intake by adding more vegetables, rather than reducing the amount of starchy foods.
 - Keep balance and variety in diet.
 - Avoid highly refined, sugary foods.
3. Don't skip meals but reduce the portion or amount of food, especially at dinner.
4. Eat small, frequent meals with low-energy-dense foods.
5. Drink more water.
6. Choose the appropriate fat, such as lean meats, fish and vegetable oil.
7. Choose complex carbohydrates instead of refined or simple carbohydrates.
8. Eat boiled, steamed, baked, roasted or grilled food instead of deeply fried foods.
9. Avoid diets high in saturated fat and cholesterol.
10. Adjust sodium intake by avoiding a high-salt diet.
11. Commence light aerobic and resistive exercise. Increase exercise to at least 30 minutes, three times per week.

12. Refer to health-care professionals for further investigation of physiological, medical and biochemical causes of obesity.

Monitoring and evaluation

1. Next follow-up visit within 1–3 months.
2. Monitor body weight every month or at the subsequent visit.
3. Monitor waist and hip circumference every month or at the subsequent visit.
4. Monitor biochemistry in the next six months.

REFERENCES

1. World Food Programme, Food and Nutrition Technical Assistance (FANTA) Project. Food assistance programming in the context of HIV. Washington, DC: FANTA Project; 2007 (http://one.wfp.org/food_aid/doc/Food_Assistance_Context_of_HIV_sept_2007.pdf, accessed 23 April 2014).
2. The M&E guide for HIV and TB programming. Rome: World Food Programme; 2011 (http://docustore.wfp.org/stellent/groups/public/documents/manual_guide_proced/wfp235338.pdf).
3. Consolidated guidelines on the use of antiretroviral drugs for treating and preventing HIV infection. Geneva: World Health Organization; 2013 (http://apps.who.int/iris/bitstream/10665/85321/1/9789241505727_eng.pdf?ua=1).
4. Guideline: nutritional care and support for patients with tuberculosis. Geneva: World Health Organization; 2013 (http://apps.who.int/iris/bitstream/10665/94836/1/9789241506410_eng.pdf?ua=1).
5. Guidelines on HIV and infant feeding. Geneva: World Health Organization; 2010:58.
6. Rollins N. Guidelines for an integrated approach to the nutritional care of HIV-infected children (6 months – 14 years): handbook. Geneva: World Health Organization; 2009 (http://whqlibdoc.who.int/publications/2009/9789241597524_eng_Handbook.pdf?ua=1, accessed 23 April 2014).
7. Guideline: vitamin A supplementation in pregnancy for reducing the risk of mother-to-child transmission of HIV. Geneva: World Health Organization; 2011 (http://apps.who.int/iris/bitstream/10665/44627/1/9789241501804_eng.pdf?ua=1, accessed 23 April 2014).
8. 2013 Global fact sheet. Geneva: Joint United Nations Programme on HIV/AIDS; 2013 (http://www.unaids.org/en/media/unaids/contentassets/documents/epidemiology/2013/gr2013/20130923_FactSheet_Global_en.pdf, accessed 23 April 2014).
9. Grant AD, De Cook KM. HIV infection and AIDS in the developing world. *BMJ*. 2001;322(7300):1475–8.
10. Global report: UNAIDS report on the global AIDS epidemic 2013. Geneva: Joint United Nations Programme on HIV/AIDS; 2013;1–198.
11. Kranzer K, Govindasamy D, Ford N, Johnston V, Lawn SD. Quantifying and addressing losses along the continuum of care for people living with HIV infection in sub-Saharan Africa: a systematic review. *J Int AIDS Soc*. 2012;15(2).
12. Fox MP, Rosen S. Patient retention in antiretroviral therapy programs up to three years on treatment in sub-Saharan Africa, 2007–2009: systematic review. *Tropical Medicine & International Health*. 2010;15:1–15.
13. De Pee S, Grede N, Forsythe M, Bloem MW. Antiretroviral therapy requires life-long adherence. *Lancet Infect Dis*. 2012;12(9):661–2.
14. UNAIDS terminology guidelines. Geneva: Joint United Nations Programme on HIV/AIDS; 2012 (http://www.unaids.org/en/media/unaids/contentassets/documents/unaidspublication/2011/JC2118_terminology-guidelines_en.pdf, accessed 23 April 2014).

15. Maartens G., Celum C. and Lewin SR. HIV infection: epidemiology, pathogenesis, treatment, and prevention. *The Lancet*. Published Online ahead of print June 5, 2014 [http://dx.doi.org/10.1016/S0140-6736\(14\)60164-1](http://dx.doi.org/10.1016/S0140-6736(14)60164-1).
16. Young DB, Gideon HP, Wilkinson RJ. Eliminating latent tuberculosis. *Trends Microbiol.* 2009;17(5):183–8 (<http://linkinghub.elsevier.com/retrieve/pii/S0966842X09000638>, accessed 23 April 2014).
17. TB/HIV facts 2011. Geneva: World Health Organization; 2011 (http://www.who.int/tb/challenges/hiv/factsheet_hivtb_2011.pdf, accessed 23 April 2014).
18. Global tuberculosis report 2013. Geneva: World Health Organization; 2013.
19. Tuberculosis. Geneva: World Health Organization; 2014 (<http://www.who.int/mediacentre/factsheets/fs104/en/>, accessed 23 April 2014).
20. Antiretroviral therapy for HIV infection in adults and adolescents: recommendations for a public health approach. Geneva: World Health Organization; 2010.
21. March 2014 supplement to the 2013 consolidated guidelines on the use of antiretroviral drugs for treating and preventing HIV infection: recommendations for a public health approach. Geneva: World Health Organization; 2014 (http://apps.who.int/iris/bitstream/10665/104264/1/9789241506830_eng.pdf?ua=1, accessed 23 April 2014).
22. Fitch K, Grinspoon S. Nutritional and metabolic correlates of cardiovascular and bone disease in HIV-infected patients. *Am J Clin Nutr.* 2011;94(6):1721S–8S.
23. Getting to zero. Geneva: Joint United Nations Programme on HIV/AIDS; 2010 (http://www.unaids.org/en/media/unaids/contentassets/documents/unaidspublication/2010/jc2034_unaids_strategy_en.pdf, accessed 23 April 2014).
24. ART scale-up in Ethiopia: success and challenges. Federal HIV/AIDS Prevention and Control Office; 2009.
25. Farmer P, Robin S, Ramilus SL, Kim JY. Tuberculosis, poverty, and “compliance”: lessons from rural Haiti. *Semin Respir Infect.* 1991;6(4):254–60.
26. Weiser SD, Tuller DM, Frongillo EA, Senkungu J, Mukiibi N, Bangsberg DR. Food insecurity as a barrier to sustained antiretroviral therapy adherence in Uganda. *PLoS ONE.* 2010;5(4):e10340.
27. Chileshe M, Bond VA. Barriers and outcomes: TB patients co-infected with HIV accessing antiretroviral therapy in rural Zambia. *AIDS Care.* 2010; 22(Suppl 1):51–9 <http://www.tandfonline.com/doi/abs/10.1080/09540121003617372#.U1e2seaH95E>, accessed 23 April 2014).
28. Weiser S, Wolfe W, Bangsberg D, Thior I, Gilbert P, Makhema J, et al. Barriers to antiretroviral adherence for patients living with HIV infection and AIDS in Botswana. *J Acquir Immune Defic Syndr.* 2003;34(3):1–8.
29. Hiarlaithe MO, Grede N, de Pee S, Bloem M. Economic and social factors are some of the most common barriers preventing women from accessing maternal and newborn child health (MNCH) and prevention of mother-to-child transmission (PMTCT) services: a literature review. *AIDS Behav.* 2014;Apr 2.

30. Greenaway K. Food by prescription: a landscape paper: GAIN Working Paper Series No. 2. Geneva: Global Alliance for Improved Nutrition; 2009.
31. Mayston R, Kinyanda E, Chishinga N, Prince M, Patel V. Mental disorder and the outcome of HIV/AIDS in low-income and middle-income countries. *AIDS*. 2012;26:S117–35.
32. Kraak VI, Pelletier DL, Frongillo EJ Jr, Rajabiun S. The potential role of food aid for AIDS mitigation in East Africa: stakeholder views. Washington, DC: Food and Nutrition Technical Assistance (FANTA) Project; 1999 (http://reliefweb.int/sites/reliefweb.int/files/resources/B680D0D3766179C7C125741000377A33-fanta_nov1999.pdf, accessed 23 April 2014).
33. Weiser SD, Young SL, Cohen CR, Kushel MB, Tsai AC, Tien PC, et al. Conceptual framework for understanding the bidirectional links between food insecurity and HIV/AIDS. *Am J Clin Nutr*. 2011;94(6):1729S–1739S (<http://www.ajcn.org/cgi/doi/10.3945/ajcn.111.012070>, accessed 24 September 2012).
34. Paton NI, Sangeetha S, Earnest A, Bellamy R. The impact of malnutrition on survival and the CD4 count response in HIV-infected patients starting antiretroviral therapy. *HIV Med*. 2006;7(5):323–30.
35. Zachariah R, Fitzgerald M, Massaquoi M, Pasulani O, Arnould L, Makombe S, et al. Risk factors for high early mortality in patients on antiretroviral treatment in a rural district of Malawi. *AIDS*. 2006;20(18):2355–60.
36. Van der Sande MAB, Van der Loeff MFS, Aveika AA, Sabally S, Togun T, Sarge-Njie R, et al. Body mass index at time of HIV diagnosis. *J Acquir Immune Defic Syndr*. 2004;37(2):1288–94.
37. Koethe JR, Heimbürger DC. Nutritional aspects of HIV-associated wasting in sub-Saharan Africa. *Am J Clin Nutr*. 2010;91(4):1138S–1142S.
38. De Pee S, Semba RD. Role of nutrition in HIV infection: review of evidence for more effective programming in resource-limited settings. *Food Nutr Bull*. 2010;31(4):S313–44.
39. Ivers LC, Jerome G, Freedberg KA. Food assistance is associated with improved body mass index, food security and attendance at clinic in an HIV program in central Haiti: a prospective observational cohort study. *AIDS Res Ther*. 2010;7(33):1–8.
40. De Pee S, Grede N, Mehra D, Bloem MW. The enabling effect of food assistance in improving adherence and/or treatment completion for antiretroviral therapy and tuberculosis treatment: a literature review. *AIDS Behav*. 2014;Mar 12.
41. Cantrell RA, Sinkala M, Megazinni K, Lawson-Marriott S, Washington S, Chi BH, et al. A pilot study of food supplementation to improve adherence to antiretroviral therapy among food-insecure adults in Lusaka, Zambia. *J Acquir Immune Defic Syndr*. 2008;49(2):190–5.
42. Nerad J, Romeyn M, Silverman E, Allen-Reid J, Dieterich D, Merchant J, et al. General nutrition management in patients infected with human immunodeficiency virus. *Clin Infect Dis*. 2003;36(Suppl 2):S52–S62.

43. Schwenk A, Hodgson L, Wright A, Ward LC, Rayner CF, Grubnic S, et al. Nutrient partitioning during treatment of tuberculosis: gain in body fat mass but not in protein mass. *Am J Clin Nutr.* 2004;79(6):1006–12.
44. Nutrient requirements for people living with HIV/AIDS. Geneva: World Health Organization; 2003 (http://www.who.int/nutrition/publications/Content_nutrient_requirements.pdf, accessed 23 April 2014).
45. World Health Organization, Food and Agriculture Organization of the United Nations. Living well with HIV/AIDS. Rome: Food and Agriculture Organization of the United Nations; 2002 (<http://www.fao.org/docrep/005/y4168e/y4168e00.HTM>).
46. Kosmiski L. Energy expenditure in HIV infection. *Am J Clin Nutr.* 2011;94(6):1677S–1682S.
47. Thomas B. Manual of dietetic practice. Oxford: Blackwell Science Ltd; 2001 (<http://onlinelibrary.wiley.com/doi/10.1046/j.1467-3010.2001.0173b.x/abstract>).
48. Food and Agriculture Organization of the United Nations, World Health Organization, United Nations University. Human energy requirements: report of a Joint FAO/WHO/UNU Expert Consultation, Rome, 17–24 October 2001. Rome: Food and Agriculture Organization of the United Nations; 2001.
49. Population nutrient intake goals for preventing diet-related chronic diseases. Geneva: World Health Organization; no date (http://www.who.int/nutrition/topics/5_population_nutrient/en/print.html, accessed 23 April 2014).
50. Forrester JE, Sztam KA. Micronutrients in HIV/AIDS: is there evidence to change the WHO 2003 recommendations? *Am J Clin Nutr.* 2011;94(6):1683S–1689S.
51. Management of severe malnutrition: a manual for physicians and other senior health workers. Geneva: World Health Organization; 1999.
52. Essential prevention and care interventions for adults and adolescents living with HIV in resource-limited settings. Geneva: World Health Organization; 2008.
53. IMAI district clinician manual: hospital care for adolescents and adults: guidelines for the management of illnesses with limited resources. Geneva: World Health Organization; 2011.
54. Grede N, Claros JM, de Pee S, Bloem M. Is there a need to mitigate the social and financial consequences of tuberculosis at the individual and household level? *AIDS Behav.* 2014;Apr 8.
55. Kemp JR, Mann G, Simwaka BN, Salaniponi FM, Squire SB. Can Malawi's poor afford free tuberculosis services? Patient and household costs associated with a tuberculosis diagnosis in Lilongwe. *Bull World Health Organ.* 2007;85(8):580–5.
56. Rony Z, Spielmann MP, Harries AD, Salaniponi FM. Moderate to severe malnutrition in patients with tuberculosis is a risk factor associated with early death. *Trans R Soc Trop Med Hyg.* 2002;96(3):291–4.

57. Lönnroth K, Castro KG, Chakaya JM, Chauhan LS, Floyd K, Glaziou P, et al. Tuberculosis control and elimination 2010–50: cure, care, and social development. *Lancet*. 2010;375(9728):1814–29.
58. Joint United Nations Programme on HIV/AIDS, World Health Organization, World Food Programme. HIV, food security and nutrition: policy brief. Geneva: Joint United Nations Programme on HIV/AIDS; 2008 (http://www.unaids.org/en/media/unaids/contentassets/dataimport/pub/manual/2008/jc1565_policy_brief_nutrition_long_en.pdf).
59. Byron E, Gillespie S, Nangami M. Integrating nutrition security with treatment of people living with HIV: lessons from Kenya. *Food Nutr Bull*. 2008;29(2):87–97.
60. Van Niekerk C, Smego RA Jr, Sanne I. Effect of nutritional education and dietary counselling on body weight in HIV-seropositive South Africans not receiving antiretroviral therapy. *J Hum Nutr Diet*. 2000;13(6):407–12 (<http://onlinelibrary.wiley.com/doi/10.1046/j.1365-277x.2000.00255.x/abstract>).
61. OPTIMIZE MNH: optimizing health worker roles to improve access to key maternal and newborn health interventions through task shifting. Geneva: World Health Organization; 2012.
62. Nutrition for PLHIV and OVC: standard operating procedures. Viet Nam: Family Health International; 2009.
63. Fields-Gardner C, Campa A, American Dietetic Association. Position of the American Dietetic Association: nutrition intervention and human immunodeficiency virus infection. *J Am Diet Assoc*. 2010;110(7):1105–19.
64. Lundgren JD, Battegay M, Behrens G, De Wit S, Guaraldi G, Katlama C, et al. European AIDS Clinical Society guidelines on the prevention and management of metabolic diseases in HIV. *HIV Med*. 2008;9(2):72–81.
65. Gibson SR. Principles of nutrition assessment. 2nd edition. New York: Oxford University Press; 1990.
66. Green SM, Watson R. Nutritional screening and assessment tools for use by nurses: literature review. *J Adv Nurs*. 2005;50(1):69–83 (<http://onlinelibrary.wiley.com/doi/10.1111/j.1365-2648.2004.03350.x/abstract?deniedAccessCustomisedMessage=&userIsAuthenticated=false>).
67. Ferguson M. Reinventing nutrition screening: a simple validated tool. American Dietetic Association; 2005.
68. Charney P. Nutrition screening vs nutrition assessment: how do they differ? *Nutr Clin Pract*. 2008;23(4):366–72 (<http://ncp.sagepub.com/content/23/4/366.short>).
69. Thai–Australian Collaboration in HIV Nutrition (TACHN). Standard operating procedures. Sydney: Albion Centre; 2009.
70. Tang AM, Dong K, Deitchler M, Chung M, Wanke C, Tumilowicz A, et al. Use of cutoffs for mid-upper arm circumference (MUAC) as an indicator or predictor of nutritional and health-related outcomes in adolescents and adults: a systematic review. Washington, DC: Food and Nutrition Technical Assistance (FANTA) Project; 2013.

71. Earthman CP. Evaluation of nutrition assessment parameters in the presence of human immunodeficiency virus infection. *Nutr Clin Pract.* 2004;19(4):330–9 (<http://www.ncbi.nlm.nih.gov/pubmed/16215124>).
72. Brown W, Bauman A, Chey T, Trost S, Mummery K. Comparison of surveys used to measure physical activity. *Aust N Z J Public Health.* 2004;28(2):128–34 (<http://www.ncbi.nlm.nih.gov/pubmed/15233351>).
73. Arvidsson D, Slinde F, Hulthen L. Physical activity questionnaire for adolescents validated against doubly labelled water. *Eur J Clin Nutr.* 2005;59(3):376–83 (<http://www.ncbi.nlm.nih.gov/pubmed/15536471>).
74. International Physical Activity Questionnaire. IPAQ group; 2014 (<https://sites.google.com/site/theipaq/>, accessed 23 April 2014).
75. World Health Organization Department of Mental Health and Substance Dependence. *Mental health: evidence and research.* Geneva: World Health Organization; 2002 (WHO/MSD/MER/022).
76. Center for HIV Identification, Prevention and Treatment Services (ed.). *HIV Health Survey—Medical Outcomes Study (MOS-HIV) (Thai version).* Los Angeles: Center for HIV Identification, Prevention and Treatment Services (<http://chipts.ucla.edu/resources/?did=125>, accessed 23 April 2014).
77. Comprehensive food security and vulnerability analysis guidelines. Rome: World Food Programme; 2009 (<http://www.wfp.org/content/comprehensive-food-security-and-vulnerability-analysis-cfsva-guidelines-first-edition>).
78. *Nutrition in adolescence: issues and challenges for the health sector: issues in adolescent health and development.* Geneva: World Health Organization; 2005.
79. Woodruff BA, Duffield A. Anthropometric assessment of nutritional status in adolescent populations in humanitarian emergencies. *Eur J Clin Nutr.* 2002;56:1108–18.
80. de Onis M, Onyango AW, Borghi E, Siyam A, Nishida C, Siekmann J. Development of WHO growth reference for school-aged children and adolescent. *Bull World Health Organ.* 2007;85(9):660–7.
81. Food and Nutrition Technical Assistance (FANTA) Project III. Meeting BMI and BMI-for-age look-up tables for children and adolescents 5–18 years of age and BMI look-up for tables for non-pregnant, non-lactating adults ≥19 years of age. Washington, DC: FANTA Project; 2013 (<http://www.fantaproject.org/sites/default/files/resources/FANTA-BMI-charts-Jan2013-ENG.pdf>).
82. Growth reference indicators 5 to 19 years. Geneva: World Health Organization; 2014. (http://www.who.int/growthref/who2007_bmi_for_age/en/index.html).
83. Raiten DJ, Mulligan K, Papathakis P, Wanke C. Executive summary. Nutritional care of HIV-infected adolescents and adults, including pregnant and lactating women: what do we know, what can we do, and where do we go from here? *Am J Clin Nutr.* 2011;94(6):1667S–1676S.

84. Guaraldi G, Zona S, Cossarizza A, Vernacotola L, Carli F, Lattanzi A, et al. Switching to darunavir/ritonavir monotherapy vs. triple-therapy on body fat redistribution and bone mass in HIV-infected adults: Monarch randomized controlled trial. *Int J STD AIDS*. 2013;Aug 28 (<http://std.sagepub.com/content/early/2013/08/20/0956462413497701.abstract?rss=1>).
85. HIV, Nutrition and food: a practical guide for technical staff and clinicians. Durham, NC: FHI360; 2007 (<http://www.ovcsupport.net/wc01.cfdynamics.com/libsys/Admin/d/DocumentHandler.ashx?id=888>).
86. Cogill B. Anthropometric indicators measurement guide. Revised edition. Washington, DC: Food and Nutrition Technical Assistance (FANTA) Project; 2003 (<http://www.pronutrition.org/files/Anthropometric%20measurement%202003.pdf>).
87. The Sphere Project Handbook. 3rd edition. Greaney P, Pfiffner S, Wilson D, editors. Geneva; Sphere Project. Northampton, United Kingdom; 2011 (<http://www.sphereproject.org/>).
88. International dietetics nutrition & terminology (IDNT) reference manual. 4th edition. Academy of Nutrition and Dietetics, Washington, DC; 2014 (<https://www.eatright.org/shop/product.aspx?id=6442471673>).
89. Olson CM, Kelly GL. The challenge of implementing theory-based intervention research in nutrition education. *J Nutr Educ*. 1989;21(6):280–4 (<http://www.sciencedirect.com/science/article/pii/S0022318289801487>).
90. FHI360. Trainer guidance and introduction. Durham, NC: FHI360; 2008.
91. Stang J, Story M (eds). Guidelines for adolescent nutrition services. Minneapolis: University of Minnesota; 2005 (http://www.epi.umn.edu/let/pubs/img/adol_preface_materials.pdf).
92. Chlebowski RT, Grosvenor M, Lillington L, Sayre J, Beall G. Dietary intake and counseling, weight maintenance, and the course of HIV infection. *J Am Diet Assoc*. 1995;95(4):428–32.
93. National Food and Nutrition Commission. Nutrition guidelines for care and support of people living with HIV and AIDS. Ministry of Health, Republic of Zambia; 2011.
94. Xuereb G. Healthy eating for better living: a manual on nutrition and HIV/AIDS for healthcare workers in the Caribbean. *Cajanus—the Caribbean Food and Nutrition Institute (CFNI) Quarterly*. 2005;38(1):1–3.
95. Knox TA, Zafonte-Sanders M, Fields-Gardner C, Moen K, Johansen D, Paton N. Assessment of nutritional status, body composition, and human immunodeficiency virus-associated morphologic changes. *Clin Infect Dis*. 2003;36(Suppl. 2):S63–8.
96. Thomas E, Piwoz EG. HIV and infant feeding counselling tools reference guide. Geneva: World Health Organization; 2005 (http://www.who.int/maternal_child_adolescent/documents/9241592494/en).
97. Nutrition and tuberculosis: a review of the literature and considerations for TB control programs. Washington, DC: United States Agency for International Development; 2008.

98. Nutrition counselling, care and support for HIV-infected women. Geneva: World Health Organization; 2004.
99. Food and Nutrition Technical Assistance (Fanta III), United States Agency for International Development. MODULE 3. Nutrition Counseling. FANTA III. 2013 Dec;1–6.
100. Nutrition and HIV/AIDS: a training manual. Kampala: Regional Centre for Quality of Healthcare; 2003.
101. Prochaska JO, DiClemente CC, Norcross JC. In search of how people change applications to additive behaviors. *Am Psychol.* 1992;47(9):1102–14.
102. Academy of Management, United States Department of Education. Classification of Instructional Programs (CIP 2000)—CIP lookup to occupational crosswalks. Washington, DC: United States Department of Education; 2009 (<http://nces.ed.gov/pubs2002/cip2000/occupationlookup6d.ASP?CIP=52.0205>).
103. Frega R, Lanfranco JG, De Greve S, Bernardini S, Geniez P, Grede N, et al. What linear programming contributes: World Food Programme experience with the “Cost of the Diet” tool. *Food Nutr Bull.* 2012;33(Suppl. 2):228S–234S(7).
104. Donovan C, Massingue J. Illness, death, and macronutrients: adequacy of rural Mozambican household production of macronutrients in the face of HIV/AIDS. *Food Nutr Bull.* 2007;28(Suppl. 2):331S–338S(8) (<http://www.ingentaconnect.com/content/nsinf/fnb/2007/00000028/A00202s2/art00012?crawler=true>).
105. Bukusuba J, Kikafunda JK, Whitehead RG. Food security status in households of people living with HIV/AIDS (PLWHA) in a Ugandan urban setting. *Br J Nutr.* 2007;98(1):211–7 (<http://www.ncbi.nlm.nih.gov/pubmed/17381879>).
106. Semba RD, Darnton-Hill I, de Pee S. Addressing tuberculosis in the context of malnutrition and HIV coinfection. *Food Nutr Bull.* 2010;31(4)(suppl.):S345–64.
107. Deitchler M, Ballard T, Swindale A, Coates J. Introducing a simple measure of household hunger for cross-cultural use: Technical Note No. 12. Washington, DC: Food and Nutrition Technical Assistance (FANTA) II Project; 2011.
108. Coates J, Swindale A, Bilinsky P. Household Food Insecurity Access Scale (HFAS) for measurement of food access: indicator guide version 3. Washington, DC: Food and Nutrition Technical Assistance (FANTA) III Project; 2007.
109. Weiser SD, Fernandes KA, Brandson EK, Lima VD, Anema A, Bangsberg DR, et al. The association between food insecurity and mortality among HIV-infected individuals on HAART. *J Acquir Immune Defic Syndr.* 2009;52(3):342–9.
110. Matilsky DK, Maleta K, Castleman T, Manary MJ. Supplementary feeding with fortified spreads results in higher recovery rates than with a corn/soy blend in moderately wasted children. *J Nutr.* 2009;139(4):773–8.
111. Van Oosterhout JJ, Ndekha M, Moore E, Kumwenda JJ, Zijlstra EE, Manary M. The benefit of supplementary feeding for wasted Malawian adults initiating ART. *AIDS Care.* 2010;22(6):737–42 (<http://www.ncbi.nlm.nih.gov/pubmed/20467944>).

112. Oldewage-Theron W, Dicks E, Napier C. Poverty, household food insecurity and nutrition: coping strategies in an informal settlement in the Vaal Triangle, South Africa. *Public Health*. 2006;120:795–804.
113. Klotz C, de Pee S, Thorne-Lyman A, Kraemer K, Bloem M. Nutrition in the perfect storm: why micronutrient malnutrition will be a widespread health consequence of high food prices. *Sight and Life*. 2008;2:5–13.
114. Eggersdorfer M, Kraemer K, Ruel M, Van Ameringen M, Biesalski HK, Bloem M, et al. *The road to good nutrition: a global perspective*. Basel: Karger; 2013.
115. *Emergency Food Security Assessment Handbook (EFSA)*. 2nd edition. Rome: World Food Programme; 2009 (<http://www.wfp.org/content/emergency-food-security-assessment-handbook>).

The Joint United Nations Programme on HIV/AIDS (UNAIDS) leads and inspires the world to achieve its shared vision of zero new HIV infections, zero discrimination and zero AIDS-related deaths. UNAIDS unites the efforts of 11 UN organizations—UNHCR, UNICEF, WFP, UNDP, UNFPA, UNODC, UN Women, ILO, UNESCO, WHO and the World Bank—and works closely with global and national partners to maximize results for the AIDS response. Learn more at unaids.org and connect with us on Facebook and Twitter.

Printed on FSC-certified paper



20 Avenue Appia
1211 Geneva 27
Switzerland

+41 22 791 3666
distribution@unaids.org

unaids.org