



MULTI-SECTORAL NUTRITION STRATEGY 2014–2025

Technical Guidance Brief

NUTRITION, FOOD SECURITY AND HIV

INTRODUCTION

Nutrition is a critical component of HIV treatment, care, and support, as recommended by The U.S. President’s Emergency Plan for AIDS Relief (PEPFAR), the World Health Organization (WHO), United Nations Programme on HIV/AIDS (UNAIDS), and the World Food Program (WFP). Programs like Feed the Future and Food for Peace that address food security and nutrition also must take into consideration the role that HIV and AIDS plays in increasing poverty and household vulnerability and decreasing resilience of communities – all contributing to increased rates of malnutrition.

USAID MULTI-SECTORAL NUTRITION STRATEGY

The goal of the U.S. Agency for International Development (USAID) Multi-Sectoral Nutrition Strategy is to improve nutrition to save lives, build resilience, increase economic productivity, and advance development. The strategy states, “[O]ptimal nutrition is fundamental to achieving USAID’s wider mission to end extreme poverty and to promote resilient, democratic societies while advancing our national security and prosperity.” Within this context, the large, synergistic impact of HIV and AIDS and food insecurity on nutrition, particularly in communities across Africa, mandates that USAID place high priority on addressing these problems together as part of its development program. The strategy’s multi-sectoral approach calls for working across sectors and through multiple programs, including PEPFAR, maternal, newborn and child health (MNCH), and family planning programs aimed at ending preventable child and maternal deaths (EPCMD), plus others such as Feed the Future, education and humanitarian assistance programs.

SCOPE OF THE PROBLEM

In 2014, approximately 36.9 million people globally were living with HIV and AIDS. Among these, 3.2 million were children under 15 years, and 1.5 million were pregnant women (UNAIDS 2014). In 2014, 1.2 million died from HIV and AIDS and 2.0 million were newly infected, including 220,000 children (UNAIDS 2014). Approximately 70 percent live in Africa where food insecurity and undernutrition are endemic. Nine countries in southern and eastern Africa have HIV prevalence above 10 percent.

Although much progress has been made, in 2014 only 41 percent of adults and 32 percent of children in need of treatment had access to antiretroviral treatment (ART) (UNAIDS 2014). Without ART, disease progression increases the probability of malnutrition – given increased metabolism, loss of appetite, and malabsorption associated with frequent diarrhea. Malnutrition further weakens the immune system, leading to greater susceptibility to opportunistic infections. In addition, at least one-third of the 36.9 million people living with HIV (PLHIV) worldwide are co-infected with tuberculosis (TB), leading to even greater metabolic stress and risk of malnutrition. Evidence shows that PLHIV who are undernourished when they start ART are 2–6 times more likely to die in the first 6 months of ART compared to those who have a normal body mass index (BMI) (Munthali 2015, Paton 2004, van der Sande 2004, Weiser 2009, Zachariah 2006).

Even on ART, there is a continuous need for PLHIV to consume a nutritious diet to maintain weight and prevent micronutrient deficiencies (Audain 2015). There is also a growing recognition of the role nutritional support within

HIV Impacts on Nutrition:

- reduced appetite
- increased energy needs
- impaired nutrient absorption
- loss of nutrients through diarrhea

Malnutrition Effects on HIV:

- weakened immune system
- increased susceptibility to opportunistic infections
- reduced effectiveness of antiretroviral treatment

clinical and community services plays in engagement, adherence and retention in care and treatment (Kendall 2014, Berhe, 2013, Tang 2015).

NUTRITION AND HIV

Nutrition is an important factor at all stages of HIV. Clinical studies show that PLHIV have reduced appetite and ability to consume food, as well as a higher incidence of diarrhea resulting in malabsorption and nutrient losses. Fungal infections (Candidiasis) in the mouth or throat may cause pain when swallowing, while nausea impedes normal eating patterns and food intake (Weiser 2009). In addition, untreated HIV infection increases energy needs by as much as 10 percent in asymptomatic adults, 20–30 percent in symptomatic adults, and 50–100 percent in children with weight loss (WHO 2003 *Nutrient Requirements for People Living with HIV/AIDS*). As a result, wasting in adults and growth faltering in children are often the first clinical symptoms that are evident in HIV infection.

Studies have also found that PLHIV are more likely to be deficient in vitamin A, vitamin B12, vitamin C, vitamin D, selenium, zinc, and iron. These micronutrient deficiencies, particularly vitamin B12, zinc, and selenium, have been associated with decreased immune function and a higher risk of disease progression in PLHIV (Heikens 2008).

Even with ART, management of HIV as a chronic disease requires continued nutrition management and support to mitigate the increased risks of cardiovascular disease, stroke, diabetes, anemia, and osteoporosis associated with HIV and long-term ART.

ANTIRETROVIRAL TREATMENT AND HIV

Even with ART, weight loss and wasting are predominant features of HIV disease progression and are strong predictors of mortality and morbidity in PLHIV (Koethe 2010). Losing as little as 3–5 percent of body weight significantly increases the risk of mortality, while losing more than 10 percent is associated with a 4–6-fold greater mortality risk (Tang 2005). A Zambian study involving nearly 30,000 patients has shown that failure to gain weight within 6 months after initiating ART increases the chance of death 10-fold when compared with those who gain more than 10 kg (Koethe, 2010).

While many studies have demonstrated that ART improves BMI, once ART has begun, the nutritional quality of the diet is very critical. The potential long-term metabolic effects of chronic HIV infection and ART include dyslipidemia and insulin resistance, increasing the risks of cardiovascular disease, stroke, and diabetes, especially in PLHIV who become overweight (Kalra 2013, Narayan 2014, Hyle 2014). In addition, dietary management may also mitigate the elevated risks of anemia, osteoporosis, cancer, and other non-communicable diseases in PLHIV on chronic ART.

Research has also identified food insecurity as a significant barrier to ART adherence and retention. Studies have shown that food insecurity is associated with adverse clinical outcomes, including incomplete HIV RNA suppression, CD4 declines, increased opportunistic infections, hospitalizations, and mortality (Singer, AW 2014).

NUTRITION AND TB

Malnutrition is common among HIV-TB co-infected patients and significantly increases mortality (Bloem MW 2010, Bates 2015). TB also contributes to undernutrition, which weakens immunity and thereby increases the likelihood that latent TB will develop into active disease (Cegielski 2004). For recovering TB patients, HIV and malnutrition lower immunity, increasing the risk of reactivation of TB. Most individuals with active TB experience weight loss and micronutrient deficiencies (Vijayamalini M, 2004). Weight loss among those with TB, like HIV, can be caused by multiple factors, including reduced food intake due to loss of appetite, nausea, and abdominal pain; nutrient losses from vomiting and diarrhea (van Lettow M 2004); and metabolic alterations caused by the disease (Chisti 2013). WHO recommends ART in conjunction with TB treatment for all co-infected patients, in addition to adequate intake of essential nutrients required to address weight loss and micronutrient deficiencies.

Considering an immunocompromised individual (or PLHIV) will be more susceptible to opportunistic infections, adherence to ART is critical. TB is one of a few opportunistic infections that arise, but other infectious diseases such as pneumonia, candidiasis, helminthes, or water/food borne illness (giardia) are common. With co-infections, nutritional needs are higher due to combating multiple foreign organisms in the body.

HIV AND FOOD SECURITY

HIV, food insecurity and malnutrition are intricately linked and exacerbate the harmful impacts of each. Millions of HIV-infected people live in countries with high levels of poverty and food insecurity. Food insecurity has a negative impact on the overall nutritional and health status of those infected and affected by HIV and AIDS, and PLHIV often express that food is the greatest need for themselves and their families (Aberman 2014, Palermo 2013). Clinical providers also report that not having food to take with medication is one of the most common reasons why patients discontinue ART (Singer 2014). Studies have also shown that HIV contributes to food insecurity, reducing the work output of PLHIV and the overall income and capacity of households to access an adequate diet and other essential needs (Wairimu 2009, Martinez 2014). Food insecurity, particularly in times of drought and other crises that have an impact on food availability and access, also leads to an increase in high-risk sexual behavior, including transactional sex, that leads to increased HIV exposure or infections (Gillespie 2008).

RECOMMENDED STRATEGIES AND INTERVENTIONS

“National HIV strategies should integrate food and nutrition interventions as part of a package of care, treatment, and support services for people living with HIV and for TB patients. Programming should be based on the identified gaps and epidemiological data, and interventions should be designed by a coalition of stakeholders recognizing the importance of food and nutrition in the HIV and TB responses. Nutritional assessment, counseling, and support should be included in the treatment, care, and support package. In resource-limited settings, food and nutritional support are key enablers for accessing health services.” (UNAIDS Food and Nutrition Note, 2014)

Nutrition assessment, counseling and support (NACS) is a systems approach to providing the nutrition *standard of care* for all individuals – pregnant and postpartum women, infants and young children, adolescents, and adults – integrated within health care, linking clinical services with community support.

Routine assessment of the nutritional status of all PLHIV and orphaned and vulnerable children (OVC) is the entry point for NACS. Nutrition screening at the community level – identifying individuals with unexplained weight loss, visual or wasting or growth faltering, chronic illness, and diarrhea – should be used as a basis to refer adults and children to health clinics where they can be clinically assessed and HIV tested. Nutritional assessment at the health facility guides the clinical management, counseling, and specific types of nutrition and dietary support that should be provided to the individual. In addition, the patient can be referred to community services where further counseling and support can be provided, including economic strengthening and livelihood support to address household food security and resilience and engagement with support groups.

HIV testing and ART have become readily available in the past decade, facilitating earlier diagnosis and treatment. Fewer PLHIV now require therapeutic feeding support to treat wasting in AIDS. Therefore NACS programming has shifted to an emphasis on earlier counseling and support for all PLHIV to maintain ART adherence and retention in conjunction with nutritional and dietary management of HIV as a chronic disease. Thus, for the vast majority of PLHIV, the priority for NACS is to link nutrition and dietary counseling and other support to maintaining adherence and retention in care and treatment.

NUTRITION ASSESSMENT, COUNSELING AND SUPPORT

I. PEPFAR NACS Program Description (2013 Guidance)¹

NACS provides a comprehensive framework for integrating nutrition-specific and -sensitive programming within routine health services and improves the continuum of health and nutrition care for adults and children by strengthening linkages between facility- and community-based services.

¹ Adopted from PEPFAR NACS Guidance 2013

II. Interventions/Actions

A. Nutrition Assessment:

At a minimum, includes recording measures of *height/weight and calculation of BMI for adults* and plotting of *weight-for-height z-score relative to growth standards for children*. Comprehensive nutrition assessment also includes evaluation of clinical and dietary factors that impact nutritional status, as well as referrals to assessment of household economic and food security status and linkage to community services and support.

B. Nutritional Counseling:

- Provision of counseling regarding *timely and adequate consumption of nutritious foods to promote weight gain and maintenance, as well as adherence to medications and retention in clinical care.*
- *Referral and linkage of individuals and families to economic strengthening and livelihood services and support at the community level.* These services may be provided by U.S. Government programs and other development partners.
- *Provision of water, sanitation, and hygiene (WASH) counseling and support within NACS.* Counseling on safe food preparation and storage, point-of-use water purification treatment and other hygiene and sanitation practices.
- *Establishing linkages and two-way referrals between health clinics and community services.*
- *Provision of ART, antibiotic, and antifungal treatment for opportunistic infections and co-morbidities per clinical guidelines.* The benefits of improved food and nutrient intake can be compromised by uncontrolled health conditions that alter appetite, absorption, metabolism, and nutrient losses.
- *Address gender issues by identifying barriers to men's/women's/boys'/girls' access and adherence to both clinic and community services and support.*

C. Nutrition Support:

Provision of feeding support for PLHIV and OVC with wasting or growth faltering. Therapeutic and supplementary feeding – Food by Prescription (FBP) – is a critical component of HIV care and support and is most effective when based on established eligibility criteria. Specialized food products, including ready-to-use therapeutic food (RUTF) and fortified blended flour (FBF), are prescribed for a limited duration, typically 3–6 months, on the basis of set anthropometric entry and exit eligibility criteria. RUTF and FBF are provided, typically monthly, as a take-home ration for the individual patients. Recipients are counseled that they need to consume the RUTF or FBP as “medicine,” in addition to their other “meds,” especially antiretrovirals (ARVs), antibiotics, and antifungals, to treat co-infections.

Prioritization of NACS feeding support within and across sites based on relative vulnerability:

- Complementary food for HIV-exposed infants from 6 months up to 2 years of age, irrespective of anthropometric status
- Supplementary food to women in prevention of mother-to-child transmission of HIV (PMTCT) programs who are underweight or fail to gain adequate weight in pregnancy or are underweight during lactation
- Therapeutic/supplementary food to OVC with evidence of growth faltering (weight-for-height z-score <-2 in under-5s or BMI/age z-score <-2 in children 5–19 years of age)
- Therapeutic/supplementary food to adult HIV and AIDS patients w/ BMI <18.5

Provision of multi-micronutrient supplements when indicated. Children, particularly under-5s, should be prioritized for daily multi-micronutrient supplements, routine vitamin A supplementation, and zinc supplementation as an adjunct to the management of severe acute diarrhea.

D. Capacity Development:

Institution of quality assurance (QA) and data-driven quality improvement (QI) to integrate NACS within clinical and community services. QA defines the standard of care and services that should be provided to individual patients – the “WHAT.” QI includes identifying key tasks according to standards of care, assigning roles and responsibilities for individual staff, establishing performance standards, supportive supervision, and empowerment of staff to identify barriers to service provision and implement corrective measures – the “HOW.” *Integration of NACS within pre-service and in-service training of health workers to provide quality nutrition care.*

III. Examples of Impact

- Improved nutritional and clinical status among patients, shown by anthropometrics and laboratory values/biomarkers
- Improved adherence and retention in clinical care resulting in improved viral suppression, HIV transmission and health
- Establishment of NACS service delivery, information systems, and referral networks that strengthen health systems
- Improved training and supervision of clinic and community health care workers to provide nutrition support and services
- Stronger government ownership of nutrition policies, strategies, programs, and services

The continuum of care for the mother and child is critical for the prevention and treatment of malnutrition and HIV and AIDS. Linkages between MNCH and PMTCT services should be explicit and facilitated by both funding streams.

Increasing access to both MNCH and PMTCT services is critical, beginning early in the mother's pregnancy.

MNCH AND PMTCT

I. PEPFAR NACS Program Description (2013 Guidance)

Programmatic emphasis should be placed on pre- and postnatal counseling that focuses on good nutrition for the pregnant/lactating mother and infant, as well as ARV adherence and mother-child pair tracking and retention in care and treatment.

II. Interventions/Actions

A. Provision of antenatal and postnatal counseling to support optimum maternal and infant nutrition and health.

B. Promotion of exclusive breastfeeding for the first 6 months of life, adequate complementary feeding from 6 months of age, provision of complementary food if access is limited, and continued breastfeeding for at least the first 12 months of life, deferring weaning until a safe and adequate replacement diet can be assured in the second year of life.

C. Provision of special counseling on infant feeding in conjunction with early infant diagnosis, so infants are not prematurely or inappropriately weaned as a response to determination of infant HIV status.

D. Emphasis on ART with good adherence and retention of all PMTCT women on ART (Option B+).

E. Rapid referral of HIV-positive infants and children for ART initiation and support to ensure adherence and retention. HIV testing should include both early infant diagnosis within 6 weeks of birth, post-weaning testing, and testing of children with moderate acute malnutrition/severe acute malnutrition.

F. Promotion of improved pre- and postpartum maternal and infant nutritional and health status, including regular NACS support and supplementary feeding support if there is inadequate weight gain in pregnancy or the mother or infant is underweight postpartum.

G. Provision of the basic preventive care package for infant and young child survival, including routine immunizations, growth monitoring, micronutrient supplementation, and regular clinic referral, assessment, and treatment for infections.

H. Provision of family planning counseling and support in the antenatal and postnatal period, including lactational amenorrhea method linking exclusive breastfeeding during the first 6 months postpartum with transition to a modern method of contraception.

I. Management of moderate and acute malnutrition linking clinical care with outpatient feeding support and community nutrition and food security support.

III. Potential Impact

- Improved HIV-free survival
- Decreased under-5 mortality
- Decreased prevalence of infectious diseases
- Increased adherence to ART and retention in care

ECONOMIC STRENGTHENING, LIVELIHOODS AND FOOD SECURITY

I. PEPFAR NACS Program Description (2013 Guidance)

Food security and maintaining adequate nutritional status are essential for treatment and care adherence, good health, and long-term survival of PLHIV.

Economic strengthening and livelihood activities are important to ensure that PLHIV are able to address the underlying causes of food insecurity and malnutrition.

Explicit and timely linkages between HIV and AIDS programs and economic strengthening and livelihood interventions are critical, targeting those most in need. Inherent in the success of these linkages are the establishment of community-based organization and local and national government activities in communities where PLHIV live.

II. Interventions/Actions

A. Creation/fostering of linkages between NACS and Feed the Future, Title II and other ES/L/FS programs.

B. Development and use of tools to assess household food security and resilience as a basis for referral to appropriate community economic strengthening, livelihoods and food security (ES/L/FS) services.

C. Design of appropriate strategies and programs to strengthen the capacity of communities to provide ES/L/FS support to PLHIV and their families, including OVC.

D. Establishment of gender-specific approaches for ES/L/FS assessment, referral, and support.

E. Establishment of referral and tracking mechanisms for individuals in clinical care and their families to ES/L/FS services in their communities.

F. Assessment of promising ES/L/FS practices and gaps in community support with regard to effective targeting, cost-effectiveness, and potential for program replication, scale-up, and sustainability.

G. National Food Security and Nutrition Policies should include recommendations addressing the particular food insecurity risks of households with PLHIV and identify linkages across health, agriculture, and livelihood programs to address food insecurity and nutrition issues.

III. Examples of Impact

- Decreased high-risk sexual behavior
- Increased treatment retention and adherence
- Improved treatment outcomes

INCREASING SYNERGIES ACROSS NUTRITION, FOOD SECURITY, AND HIV AND AIDS PROGRAMS

In order to maximize synergies across HIV and AIDS, Nutrition and Food Security Programs such as Feed the Future and Food for Peace, USAID project managers should collaborate on project design and implementation in regards to addressing the nutritional and food security needs of vulnerable families that include PLHIV. When HIV and AIDS community-based programs identify families of clients as food insecure, there should be mechanisms available to link these families to local programs that can address food security issues and nutritional needs of the entire family. On the

other hand, nutrition and food security projects should identify chronically ill members of their target households and also be able to refer them to appropriate health services. This process of identification and referral should be built into the design of projects across these programs, and implementation modalities worked out between partners.

REFERENCES

- Aberman, N.L., Rawat, R., Drimie, S., Claros, J.M., and Kadiyala, S. (2014). Food Security and Nutrition Interventions in Response to the AIDS Epidemic: Assessing Global Action and Evidence. *AIDS Behav 18 Suppl 5*, S554-565.
- Audain, K.A., Zotor, F.B., Amuna, P., and Ellahi, B. (2015). Food Supplementation among HIV-infected Adults in sub-Saharan Africa: Impact on Treatment Adherence and Weight Gain. *Proc Nutr Soc*, 1-9.
- Bates, M., Marais, B.J., and Zumla, A. (2015). Tuberculosis Comorbidity with Communicable and Noncommunicable Diseases. *Cold Spring Harb Perspect Med*.
- Berhe, N., Tegabu, D., and Alemayehu, M. (2013). Effect of Nutritional Factors on Adherence to Antiretroviral Therapy among HIV-infected Adults: A Case Control Study in Northern Ethiopia. *BMC Infect Dis 13*, 233.
- Bloem M.W., de Pee S., eds. Nutrition and Food Insecurity in Relation to HIV and AIDS and Tuberculosis. *Food Nutr Bull. 2010;31(Suppl 4):S289–S364*.
- Cegielski J.P. (2004, McMurray D.N. The Relationship between Malnutrition and Tuberculosis: Evidence from Studies in Humans and Experimental Animals. *Int. J. Tuberc. Lung Dis. 2004;8:286–98*.
- Christie, European Collaborative Study (January 2003), "Height, Weight, and Growth in Children Born to Mothers with HIV-1 Infection in Europe," *Pediatrics 111(1)*.
- Gillespie, Stuart. Poverty, Food Insecurity, HIV Vulnerability and the Impact of AIDS in sub-Saharan Africa, *IDS Bulletin*, Volume 39, Number 5 Nov 2008. Institute of Development Studies.
- Heikens, G.T., Indi Trehan, I, Bernadette A. O'Hare, I., Ajib Phiri, Challenges in the Management of HIV-Infected Malnourished Children in sub-Saharan Africa. *AIDS Research and Treatment. Volume 2012 (2012), Article ID 790786, 8 pages*<http://dx.doi.org/10.1155/2012/790786>.
- Hyle, E.P., Naidoo, K., Su, A.E., El-Sadr, W.M., and Freedberg, K.A. (2014). HIV, Tuberculosis, and Noncommunicable Diseases: What Is Known about the Costs, Effects, and Cost-effectiveness of Integrated Care? *J Acquir Immune Defic Syndr 67 Suppl 1*, S87-95.
- Kalra, S., and Agrawal, N. (2013). Diabetes and HIV: Current Understanding and Future Perspectives. *Curr Diab Rep 13*, 419-427.
- Kendall, T., Danel, I., Cooper, D., Dilmitis, S., Kaida, A., Kourtis, A.P., Langer, A., Lapidus-Salaiz, I., Lathrop, E., Moran, A.C., Sebitloane, H., Turan, J.M., Watts, D.H., and Wegner, M.N. (2014). Eliminating Preventable HIV-related Maternal Mortality in sub-Saharan Africa: What Do We Need to Know? *J Acquir Immune Defic Syndr 67 Suppl 4*, S250-258.
- Koethe, J.R. MD. et al. (2010, 1st April). Association between Weight Gain and Clinical Outcomes among Malnourished Adults Initiating Antiretroviral Therapy in Lusaka, Zambia. *JAIDS 53(4)* 507.
- Martinez, H., Palar, K., Linnemayr, S., Smith, A., Derose, K.P., Ramirez, B., Farias, H., and Wagner, G. (2014). Tailored Nutrition Education and Food Assistance Improve Adherence to HIV Antiretroviral Therapy: Evidence from Honduras. *AIDS Behav 18 Suppl 5*, S566-577.
- Munthali, T., Jacobs, C., Sitali, L., Dambe, R., and Michelo, C. (2015). Mortality and Morbidity Patterns in Under-five Children with Severe Acute Malnutrition (SAM) in Zambia: A Five-year Retrospective Review of Hospital-based Records (2009-2013). *Arch Public Health 73*, 23.

- Narayan, K.M., Miotti, P.G., Anand, N.P., Kline, L.M., Harmston, C., Gulakowski, R., 3rd, and Vermund, S.H. (2014). HIV and Noncommunicable Disease Comorbidities in the Era of Antiretroviral Therapy: A Vital Agenda for Research in Low- and Middle-Income Country Settings.
- Palermo, T., Rawat, R., Weiser, S.D., and Kadiyala, S. (2013). Food Access and Diet Quality Are Associated with Quality of Life Outcomes among HIV-infected Individuals in Uganda. *PLoS One* 8, e62353.
- Paton N.I., S. Angeetha S., Earnest A., Bellamy R. The Impact of Malnutrition on Survival and CD4 Count Response in HIV-infected Patients Starting Antiretroviral Therapy. *HIV Med.* 2006;7(5):323–330.
- PEPFAR, Nutrition Assessment, Counseling and Support NACS, Technical Considerations, 3.8. 2013
- Semba R.D., Darnton-Hill I., de Pee S., Addressing Tuberculosis in the Context of Malnutrition and HIV Coinfection. *Food Nutr. Bull.* 2010;31:S345–64.
- Seume-Fosso E. et al. (2004). *Food and Nutrition Technical Assistance. HIV/AIDS: A Guide for Nutritional Care and Support.* Washington, DC, Food and Nutrition Technical Assistance Project. October 2004.
- Singer A.W.I., Weiser S.D. Does Food Insecurity Undermine Adherence to Antiretroviral Therapy?: A Systematic Review, *AIDS Behav.* 2015 Aug; 19(8):1510-26. doi: 10.1007/s10461-014-0873-1.
- Tang A.M. et al. Sept 2005 Increasing Risk of 5% or Greater Unintentional Weight Loss in a Cohort of HIV-infected Patients 1995-2003. www.ncbi.nlm.nih.gov/pubmed/16123685 *JAIDS* 41.
- UNAIDS Global Nutrition Report 2014.
- UNAIDS Food and Nutrition Guidance Note, Geneva 2014.
- Van Lettow M. et al. Micronutrient Malnutrition and Wasting in Adults with Pulmonary Tuberculosis with and without HIV Co-infection in Malawi. *BMC Infect. Dis.* 2004;4(1):61. doi:10.1186/1471-2334-4-61.
- Van der Sande M., et al. Body Mass Index at Time of HIV Diagnosis: A Strong and Independent Predictor of Survival. *J Acquir Immune Defic Syndr.* 2004;37(2):1288–1294.
- Vijayamalini M., 2004) Manoharan S. Lipid Peroxidation, Vitamins C, E and Reduced Glutathione Levels in Patients with Pulmonary Tuberculosis. *Cell Biochem. Funct.* 2004;22(1):19–22.
- Wairimu, Mwangi. International Food Policy Research Institute (IFPRI), 2009.
- Weiser S.D., et al. The Association between Food Insecurity and Mortality among HIV-infected Individuals on HAART. *J Acquir Immune Defic Syndr.* 2009;52(3):342–349.
- Weiser S.D., Frongillo E.A., Ragland K., Hogg R.S., Riley E.D., Bangsberg D.R.. Food Insecurity Is Associated with Incomplete HIV RNA Suppression among Homeless and Marginally Housed HIV-infected Individuals in San Francisco. *J Gen Intern Med.* 2009;24(1):14–20. doi:10.1007/s11606-008-0824-5.
- Weiser S.D., et al. The Association between Food Insecurity and Mortality among HIV-infected Individuals on HAART. *J Acquir Immune Defic Syndr.* 2009;52(3):342–349).
- WHO (April 2005), “Consultation on Nutrition and HIV/AIDS in Africa: Evidence, Lessons and Recommendations for Action.”
- WHO (2003). *Nutrient Requirements for People Living with HIV/AIDS.* p. 4.
- WHO. Guideline: Nutritional Care and Support for Patients with Tuberculosis; Geneva, WHO Press, 2013.

Wilkinson R.J. et al. Influence of Vitamin D Deficiency and Vitamin D Receptor Polymorphisms on Tuberculosis among Gujarati Asians in West London: A Case-control Study. *Lancet*. 2000;355:618–21.

World Bank (2007). *HIV/AIDS, Nutrition and Food Security: What We Can Do. A Synthesis of International Guidance*. Washington, DC, World ID00008431337/HIVAIDSNutritionFoodSecuritylowres.pdf), p. 10. (<http://www.pronutrition.org/archive/200303/msg00022.php>).

Zachariah R., Fitzgerald M., Massaquoi M., Pasulani O., Arnould L., Makombe S., Harries A.D. Risk Factors for High Early Mortality in Patients on Antiretroviral Treatment in a Rural District of Malawi. *AIDS*. 2006;20(18):2355–2360.

ADDITIONAL RESOURCES

Detailed information, guidance and job aids for NACS can be found in:

- *Nutrition Assessment, Counseling, and Support (NACS): A User's Guide* – <http://www.fantaproject.org/tools/NACS-users-guide-modules-nutrition-assessment-counseling-support>
- *Technical Considerations Provided by PEPFAR Technical Working Groups for 2015 COPS and ROPS* – <http://www.pepfar.gov/documents/organization/237687.pdf>
- *Nutrition Assessment, Counselling and Support for Adolescents and Adults Living with HIV* – <http://www.wfp.org/content/nutrition-assessment-counselling-and-support-adolescents-and-adults-living-hiv>

This Technical Brief will be periodically updated. Comments from readers are welcome, especially comments to help clarify the information provided or where additional information may be useful. (Last updated December 9, 2015.)