MODULE 1.
What Is NACS?

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In this module

What does NACS stand for?
NACS is an approach informed by evidence.

Why is NACS important in health care and treatment?

What is the origin of NACS?
NACS includes nutrition assessment, nutrition counseling, and nutrition support.

NACS is important throughout the lifecycle.
NACS ties in with global health and nutrition initiatives.

How to use

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What does NACS stand for?

NACS stands for nutrition assessment, counseling, and support. It is a client-centered programmatic approach for integrating a set of priority nutrition interventions into health care services. NACS covers prevention, detection, and treatment of malnutrition and maintenance of improved nutritional status to prevent relapse.

NACS = Client-centered nutrition assessment, counseling, and support along the continuum of care, with referrals and effective coordination for optimal quality and impact

Different nutrition platforms in a country may support, for example, micronutrient supplementation, growth monitoring and promotion, optimal infant feeding, Community-Based Management of Acute Malnutrition (CMAM), food fortification, water purification, or improved household food production in separate, vertical programs. NACS is a way to tie these program approaches together to ensure a comprehensive approach to improving nutrition while strengthening health systems.

Have a comment?

NACS is an approach informed by evidence.

For pregnant women, micronutrient supplementation has been shown to reduce the incidence of anemia, preeclampsia, hypertension, and maternal mortality.¹ Severe anemia is linked to postpartum hemorrhage, and short maternal stature can lead to obstructed labor.² Optimal infant feeding can prevent poor nutrition during the first 2 years of life and confer long-term benefits later in life.³

There is both qualitative and quantitative evidence of the effectiveness of nutrition assessment, counseling, and support in treating and preventing malnutrition from CMAM and from food and nutrition interventions implemented over the past decade for people living with HIV (PLHIV). CMAM includes community screening and referral of cases of malnutrition, clinical assessment and diagnosis of malnutrition, and treatment of children under 5 with severe acute malnutrition (SAM) using therapeutic foods and routine medications. CMAM also includes referral of children with moderate acute malnutrition (MAM) for supplementary feeding. Between 2001 and 2005, 21 CMAM programs in Ethiopia, Malawi, and Sudan showed a 79 percent recovery rate, 11 percent default rate, 4 percent mortality rate, 3 percent transfer rate, and only 2 percent non-recovery rate.⁴ NACS includes both CMAM interventions for children under 5 and nutrition interventions for older children, adolescents, and adults.

Studies in both resource-constrained and non-resource-constrained settings have shown that acute malnutrition, manifested by thinness and sudden recent weight loss, significantly increases the risk of mortality among

PLHIV regardless of treatment status. In PLHIV not on antiretroviral therapy (ART), each unit decrease in body mass index (BMI) at the time of diagnosis has been associated with a 13 percent increased risk of mortality after controlling for baseline CD4 count. In PLHIV on ART, lower BMI at the time of ART initiation is associated with higher mortality. Clients on highly active antiretroviral therapy (HAART) with BMI < 17 have seven times the risk of mortality of clients with BMI > 18.5. Some early (pre-HAART era) studies found nutrition counseling could support weight gain and body cell mass gain among PLHIV. A 2010 study showed that weight gain was positively associated with clinical outcomes among HIV patients.

Several studies have investigated the clinical benefits of nutritional supplementation in adults with HIV. Reports of trials between 1990 and 2010 reported on CD4 count, viral load, and disease progression or survival. Evidence was limited on the impact of nutrition interventions on delaying response to HAART or improving HAART response in 9 micronutrient and 22 micronutrient trials. In 11.1 percent of micronutrient supplementation trials (including with high-calorie protein supplement) and 36.8 percent of micronutrient supplementation trials, improved CD4 count was reported, and in 33.3 percent of micronutrient trials and 12.5 percent of micronutrient trials, decreased viral load was reported. However, heterogeneous study design, patient population, nutrient doses and combinations, baseline deficiency levels, and study end points make it difficult to evaluate the effects of nutritional supplementation on clinical disease. A more rigorous standard design with adequate power and follow-up and consensus on composition and dose of nutrient interventions is needed to determine the impact of nutrition interventions on HIV disease progression and HAART response.

Evidence from a review of Kenya’s Food by Prescription (FBP) program, a study comparing two food products in Malawi, and similar interventions in Zambia and Uganda showed the benefits of food supplementation on outcomes such as weight gain, hemoglobin, nutritional recovery, and adherence. A 2012 Cochrane Systematic Review of 14 randomized controlled trials that evaluated the effectiveness of macronutrient interventions compared with no nutritional supplements or placebo in the management of PLHIV at different stages of HIV infection and with varying treatment status was unable to draw firm conclusions about the effects of macronutrient supplementation on morbidity and mortality in PLHIV. The reviewers, however, noted that more studies are being conducted in low-income countries, particularly in children, where macronutrient supplementation might prove to be beneficial both pre-ART and in conjunction with ART.

For HIV-positive women, optimal nutrition during pregnancy increases weight gain and improves maternal nutrition which, in turn, improves birth outcomes. Low serum retinol concentrations in women have been linked with increased rates of mother-to-child transmission of HIV. For HIV-positive children, hygienic feeding practices and improved dietary intake are critical to regaining weight lost during opportunistic infections. A 2010 study in Tanzania found that HIV-positive children on ART had higher rates of undernutrition than their HIV-negative counterparts, and that their households had lower economic status, lower levels of education, and a high prevalence of food insecurity. HIV-positive children on ART were more likely than HIV-negative children to be orphaned and fed less frequently and to have lower body weight at birth. The study concluded that because HIV is associated with increased child underweight and wasting, even among ART-treated children, interventions...
to improve nutritional status are needed in addition to increasing coverage of ART for HIV-positive children. A clinic-based observational study in India followed HIV-positive children 2–12 years old, both with and without food supplements, for 2 years to evaluate the importance of food supplements as an incentive in improving ART adherence and its impact on health. Results showed significant improvement in clinical adherence and an increase in mean clinical visits and mean CD4 count in the children who received food supplements.

Active TB affects protein metabolism and nutritional status through multiple mechanisms. Malnutrition enhances the development of active TB, and active TB makes malnutrition worse. Like other infectious diseases, active TB is likely to increase energy requirements, although current evidence does not allow an accurate estimate of the increase. Malnutrition reduces the expression of mycobactericidal substances and may compromise cell-mediated immunity, leading to active TB. Active TB is associated with wasting, which is affected by poor appetite, increased energy expenditure because of the infection, altered protein metabolism, and micronutrient deficiencies. TB treatment improves nutritional status, but this improvement is limited to gains in fat mass. Protein metabolism alteration may continue during treatment. A typical diet may be inadequate to offset these nutritional deficiencies. The combination of HIV/TB co-infection and malnutrition has been called “triple trouble” because it further increases the energy expenditure, nutrient malabsorption, micronutrient deficiency, and breakdown of lipids and proteins.

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Why is NACS important in health care and treatment?

An adequate, well-balanced diet is a cornerstone of good health. Poor nutrition can lower immunity, impair physical and mental development, and reduce productivity. Good nutrition reduces maternal and neonatal mortality, promotes optimal child growth and development, enhances the body’s ability to fight infections, helps achieve and maintain optimal body weight, makes medications more effective, prolongs good health, and improves quality of life.

Poor nutrition is a causal factor in many illnesses, and improved nutrition is an aid to treating them. There is an established cyclical relationship between poor nutrition and increased susceptibility to diseases (figure 1). Malnutrition weakens the immune system, which worsens the effects of infection, which then increases the likelihood of malnutrition. Infections can reduce appetite, decrease the body’s absorption of nutrients, and make the body use nutrients faster than usual to repair the immune system.

**FIGURE 1.** Cycle of malnutrition and infection
Malnutrition contributes to mortality through its impact on disease mechanisms. Because a severely malnourished person does not consume enough nutrients, the body meets energy needs by mobilizing tissue reserves of fat and protein from muscle, skin, and the gut. To conserve energy, the body reduces physical activity and growth, turnover of protein, functional organ reserves, the number of cell membranes, and inflammatory and immune responses. This process:

1. Reduces the liver's ability to make glucose and excrete excess dietary protein and toxins
2. Reduces the kidney's ability to excrete excess fluid and sodium
3. Reduces the size, strength, and output of the heart
4. Slows down the body's sodium/potassium chemical pump. Causing sodium to leak into the cells and potassium to leak out of the cells and be lost in the urine
5. Reduces the gut's acid and enzyme production, flattening the villi and reducing their motility
6. Affects safe storage of iron liberated from red blood cells, promoting the growth of pathogens and harmful free radicals
7. Reduces muscle mass, leading to loss of intracellular nutrients and glucose stores
8. Reduces the immune system's ability to respond to infection

Inadequate intake of protein and energy results in proportional loss of skeletal and myocardial muscle. As myocardial mass decreases, the ability to generate cardiac output decreases. Good nutrition is especially important for people with special health and nutritional needs, listed below.

**Pregnant and lactating women.** Pregnancy is the most nutritionally demanding time of a woman’s life. Extra nutrients and calories are needed to support the growth of the fetus as well as to maintain the mother’s health. Low pre-pregnancy weight, inadequate weight gain during pregnancy, and inadequate protein intake are related to low birth weight, which affects infant health and development. Deficiencies in nutrients such as folate, calcium, zinc, iodine, and iron can increase the risk of morbidity and mortality in both mothers and their infants.  

**Children under 5 years old.** Nutritional status during the first 1,000 days of life, between pregnancy and a child’s second birthday, can have permanent effects on later growth and development. Undernutrition is responsible for 45 percent of deaths among children under 5. Severe malnourished children are at risk of death from hypoglycemia, hypothermia, and cardiac failure as well as from infection.

**Adolescents.** Adolescents are vulnerable to malnutrition because they are growing faster than at any time after the first year of life. During adolescence, a growth spurt increases the need for calories, protein, calcium, and iron, and changes in lifestyle can affect future eating habits and food choices. The need for iron increases during menstruation. Pregnant adolescents who are underweight or stunted are likely to have complications during delivery and low birthweight infants, perpetuating the intergenerational cycle of undernutrition.
People with chronic diseases such as TB, HIV, and diabetes. Poor nutritional status increases the risk of infections that affect nutrient intake and lead to malnutrition. HIV can cause or aggravate malnutrition through reduced food intake, increased energy needs, and poor nutrient absorption. In turn, malnutrition can hasten the progression of HIV and worsen its impact by weakening the immune system and reducing the effectiveness of treatment. Malnutrition can increase the risk of mother-to-child transmission of HIV. Stunted growth, failure to thrive, and frequent common childhood illnesses are common in HIV-positive children. Asymptomatic HIV-positive children need 10 percent more energy than HIV-negative children of the same age, sex, and activity levels, and HIV-positive children who are losing weight need 50–100 percent more energy. Asymptomatic HIV-positive adults need 10 percent more energy and symptomatic HIV-positive adults and children need 20–30 percent more energy than HIV-negative people of the same age, sex, and physical activity level.23 As people are staying on antiretroviral therapy (ART) for longer periods, new nutrition challenges are emerging, including high blood pressure, dyslipidemia, insulin resistance, heart disease, and osteoporosis. TB is the leading bacterial cause of death in humans and the second leading cause of death among infectious diseases after HIV. People with active TB often have decreased appetite, weight loss, and micronutrient deficiencies, which increase the risk of progression from TB infection to active TB. Diabetes is part of a growing epidemic of non-communicable diseases that impose a double burden of malnutrition (undernutrition and overweight/obesity). Good nutrition is important for people with diabetes to maintain optimal blood glucose, lipid and lipoprotein, and blood pressure levels and to prevent and treat chronic complications such as obesity, dyslipidemia, cardiovascular disease, and hypertension.

NACS can identify nutrition problems early and provide counseling and resources to help ensure adequate food intake, improve nutritional status, boost immune response, and improve response to treatment of illness. People whose malnutrition is not treated early have longer hospital stays, slower recovery from infection and complications, and higher morbidity and mortality.

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What is the origin of NACS?

Food by Prescription (FBP) was a model established in 2006 in Kenya to address malnutrition in PLHIV and later scaled up as a national program. The model included nutrition assessment, counseling, and prescription of specialized food products to treat moderate malnutrition based on strict anthropometric eligibility criteria. The specialized food products were provided for a limited time in individual rations to discourage household sharing.

Based on the Kenya experience, national HIV care and treatment programs in more than a dozen countries supported by the President’s Emergency Fund for AIDS Relief (PEPFAR) adopted or adapted the FBP model as a standard of care. Kenya and Malawi have the longest-running programs using the FBP approach in resource-constrained settings.

Recognizing that the specialized food products became the main focus of FBP programming, with limited attention to counseling clients on how to prevent malnutrition or maintain improved nutritional status after treatment, in 2009 PEPFAR began promoting the term “NACS” to cover the whole range of interventions needed to prevent and treat malnutrition.

NACS includes nutrition assessment, nutrition counseling, and nutrition support.

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Nutrition assessment involves collecting information about a client’s medical history, dietary patterns, anthropometric measurements, clinical and biochemical characteristics, and social and economic situation. Good nutrition starts with good assessment. The results enable health care providers to classify clients’ nutritional status and choose appropriate interventions. Nutrition care plans specify nutrition goals and food and nutrition interventions and medical treatment to meet those goals. Clients may be referred for further medical assessment or other support services if needed.

Nutrition counseling is an interactive process between a client and a trained counselor to interpret the results of nutrition assessment. Counseling helps identify client preferences, barriers to behavior change, and ways to address those barriers. With this information, the client and counselor can jointly plan a feasible course of action to support healthy practices. Group education on nutrition topics can be provided in health facility waiting rooms, support group meetings, and community nutrition events.

Nutrition support can include specialized food products to treat malnutrition, micronutrient supplements to prevent or treat micronutrient deficiencies, point-of-use water...
purification products, and referral to economic strengthening and livelihood support. In many countries, only a small percentage of people seek health care in health facilities. The rest consult family members, traditional healers, or private medicine sellers when they are ill. Health facilities can provide nutrition support, but to make nutrition services available to the maximum number of people, community resources can be mobilized to screen and treat people for malnutrition; follow up and track NACS clients; and provide household food support, home-based care, peer counseling, and other support. An important part of NACS is linking health facilities and community-based organizations to ensure that clients at risk of malnutrition and malnourished clients receive the treatment and support they need.

None of the components of NACS—assessment, counseling, or support—is sufficient on its own to prevent malnutrition.

Ideally, every client who visits a health care facility should receive nutrition assessment to determine his or her nutritional status. Health care providers need to know clients’ nutritional status to be able to counsel them on how to maintain healthy weight, manage common conditions, and avoid infections, as well as to refer them for needed medical care or social support.

Many health care facilities provide some type of nutrition assessment, such as weighing children and pregnant women or monitoring child growth. But sometimes the use of this information ends with recording or reporting. Assessment is all but useless for individual clients unless the results are used to classify their nutritional status and counsel them on how to improve their diets to address under- or over-nutrition.

Nutrition counseling, in turn, is of little value unless clients have access to adequate food to improve their diets. Clients may also need water purification products to make drinking water safe, supplements to help them recover from micronutrient deficiencies, and economic strengthening assistance to improve household food consumption.

Rx: Combine nutrition assessment, counseling, and support for best results.
NACS is important throughout the life cycle.

Undernutrition affects all stages of human development. NACS can help improve nutritional status at each stage.

**Pregnancy.** During pregnancy, maternal needs for energy, protein, vitamins, and minerals increase to meet the demands of gestational weight gain and fetal development. Women who are underweight, have micronutrient deficiencies, or are of short stature have an increased risk of low birth weight infants and complications during pregnancy and delivery. They and their infants are also at increased risk of mortality. The negative effects of maternal undernutrition on fetal brain development may be permanent and irreversible.

**Birth.** Birth weight less than 2,500 g is associated with morbidity and mortality, inhibited growth and cognitive development, and chronic diseases later in life. New mothers need counseling on infant and young child feeding to ensure optimal growth and development.

**Infancy.** During the period of rapid growth in the first year of life, infants are vulnerable to nutrient deficiencies and need careful nutrition support to continue the growth and development that began at conception. Infants need exclusive breastfeeding (or exclusive replacement feeding if it can be provided safely) for the first 6 months of life, adequate complementary foods beginning at the age of 6 months, deworming, micronutrients, growth monitoring to catch growth faltering before treatment is needed, and treatment if they become acutely malnourished. Routine deworming and micronutrient supplementation also contribute to healthy weight gain.

**Childhood.** Monthly growth monitoring should continue for the first 2 years of life. Growth promotion should include counseling on adequate and safe nutrition, safe water, and good sanitation; routine deworming; and micronutrient supplementation. Acutely malnourished children need treatment with specialized food products. Chronic undernutrition in early childhood diminishes cognitive and physical development, putting children at a disadvantage for the rest of their lives.

**Adolescence.** Body changes during adolescence affect nutritional and dietary needs. Low birth weight infants can grow into adolescents with low weight and height, who will then be small adults. Adolescents have the highest prevalence of nutritional deficiencies. The teen years are also a time when lifelong food habits are established. Adolescents need to consume enough nutrients to meet these growth needs and develop efficiently.

**Adulthood.** Good nutrition continues to promote health and reduce the risk of disease in adults. Overweight and obesity, hypertension, and high cholesterol are linked to many health problems. A healthy diet can reduce the incidence of cardiovascular disease, type 2 diabetes, high blood pressure, osteoporosis, and some types of cancer, as well as complement medical treatment for those conditions.

While much attention has focused on the first 2 years of life as a window of opportunity to prevent stunting, interventions outside this period can also be effective. Data have shown that older children and adolescents can substantially catch up in height even without any interventions.
NACS ties in with global health and nutrition initiatives.

The **U.S. President’s Emergency Plan for AIDS Relief (PEPFAR)** was launched in 2003 to expand access to HIV prevention, care, and treatment in low-resource settings. In its second phase (2009–2013), PEPFAR supports improving health outcomes, increasing program sustainability and integration, and strengthening health systems.

**Feed the Future (FTF)** aims to strengthen the links between agricultural and nutrition outcomes. FTF focuses on country-led planning in agricultural development and food security.

The **Scaling Up Nutrition (SUN) Framework** was launched in 2010 by multiple international stakeholders. SUN encourages nutrition-focused development policies to achieve the Millennium Development Goals (MDG). The SUN Road Map focuses on achieving nine nutrition-related indicators.

The **1,000 Days Hub** is a U.S.-based advocacy platform to build awareness and encourage investment in the 1,000 day window of opportunity for children from pre-conception through the age of 2.

**RESOURCES**


