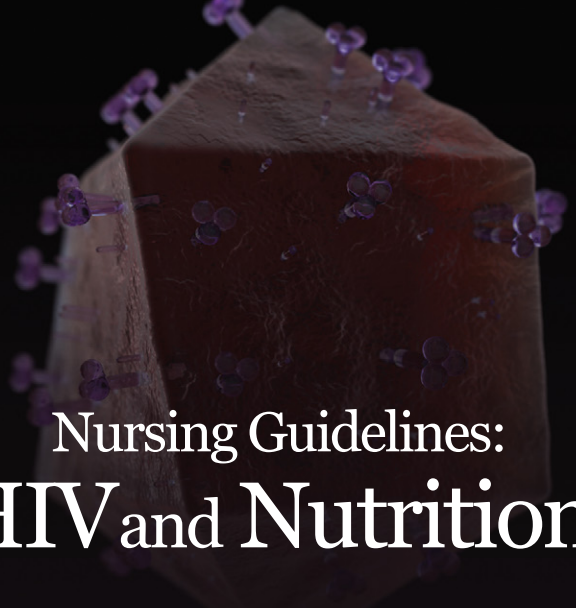

Nursing Guidelines: HIV and Nutrition

Provided by:

ANAC
ASSOCIATION OF NURSES IN AIDS CARE

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NUTRITION AND THE IMMUNE SYSTEM

Deficiencies of both macronutrients and micronutrients have been associated with impaired immunity, accelerated disease progression, and increased risk for infections and mortality. Nutrient deficiencies can be due to malabsorption, treatment-induced anorexia, limited access to nutrient-dense foods, increased energy needs, or knowledge deficits regarding healthy eating. Because nutritional deficiencies may undermine HAART-induced gains in immune function, nurses must be prepared to assess their patients' nutritional status and formulate tailored interventions.

Effects of Macronutrient Deficiencies on Immune Function

- Lymphoid atrophy
- Reduced T lymphocyte numbers
- Anergy
- Th2 cytokine response
- Reduced T cell memory responses
- Barrier defects at mucosal surfaces
- Thymic involution

Clinical Immune-Related Manifestations of Macronutrient Deficiencies

- Reactivation of latent viral infections
- Opportunistic infections
- Nosocomial infections
- Diarrhea

NUTRITION-RELATED COMPLICATIONS OF HIV INFECTION

HIV infection and its treatment are associated with nutritional-related sequelae that can range from mild, such as oral lesions, to potentially life-threatening, such as lactic acidosis and opportunistic infections (Table 1). Many of these sequelae are refractory to conventional therapies leading clinicians and patients to explore alternative therapies for relief.

Table 1. Opportunistic Infections and Cancer

Condition	Nutritional Manifestations
Candidiasis	Dysphagia, odynophagia, stomatitis, altered taste perception
Tuberculosis	Fever, weight loss, anorexia, increased resting energy expenditure, impaired protein synthesis secondary to release of proinflammatory cytokines
Cryptospor-idiosis	Cholera-like diarrhea (up to 20L/day), abdominal cramps, anorexia, weight loss
HIV-related wasting syndrome	Loss of skeletal muscle and fat mass, anemia, hypoalbuminemia, reduced muscle strength and functional performance, fever, chronic diarrhea
Non-Hodgkin's lymphoma	Weight loss, fever, night sweats; if GI involvement: abdominal pain, diarrhea or constipation, GI bleeding, ascites
GI Kaposi's sarcoma	Pain, obstruction, bleeding
Cytomegalovirus enterocolitis	Anorexia, abdominal pain, diarrhea, weight loss, fever
Hepatitis	Malaise, anorexia, nausea & vomiting, abdominal pain, weight loss

NUTRITION SCREENING

Persons newly diagnosed with HIV infection should be screened for nutrition problems at their initial visit and every 3-6 months thereafter. Table 2 depicts a nutrition screening tool that can be used with adults; and Table 3 illustrates a tool for children and adolescents. The presence of any one of the nutrition-related criteria indicates nutrition risk and warrants referral to a registered dietitian for follow-up.

Table 2. Nutritional Screening and Referral Criteria for Adults (18+ years) with HIV/AIDS

Refer to a registered dietitian when any one of the following conditions exists:

Newly diagnosed with HIV infection
Not seen by a registered dietitian in six months
Financially unable to meet caloric and nutrient needs
Visible wasting, <90% ideal body weight, <20 BMI, or decrease in body cell mass (BCM); or obesity, BMI >30
Poor oral intake of food or fluid
Persistent diarrhea, constipation, change in stools (color, consistency, frequency, smell)
Persistent nausea or vomiting
Persistent gas, bloating, heartburn
Difficulty chewing, swallowing, mouth sores, thrush, severe dental caries
Changes in perception of taste or smell
Food allergies/intolerances (fat, lactose, wheat, etc.)
>5% unintentional weight loss from usual body weight in last 6 months or since last visit
(% weight loss formula: usual body weight – current body weight/usual body weight x 100)
Medication involving food or meal modification
Concomitant hypo- or hyperglycemia, insulin resistance, hyperlipidemias, hypertension, hepatic or renal insufficiency, heart disease, cancer, pregnancy, anemia, or other nutrition-related condition

Albumin < 3.5 mg/dL
Cholesterol < 120 mg/dl and >200 mg/dl
Triglycerides >200 mg/dl

Modified from: Dietitians in AIDS Care. In Guidelines for Implementing HIV/AIDS Medical Nutrition Therapy Protocols, September, 1999, Los Angeles County Commission on HIV Health Services

Table 3. Nutritional Screening and Referral Criteria for Children and Adolescents (<18 years) with HIV/AIDS

Refer to a registered dietitian when any one of the following conditions exists:

Newly diagnosed with HIV infection
Not seen by a registered dietitian in three months
Weight for age <10th percentile (NCHS)
Height for age <10th percentile (NCHS)
Weight for height >95% of standard, or weight for height < 25th percentile
Visible wasting, <95% ideal body weight, BMI <25th percentile for age and gender, or decrease in body cell mass (BCM)
Poor appetite, food, or fluid refusals
Prolonged bottle feeding or severe dental caries
Medication involving food or meal modification
For children 4-16 years: No weight gain x 3 consecutive months
Albumin <3.5 mg/dL, prealbumin: 9-22 mg (0-6 mo), 11-

29 mg/dL (6 mo – 6 yr), 15-37 mg/dL (6-16 yr)
Difficulty chewing, swallowing, mouth sores, thrush, poor feeding skills
Food allergies/intolerances (fat, lactose, wheat, etc.).
Change in stools (color, consistency, frequency, smell)
For children 0-12 months: Low birth weight
For children 0-12 months: No weight gain x 1 month
For children 0-12 months: Diarrhea or vomiting x 2 days
For children 0-12 months: Poor sucking
For children 1-3 years: No weight gain x 2 consecutive months
For children 1-3 years: Diarrhea or vomiting x 3 days
For children 4-18 years: Diarrhea or vomiting x 4 days
Cholesterol < 65 mg/dl or > 175 mg/dl
Triglycerides < 40 mg/dl and > 160 mg/dl

Modified from: Dietitians in AIDS Care. In Guidelines for Implementing HIV/AIDS Medical Nutrition Therapy Protocols, September, 1999, Los Angeles County Commission on HIV Health Services

NUTRITION ASSESSMENT

Persons identified at nutrition risk during screening should undergo a focused nutritional assessment two to three times per year, including a dietary/clinical history, body composition measures, physical examination for nutritional alterations, and laboratory tests. Table 4 provides a summary of key nutrition assessment parameters.

Table 4. Nutrition Assessment (2-3 times/year)

Dietary/clinical history: dietary patterns/preferences, food intolerances/allergies, nutrition-related symptoms, psychosocial factors, nutrition knowledge
Body composition measures: body mass index (BMI), waist circumference
Physical examination: general appearance, clinical signs of vitamin/mineral deficiencies
Laboratory tests: fasting lipids, glucose/insulin, C-reactive protein, albumin, liver and renal function tests

Dietary/Clinical History

When obtaining the dietary history, particular attention should be paid to dietary patterns and nutrient adequacy, food likes/dislikes, food intolerances/allergies, special diets, and use of dietary supplements. The clinical history should focus on weight gain/loss patterns over the past 6

months; medication side effects and medication-nutrient interactions; and presence of nutrition-related symptoms such as anorexia, difficulty chewing and swallowing, nausea and vomiting, fever and infections, diarrhea, pain, and fatigue. Other areas to assess include psychosocial factors (anxiety, depression, drug use, income) and nutrition knowledge.

Body Composition Measures

Body mass index (BMI) and waist circumference are used to assess body composition in PLWH. BMI, an indicator of weight status, is calculated from weight and height (BMI = weight in kilograms/height in meters squared). Several BMI calculators are available online in English and Spanish, such as http://www.nhlbisupport.com/bmi/. Tables 5 and 6 present criteria for BMI interpretation for adults and children/adolescents. For adults, a BMI less than 18.5 is indicative of undernutrition, and a BMI of 25 or greater is indicative of overweight or obesity. For children/adolescents, a BMI less than the 5th percentile signifies undernutrition, and a BMI greater than the 95th percentile indicates obesity.

Table 5. Adults: BMI Interpretation

Weight Class	BMI
Underweight	<18.5
Normal Weight	18.5-24.9
Overweight	25-29.9
Obesity	30-39.9
Extreme Obesity	>40

From: NHLBI, 2009

Table 6. Children and Adolescents (2-20 years): BMI Interpretation

Weight Class	BMI
Underweight	< 5th percentile
Normal Weight	5th - < 85th percentile
Overweight	85th - < 95th percentile
Obesity	> 95th percentile

From: NHLBI, 2009

Changes in waist circumference are associated with increased risk for type 2 diabetes, hypertension, and cardiovascular disease. A waist circumference over 40 inches in men and 35 inches in women indicate heightened

risk for these conditions. Because PLWH may have increased waist circumference due to lipodystrophy, bioelectrical impedance analysis (BIA), magnetic resonance imaging (MRI) and computed tomography may be used to more precisely evaluate fat redistribution.

Physical Examination

Observation of general appearance — obese, cachectic, or fat redistribution — can provide clues to overall nutritional status during physical examination. Specific clinical signs of micronutrient deficiencies can also be detected and are shown in Table 7. Common deficiencies include vitamins A, B1, B6, and B12, iron, selenium, and zinc, all of which are important in immune function and metabolism.

Table 7. Clinical Signs of Common Vitamin and Mineral Deficiencies

Nutrient Deficiency	Clinical Signs
Vitamin A	Corneal changes (softening, dryness, foamy plaques); dry, flaky, scaling skin
Vitamin B1	Muscle pains; peripheral neuropathy; hyporeflexia
Vitamin B6	Skin changes (rash, seborrhea); stomatitis; peripheral neuropathy
Vitamin B12	Pale conjunctivae; disorientation; irritability
Iron	Pale conjunctivae; stomatitis; pale tongue; brittle, ridged, or spoon shaped nails
Selenium	Depigmentation of hair and skin
Zinc	Conjunctivitis, dermatitis, alopecia, poor wound healing

Laboratory Tests

Laboratory tests are useful when monitored over time. Clinically relevant tests are fasting lipids (total cholesterol, low-density lipoproteins, high-density lipoproteins, triglycerides); fasting blood sugar, insulin, serum albumin, C-reactive protein, and liver and renal function tests.

DRUG/NUTRIENT INTERACTIONS

Many antiretroviral medications can interact with food, leading to either drug toxicities or subtherapeutic drug concentrations that can drive the emergence of drug-resistant viral species (Table 8). It is essential that nurses educate their patients about these interactions.

Table 8. Drug Nutrient Interactions for Commonly Prescribed Antiretrovirals

Drug	Nutrient/Basis for Interaction
Indinavir	Grapefruit juice/increases gastric pH and delays absorption leading to slowed time to Cmax Take on an empty stomach or with a light meal to increase absorption
Saquinavir	Garlic/induces CYP 3A4 and decreases plasma drug concentration Grapefruit juice/inhibits CYP 3A4 and increases plasma drug concentration Take with high fat meal to increase absorption
Emtricitabine	Can be taken with or without food
Lamivudine	Can be taken with or without food
Etravirine	Take with food
Nevirapine	Can be taken with or without food
Lopinavir	Can be taken with or without food
Darunavir	Take with food
Raltegravir	Can be taken with or without food
Maraviroc	Can be taken with or without food
Efavirenz	Take on an empty stomach
Tenofovir	Can be taken with or without food

NUTRITION MANAGEMENT

General Dietary Guidelines

The Food Guide Pyramid is commonly used to guide dietary planning in both PLWH and uninfected HIV persons. The Food Guide Pyramid is available at www.mypyramid.gov and includes interactive features that promote individualized nutrition plans. It can also be adapted to various cultural backgrounds and lifestyles.

Wasting/Weight Loss

HIV-related wasting and weight loss are often due to one or more of four factors: a) reduced intake (e.g., anorexia, nausea); b) excessive nutrient losses (e.g., diarrhea, vomiting, malabsorption); c) metabolic changes (e.g., hypermetabolism, cytokine mediators); and d) drug-nutrient interactions (e.g., altered absorption, metabolism). To maintain protein status in stable PLWH, 0.8 to 1.25 g of protein per kilogram of body weight and 20-30 calories per kilogram of body weight are recommended. For symptomatic PLWH, 1.5 to 2.0

g of protein per kilogram of body weight and 35 calories per kilogram of body weight are recommended. A daily multivitamin/mineral supplement that supplies 100% of the daily recommended intake is also recommended. When PLWH cannot consume enough protein and calories from food, oral high-calorie and high-protein supplements should be incorporated into the nutrition plan. Oral supplements are available in many forms, such as nutrient-dense bars, soups, puddings, juices, and coffees. Several pharmacologic agents show promise for improving appetite and weight and muscle gain in PLWH. Both megestrol acetate (Megace®) and dronabinol (Marinol®) are used as appetite stimulants.

Lipodystrophy/Lipoatrophy/Insulin Resistance

HAART has been associated with a variety of body shape changes. Individuals can develop a loss of peripheral fat, known as lipoatrophy, in the face, arms, legs and/or buttocks, and an accumulation of central fat in the intra-abdominal area, upper back (buffalo hump), and/or breasts. Although no standard definition exists, these various body shape changes are commonly known as HIV-associated lipodystrophy. Nutrition and exercise interventions have proven helpful for some persons with HIV-related lipodystrophy.

HIV-related lipodystrophy has been associated with insulin resistance which can be monitored by measuring blood sugar, triglycerides, and HgbA1c if fasting glucose levels are consistently elevated. Nutrition and exercise recommendations for HIV-infected individuals with insulin resistance are the same as those for uninfected individuals. Caloric intake should be adjusted to achieve and maintain a healthy body weight.

Detailed information on food groups and portion sizes can be found in Table 9 and at the American Diabetes Association website: www.diabetes.org/nutrition-and-recipes/nutrition/foodpyramid.jsp

Anemia

Risk factors associated with HIV-related anemia include female gender, African-American race, zidovudine and lamivudine treatment, low CD4 cell counts (< 200 cells/uL), high viral loads, chronic illness, and blood loss. Anemia may also be due to nutritional deficits, caused either by inadequate ingestion or conditions that affect absorption or requirements. Microcytic anemia is most often due to iron deficiency and macrocytic anemia is generally caused by decreased erythropoiesis secondary to either folate or vitamin B12 deficiency.

Individuals with microcytic anemia should be counseled to take daily oral iron supplements and to eat iron-rich foods, such as meat, fish, poultry, beans, dried fruits and fortified grains, cereals, and energy bars. Iron absorption can be maximized by including sources of vitamin C (orange juice, cantaloupe slices) at every meal and by avoiding tea, coffee, or milk with meals or supplements.

For persons with macrocytic anemia, recommendations include oral folate supplements, IM or SQ injections of vitamin B12, and a diet high in protein (1.5 g/kg of body weight), fruits, and vegetables. Meats, eggs, and milk products are rich in vitamin B12, and fresh, uncooked fruits and vegetables, as well as their juices, are good sources of folate because folate is easily destroyed by heat.

Hyperlipidemia

Dyslipidemias, especially increases in triglycerides and total and low-density lipoprotein cholesterol (LDL-C), are common in PLWH who take protease inhibitors. To manage hyperlipidemia and reduce risk for cardiovascular disease, the National Cholesterol Education Program (NCEP) Therapeutic Lifestyle Changes (TLC) diet is recommended (Table 9).

Table 9. Therapeutic Lifestyle Changes (TLC) Diet

Nutrient	Recommended Intake
Saturated fat	< 7% of total calories
Polyunsaturated fat	Up to 10% of total calories
Monounsaturated fat	Up to 20% of total calories
Total fat	25-30% of total calories
Carbohydrate	50-60% of total calories
Fiber	20-30 gm/day
Protein	15% of total calories
Cholesterol	<200mg/day
Total calories	Based on individual

More information on the TLC diet can be found at the National Heart Lung Blood Institute Website at: http://www.nhlbisupport.com/cgi-bin/chd1/step2intro.cgi

Overweight / Obesity

Within the context of ART, PLWH are gaining weight and becoming obese at rates that mirror those of the general U.S. population. Although data are limited on approaches for managing obesity in PLWH, they should be culturally sensitive and consider the patient's readiness to lose weight and health care and self-care

beliefs. Weight loss programs that provide less than 1000-1200 calories may not provide adequate nutrients, which could affect immune function and metabolism. Lifestyle modifications for successful long-term weight loss are: a) regular physical exercise (i.e., aerobic or resistive exercise, 4-5 times/week for 30 minutes); b) a low-calorie (~1400-1500 kcal/day), low fat (20-25% of total calories) diet; c) monitoring daily food intake (e.g., food diary, portion size) and weight; d) a consistent eating pattern; and e) catching "slips" before they turn into large weight regains. Pharmacological agents may be used as adjuncts in the treatment of high risk obese patients. Two drugs are currently approved for long-term weight loss use: a) Orlistat, which inhibits intestinal fat absorption but can also reduce the absorption of fat-soluble vitamins, and b) Sibutramine, an appetite suppressant, which may cause hypertension and tachycardia.

SYMPTOM MANAGEMENT

Common nutrition-related symptoms are anorexia, nausea and vomiting, sore mouth/throat, and diarrhea.

Anorexia

Anorexia and reduced food intake can be related to depression, fatigue, pain, vomiting, diarrhea, infections, ARV and other medications, and vitamin/mineral deficiencies. The following strategies may be helpful:

Eat small snacks and meals every 2-3 hours; eat more food in the morning when appetite is best
Eat high-calorie, high-protein foods and snacks, such as peanut butter, cheese, eggs, ice cream, nuts, pizza, and dried fruit
Drink high-calorie beverages like juices or smoothies
Stimulate appetite by eating favorite foods, listening to favorite music, drinking a small glass of wine, exercising lightly before eating, or using appetite stimulants
If fatigue is a problem, consider prepared foods, frozen meals, or take-out or home-delivered meals
Keep a supply of ready-to-eat snacks on hand such as granola, yogurt, pudding cups

Nausea and Vomiting

HIV-related nausea and vomiting are usually the result of medication side effects, OIs, psychological factors (fear, anxiety), food intolerances, pain, or noxious odors, sights, and tastes. Tips for combating nausea and vomiting include:

- Eat bland, easy to digest foods such as rice, noodles, potatoes, chicken, yogurt, oatmeal
- Avoid sweet, spicy, fried, or greasy foods if they cause problems
- Eat crackers, dry toast, or cereal first thing in the morning
- Sip flat soda, non-citrus juices, water, or weak ginger or mint tea
- Replace fluids and electrolytes lost from vomiting with sports drinks, fruit juice, broth, ginger ale, vegetable juice
- Avoid lying down after eating

Sore Mouth/Throat

Secondary infections, medications, and local radiation therapy are the most common causes of sore mouth and throat. Strategies are:

- Eat soft foods such as casseroles, yogurt, soups, custards, and milk shakes
- Moisten foods by adding gravies or cream sauces to meats or vegetables; soak dry foods in milk or other beverage before eating
- Use a straw to drink beverages and soups to help ease discomfort
- Cold foods such as popsicles, Italian ices, and ice cream may ease mouth irritation
- Avoid hot, acidic, or spicy foods or beverages that can irritate the mouth; avoid hard foods such as hard bread and chips

Diarrhea

Diarrhea may be due to infections or medication side-effects. To reduce the loss of nutrients, fluids, and electrolytes, consider the following approaches:

- Avoid alcoholic, carbonated, and caffeinated beverages as they stimulate gut motility
- Eat well-cooked, easy to digest foods, such as canned peaches, cooked carrots, baked chicken, turkey, or fish
- Avoid foods that may worsen diarrhea, such as milk products or greasy or gassy foods
- Control diarrhea with bananas, rice, applesauce, tea, toast, and gummy bears
- Replace fluid and electrolytes with sports drinks, juices, bananas, and salt added to foods
- Use safety strategies for food handling, storage, and preparation, as well as strategies for eating safely in restaurants and traveling abroad

FOOD AND WATER SAFETY

All PLWH should receive regular education from a nutritional professional on preventing food- and water-borne infection. Safety recommendations include:

Wash hands thoroughly with hot, soapy water before handling/preparing foods
Cook meat, poultry, fish, and eggs thoroughly. Avoid eating raw or undercooked fish, eggs, or meat
Wash fresh fruits and vegetables thoroughly
Use only pasteurized dairy products and treated or purified water
Discard leftover foods after two days; avoid moldy food and food past the expiration date on the label
Use different cutting boards for raw and cooked foods
Use sponges, dishcloths, and dishtowels only once before laundering, or use paper towels

Additional food and water safety recommendations may be accessed at: http://vm.cfsan.fda.gov/list.html

CAM NUTRITION THERAPIES

Many HIV-infected patients use nutritional therapies to manage symptoms, improve immune functioning, and to promote wellness. Most of these therapies have not been scientifically tested for safety and efficacy and only anecdotal data are available to support or refute their use. Patients should be aware that nutritionally-based therapies can have potentially serious side effects and that they should confer with their providers before beginning any therapy. Table 10 summarizes available evidence about nutritionally-based therapies that are commonly used by HIV-infected persons.

Table 10. Nutritionally-Based CAM Therapies

THERAPY	INDICATION	EVIDENCE
Fish oil	Dyslipidemia, inflammation	Significantly reduces triglycerides; greater efficacy seen in combination with fenofibrate; no effect on plasma PI concentrations or hsCRP; high level of tolerability
Oral nutritional supplements	Weight loss, immune deficiency	Generally well-tolerated, mixed findings on whether supplements increase lean body mass; associated with weight gain in underweight persons; no evidence that supplements enhance immunity
Policosanol	Dyslipidemia	Cuban studies consistently show LDL cholesterol reductions, however, these findings have not been replicated outside of Cuba; limited data suggest that it is well-tolerated, but ineffective for HIV-related dyslipidemia, and has no pharmacokinetic interactions with ARVs
Multivitamins	Immune deficiency, promote wellness	Reduce disease progression and mortality in pregnant women living in Tanzania; reduce child mortality and breastfeeding transmission in Africa; prenatal supplements increase hemoglobin in mothers and infants; no evidence that vitamin A supplementation affects vertical transmission, but does increase birth weight
Antioxidants	Immune deficiency, reduce oxidative stress	Vitamins E & C reduce oxidative stress and may lower viral load, though data are inconclusive; vitamin E reduces HIV-associated lymphocyte apoptosis; limited data suggest that antioxidants can lower lactate levels in HIV-infected persons
Appetite stimulants	Anorexia, weight loss	Megestrol acetate alone and in combination with dronabinol has been associated with weight gain and increased lean mass; dronabinol associated with weight gain

PEDIATRIC CONSIDERATIONS

Although children represent a small percentage of HIV-infected persons in the U.S., malnutrition, growth failure, and wasting can occur, especially in symptomatic children. As part of growth and development monitoring, assessment of height, weight, and head circumference with documentation on growth charts should occur at every visit. Since children have proportionally smaller body fuel reserves available during times of increased energy needs such as infection or nausea, meeting nutritional needs is especially challenging. Ways to provide supplemental calories and protein include using calorie-dense formulas (e.g., addition of sucrose or vegetable oil to formula) for infants and encouraging nutrient dense snacks, such as raisins and peanut butter with older children. A multi-vitamin/mineral supplement that provides 100% of the daily recommended intake is needed. Preventing food-borne infection is crucial, and parents and caregivers should be instructed in the use of sanitary techniques to prepare infant formulas and to avoid letting infants drink from partially consumed bottle or jars of baby food.

GLOBAL PERSPECTIVES

In developing countries, HIV-infected persons typically live in impoverished rural areas that are characterized by limited access to health care, food shortages, poor sanitation, and a high prevalence of homelessness. As a result, HIV-infected persons often have pre-existing nutritional deficiencies/abnormalities that are exacerbated by HIV infection and difficult to manage due to the scarcity of resources. Coordinated international efforts are needed to address the complex issues that drive HIV-related nutritional abnormalities. Current efforts toward this end include increasing access to potable water supplies through water disinfection programs, reducing micronutrient deficiencies through supplementation and biofortification of staple foods, developing lightweight farm equipment that can be operated by women and children, and reducing the gender disparities in health outcomes that can adversely affect families, especially children.

NUTRITION AND HIV RESOURCES

AIDS/HIV: Diet and Disease, Food and Nutrition Information Center, USDA
http://fnic.nal.usda.gov/nal_display/index.php?info_center=4&tax_level=2&tax_subject=278&topic_id=1380

American Dietetic Association *http://www.eatright.org*

Centers for Disease Control *www.cdc.gov*

FDA Center for Food Safety
http://vm.cfsan.fda.gov/list.html

HIV/AIDS Information, National Library of Medicine
http://sis.nlm.nih.gov/hiv/nutrition.html

HIV ReSources *http://www.hivresources.com/*

Guidelines for Implementing
HIV Medical Nutrition Therapy
http://hivcommission-la.info/guidelines_implementing.pdf

Nutrition and HIV/AIDS list of publications, World Health Organization *http://www.who.int/nutrition/publications/hivaids/en/index.html*

Tufts Nutrition/Infection Unit
http://www.tufts.edu/med/nutrition-infection/hiv/index.html

This booklet is available for download at our website:

www.nursesinaidscare.org

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