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Effect of the Supplemental Nutrition Assistance Program (SNAP) and Nutrition Education on Nutrition and Health Outcomes of HIV+ Individuals

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FLORIDA INTERNATIONAL UNIVERSITY

Miami, Florida

EFFECT OF THE SUPPLEMENTAL NUTRITION ASSISTANCE PROGRAM
(SNAP) AND NUTRITION EDUCATION ON NUTRITION AND HEALTH
OUTCOMES OF HIV+ INDIVIDUALS

A dissertation submitted in partial fulfillment of

the requirements for the degree of

DOCTOR OF PHILOSOPHY

in

DIETETICS AND NUTRITION

by

Irene E. Hatsu

2013

To: Dean Michele Ciccazzo
R.Stempel College of Public Health and Social Work

This dissertation, written by Irene E. Hatsu, and entitled Effect of the Supplemental Nutrition Assistance Program (SNAP) and Nutrition Education on Nutrition and Health Outcomes of HIV+ Individuals, having been approved in respect to style and intellectual content, is referred to you for judgment.

We have read this dissertation and recommend that it be approved.

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DEDICATION

I dedicate this dissertation to God for His grace and provision throughout my life and for seeing me through my doctoral education.

I also dedicate this work to my family in Ghana and my “adopted” family in California, without whose encouragement and support I will not have made it this far. Thank you for being there, and for believing in me.

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ABSTRACT OF THE DISSERTATION
EFFECT OF THE SUPPLEMENTAL NUTRITION ASSISTANCE PROGRAM (SNAP)
AND NUTRITION EDUCATION ON NUTRITION AND HEALTH OUTCOMES OF
HIV+ INDIVIDUALS

by

Irene E. Hatsu

Florida International University, 2013

Miami, Florida

Professor Adriana Campa, Major Professor

Factors associated with and barriers to participation in Supplemental Nutrition Assistance Program (SNAP) and the effect participation has on food security, nutrition status, disease status and quality of life was investigated in a cross-sectional study including 175 HIV infected individuals. In addition, the effect of a targeted nutrition education on nutrition knowledge, readiness to dietary behavior change, nutrition status, disease status and quality of life was also investigated among a subset of the population (N = 45) in a randomized clinical control trial.

SNAP participation rate was 70.3%, similar to the State of Florida and national participation rates. SNAP participation was positively and independently associated with being born in the US ($P < 0.001$), having monthly income less than \$1000 ($P = 0.006$), and receiving antiretroviral treatment ($P < 0.001$). Participation barriers include denial of participation by program, recent incarceration, living in a shelter where participation is not allowed and unawareness of eligibility status. In regression analyses, SNAP participation was not significantly associated with improved food security, nutrition

status, disease status and health related quality of life (HRQOL). Over half (56%) of the population experienced food insecurity and had inadequate intakes of half of the nutrients assessed. Illicit drug, alcohol and cigarette use were high in this population (31%, 55% and 63% respectively), and affected food security, nutrients intake, disease status and HRQOL. The nutrition education intervention resulted in a trend towards improvements nutrition knowledge, self-efficacy, and readiness to change without impacting nutrition status, disease state and quality of life.

Food insecurity and other nutrition related issues, with implications for treatment, management and cost of HIV disease, continue to plague infected individuals living in poverty. More resources, including food and nutrition programs, specifically targeted towards this population are needed to address these issues.

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CHAPTER I: INTRODUCTION

Statement of Problem

Human Immunodeficiency Virus (HIV) infection, as other infections, creates metabolic conditions that may lead to reduced nutrient intake and absorption, as well as increased nutrient requirement and utilization.¹⁻³ These metabolic alterations may hasten disease progression and reduce adherence and response to treatment, making adequate nutritional status at the onset and during the course of the disease critical for individuals infected with HIV.^{2,4}

In addition to the health impact of the disease, low income individuals infected with HIV experience food insecurity (defined as availability of nutritionally adequate and uncontaminated foods) which could also affect the natural course of the disease progression and its management.⁵⁻⁸ The extent of reported food insecurity among households of individuals infected with HIV is significantly higher than that reported in the general public.⁵⁻⁸ Interventions of food assistance for such individuals, especially in resource-limited settings, successfully reversed food insecurity conditions, and improved nutrition and disease status.⁹⁻¹² In the United States, the Food Stamp Program (FSP), currently known as the Supplemental Nutrition Assistance Program (SNAP) is the largest of the food assistance programs for low income households and individuals. The aim of the program is “to alleviate hunger and malnutrition . . . by increasing food purchasing power for all eligible households who apply for participation” as stated in the Food Stamp Act, amended in 2008 (P.L. 108-269).¹³ Among some low income populations, several studies have demonstrated nutrition and health benefits from participation in the SNAP program,¹⁴⁻¹⁶ although these results were not consistent for all studies.^{17,18} Other

studies have shown the benefit of nutrition education programs in improving nutrient intake through increases in nutrition knowledge and self-efficacy.^{19,20} In this study, we proposed that the provision of food assistance would alleviate food insecurity, improve nutrient intakes and affect HIV disease management for low income people living with the infection. Furthermore, we proposed that nutrition education will also improve the nutrition and health parameters listed above.

There is lack of information in the literature about the utilization and barriers to utilization of the supplemental nutrition assistance program by low income HIV infected adults, and the benefits of this program to this population at high nutritional risk. As such, the study's first aim was to characterize factors associated with, as well as barriers to program participation, among low income HIV infected SNAP participants and eligible non-participants. Another aim was to assess the association of the supplemental nutrition assistance program with nutritional status, food insecurity, disease stage, and quality of life of low income HIV infected adults. Thirdly, it assessed the effectiveness of a nutrition education intervention to increase nutrition knowledge, readiness for dietary behavior change, and self-efficacy of HIV infected adults in making choices to eat healthy. Additionally, it also determined the effectiveness of the nutritional education intervention to increase nutrient intake and improve nutritional status, disease stage and health-related quality of life.

Significance of Study

The study was particularly relevant for several reasons. First, it aimed to determine the effect that SNAP has on food security, nutritional, and health status of HIV infected adults. In general, low income individuals are a disempowered population with

regards to adequate nutrition. This study helped to identify barriers to SNAP participation among HIV infected adults who are eligible but not participating in this program. The information obtained is useful for program administrators in identifying and targeting those in need of outreach efforts, thus maximizing SNAP participation, and improving nutritional services and their benefits to people living with HIV.

These studies also aimed at empowering and engaging low income HIV infected individuals to improve dietary practices with the ultimate goal of achieving adequate nutritional status to maintain health. Improving nutrition may translate into better HIV management,² which could lead to reduction in the cost of healthcare for the individual and the community. By providing nutrition education to this vulnerable population in this study, we not only contributed to broadening information about types of effective interventions for managing HIV, but also determined the degree to which such interventions can enhance the health and quality of life of HIV infected adults. Though similar studies investigating the effects of SNAP on nutrition and health have been conducted in several other non-HIV populations,¹⁴⁻¹⁶ to the best of our knowledge, this is the first such study being conducted in the HIV infected population. The information obtained by this study will contribute practical and valuable information for policy decision making to invest limited resources in areas and conditions where they will maximize outcomes. The study utilized both an observational cross-sectional study design and a randomized controlled trial. The results are divided into four chapters, each responding to individualized specific aims and hypotheses.

Specific Aims and Hypotheses

A. Observational Cross-Sectional Study

CHAPTER III: SUPPLEMENTAL NUTRITION ASSISTANCE PROGRAM (SNAP) AND THE HIV INFECTED POPULATION IN MIAMI: WHO PARTICIPATES, WHO DOESN'T AND WHY.

Specific Aim 1: To identify and characterize factors associated with SNAP participation among HIV infected participants and HIV infected eligible non-participants respectively.

Hypothesis 1: Factors associated with participation will differ significantly among HIV infected SNAP participants and HIV infected eligible non-participants.

Specific Aim 2: To identify barriers to SNAP participation among HIV infected eligible non-participants.

Rationale: The barriers to access and utilization of SNAP are not well understood in this cohort due to the marginalization. This low income HIV infected population is mainly comprised of minorities living in poverty, largely plagued by substance abuse and criminalization.

CHAPTER IV: ASSOCIATION OF SUPPLEMENTAL NUTRITION ASSISTANCE PROGRAM (SNAP), WITH FOOD SECURITY AND NUTRITIONAL STATUS OF HIV INFECTED ADULTS

Specific Aim 1: To determine the association between SNAP participation and food security among HIV infected individuals.

Hypothesis 1: SNAP participation will be significantly and directly associated with food security (as measured by the 6-item food security survey module) in HIV infected adults.

Specific Aim 2: To determine the association between SNAP participation and nutritional status of HIV infected individuals.

Hypothesis 2: SNAP participation will be significantly and directly associated with nutritional status (as measured by nutrient intake and adequacy of intake, BMI, hemoglobin, hematocrit and albumin) in HIV infected adults.

**CHAPTER V: ASSOCIATION OF SUPPLEMENTAL NUTRITION
ASSISTANCE PROGRAM (SNAP), WITH HEALTH RELATED QUALITY OF
LIFE AND DISEASE STATE OF HIV INFECTED ADULTS**

Specific Aim 1: To determine the association between SNAP participation and disease stage of HIV infected individuals.

Hypothesis 1: SNAP participation will be significantly and inversely associated with disease stage (as measured by CD4 and viral load) in HIV infected adults.

Specific Aim 2: To determine the association between SNAP participation and health related quality of life of HIV infected individuals.

Hypothesis 2: SNAP participation will be significantly and directly associated with health-related quality of life (as measured by the SF-36 survey²¹ and Spitzer Quality of life index²²) in HIV infected adults.

B. Randomized Trial of Nutritional Intervention

CHAPTER VI: NUTRITION EDUCATION PROGRAM FOR LOW INCOME HIV INFECTED ADULTS

Specific Aim 1: Determine the effect of nutrition education on nutrition knowledge of HIV+ adults.

Hypothesis 1a: Nutrition education will significantly increase nutrition knowledge (as measured by a general nutrition knowledge questionnaire for adults)²³ compared to baseline, among low income HIV infected adults in an intervention group.

Hypothesis 1b: Nutrition education will significantly increase nutrition knowledge in the intervention group compared to the control group of low income HIV infected adults.

Specific Aim 2: Determine the effect of nutrition education on readiness to dietary behavior change (using the stage of change continuum) among HIV infected adults.

Hypothesis 2a: Nutrition education will lead to significant movement along the stage of change continuum (as measured by a validated stage of change questionnaire)²⁴ compared to baseline among low income HIV infected adults in an intervention group.

Hypothesis 2b: Nutrition education will lead to significant movement along the stage of change continuum in the intervention group compared to the control group of low income HIV infected adults.

Specific Aim 3: Determine the effect of nutrition education on self-efficacy in HIV infected adults.

Hypothesis 3a: Nutrition education will significantly increase self-efficacy (as measured by a validated self-efficacy questionnaire)²⁵ compared to baseline among low income HIV infected adults in an intervention group.

Hypothesis 3b: Nutrition education will significantly increase self-efficacy in the intervention group, compared to the control group, of low income HIV infected adults.

Specific Aim 4: Determine the effect of nutrition education on nutritional status of HIV infected adults.

Hypothesis 4a: Nutrition education will significantly improve nutritional status (as measured by nutrient intake, BMI, hemoglobin, hematocrit and albumin) compared to baseline among low income HIV infected adults in an intervention group.

Hypothesis 4b: Nutrition education will significantly improve nutritional status in the intervention group, compared to the control group, of low income HIV infected adults.

Specific Aim 5: Determine the effect of nutrition education on disease stage of HIV infected adults.

Hypothesis 5a: Recipients of nutrition education will have significantly less advanced disease stage (as measured by CD4 and viral load), compared to baseline, among low income HIV infected adults.

Hypothesis 5b: The intervention group receiving nutrition education will have significantly less advanced disease stage, compared to the control group, of low income HIV infected adults.

Specific Aim 6: Determine the effect of nutrition education on quality of life of HIV infected adults.

Hypothesis 6a: Nutrition education will significantly increase quality of life (as measured by the SF-36 survey²¹ and Spitzer Quality of life index²²) compared to baseline among low income HIV infected adults in an intervention group.

Hypothesis 6b: Nutrition education will significantly increase quality of life in the intervention group, compared to the control group, of low income HIV infected adults.

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CHAPTER II: LITERATURE REVIEW

Epidemiology of HIV/AIDS in the US, Florida and Miami-Dade County

The HIV epidemic continues to be a public health issue in the United states with an estimated 1.2 million people living with the HIV infection.¹ Although the incidence of the disease has been considered stable in recent years, an estimated 47,129 new cases were diagnosed in 2010 in 46 states.¹ It is reported that approximately 21% of individuals infected with HIV are not aware of their status² and hence are major contributors to new infections.³ According to the Center for Disease Control and Prevention (CDC), men who have sex with men (MSM) contributed 61% of new HIV diagnosis in 2009, although they account for only 2% of the US population.¹ Other transmission routes were heterosexual contact (27%) and injection drug use (9%).¹ Among the various ethnic/racial groups, HIV infection continues to burden Blacks/African Americans more than any other group, accounting for 45% of new diagnoses in 2010 compared to 29% in Whites and 22% in Hispanics/Latinos.¹

The State of Florida has one of the highest number of HIV cases in the United States.⁴ In 2010, it ranked the highest in the number of HIV cases diagnosed in the country, (ahead of California and New York) and third in the number of cases diagnosed with AIDS.⁴ The state reported 5,251 new HIV infections and 3,658 diagnosed AIDS cases in 2010, making the incidence rate of both HIV (27.7 per 100,000) and AIDS (18.4 per 100,000) higher than national averages.^{4,5} In 2011, HIV and AIDS were reported in all Florida counties except three.⁴ Most cases were from the state's most populous counties, with Miami-Dade ranking first in both HIV and AIDS reported cases.⁴ Miami-Dade and Broward counties contributed 39% of statewide AIDS cases, and by adding the

cases in Orange County, contributed 50% of the HIV cases in Florida.⁴ Males account for 76% and 68% of Florida's HIV infection and AIDS cases respectively. Similar to nationwide trends, Blacks are over-represented in the epidemic making up 55% of AIDS cases and 45% of HIV infection cases, higher than any other ethnic group, even though they account for only 15% of Florida's population.⁴ The main forms of sexual transmission for HIV in Florida in 2008 were through MSM (43.8%) and heterosexual contact (30.7%).⁶ In 2011, there were approximately 25,711 persons living with HIV in Miami-Dade County.⁷ According to the CDC, the county ranked third in the country in 2010 among metropolitan statistical areas in number of AIDS diagnosis. Approximately 1,400 HIV cases and 736 AIDS cases were reported in the county for 2011, with Blacks representing 41% and 52% respectively, while Hispanics accounted for 44% and 39% respectively.⁷ Cumulatively, however, Blacks represent the highest HIV and AIDS rates in the county (45% and 51%).⁷ Miami-Dade County also has the third highest disparity of income distribution among large metropolitan areas in the nation. Sixteen percent of the residents of Miami-Dade County live below the federal poverty level.⁸ With high incidence and prevalence rates of HIV/AIDS, and widespread poverty, Miami is an excellent site to study the relationship between HIV infection, participation in nutrition assistance programs and other social and health parameters.

Nutrition and HIV infection

Infections in general create an environment leading to reduction in nutrient intake and absorption, as well as an increase in the utilization and requirement for nutrients.^{9,10} HIV infection is associated with the destruction of the immune system. As a result,

maintaining adequate nutritional status in HIV infected individuals is critical. The disease, in combination with underlying or consequent malnutrition, creates a vicious cycle that aggravates disease progression and affects chances of survival.¹¹ Poor nutritional status may accelerate disease progression and lead to poor outcomes. On the other hand, HIV infection also impairs nutrient intake, digestion, absorption and utilization, leading to weight loss, nutrient deficiencies, compromised immune function and competence, as well as susceptibility to infections.^{10,11}

In people living with HIV, clinical symptoms and treatment side effects such as loss of appetite, nausea and vomiting may lead to reduction in food and nutrient intake.¹²⁻¹⁴ This contributes to weight loss and nutrient deficiency even in asymptomatic patients.^{12,15} Weight loss has been persistent among the HIV infected even in the era of antiretroviral therapy (ART).¹⁵ In addition to inadequate intake, diarrhea and malabsorption of macronutrients and micronutrients are also common during HIV infection. These conditions are exacerbated by infections from pathogens like *Cryptosporidia* and *Cytomegalovirus*. When fat malabsorption is present, it may cause decreased bioavailability or deficiency of fat-soluble vitamins.¹¹ Even among asymptomatic patients, HIV infection can lead to intestinal defects like permeability and epithelial damage.^{11,16,17} The infection can also alter the body's ability to metabolize and store nutrients such as carbohydrates,¹² proteins and fats by altering the effect of enzymes and hormones needed for their metabolism.¹⁰ HIV infection may impair the production of enzymes and transport proteins in the gastrointestinal track that are needed for nutrient digestion and absorption. Among the essential hormones needed for nutrient utilization and metabolic reactions are insulin, glucagon, cortisol and epinephrine.¹⁰

Poor nutritional status impairs immune function either directly or indirectly. Directly, nutritional deficiency can interfere with the primary activity of the lymphoid system such as during immune cell triggering, interaction and differentiation. Indirectly, it can affect other metabolic and cellular processes needed for immune regulation.¹⁸

Several micronutrients are necessary for proper immune function. Vitamin A is important for the growth and function of T and B cells, antibody responses, as well as for the maintenance of the epithelial integrity of the respiratory and gastrointestinal tract.¹¹

Vitamin E is also essential for the function of T, B, and phagocytic cells.¹⁹ It also acts as an antioxidant protecting vitamin A and fats from oxidation.¹⁰ Zinc and selenium are also important nutrients for the immune system, acting as antioxidants, with involvement in the development of cell mediated and non-specific immunity as well as vitamin A transport.¹⁰ Several other vitamins and minerals also play a role in immune function; either at the physical barrier (skin/mucosal) level, cellular immunity level, or antibody production level.²⁰ Vitamin B₆, B₁₂, C, D, folic acid, iron and copper, all work to enhance the protective activities of immune cells. With the exception of vitamin C and iron, the rest of the nutrients work to support antibody production.²⁰ Nutritional deficiency during HIV infection could result in increased levels of pro-oxidants, leading to oxidative stress, which may hasten HIV replication through nuclear factor κ B (NF- κ B), a transcriptional promoter of proteins involved in HIV transcription.¹¹ It can also result in immunosuppression which may affect viral expression and replication and ultimately disease progression and death. Factors that could contribute to poor nutrition include inadequate nutrient intake and absorption, poor appetite, metabolic problems, chronic infection and limited food availability among others.¹⁰

HIV infected individuals are more susceptible to infections because of compromised immunity. Chronic HIV infection also increases the nutritional requirements of those infected above those who are uninfected.^{11,21,22} Antiretroviral therapy (ART) medications can also affect energy expenditure, contributing to higher caloric needs.²² HIV infected individuals, who are asymptomatic, require on average 10% more energy intake than what is recommended for non-infected healthy individuals, for the same age and gender.²¹ This requirement increases to 20%-30% during the symptomatic phase. Increased energy requirement, among other nutrient needs, makes optimal nutrition critical for managing the HIV disease.²³

Nutritional Status during HIV infection

Nutritional status defined by the Mosby's Medical dictionary (8th edition) as the "extent to which nutrients are available to meet metabolic needs",²⁴ is a good predictor of morbidity and mortality in the course of HIV infection.^{25,26} There are several indicators used in measuring nutritional status such as anthropometric measures (weight, height, body mass index [BMI], and body composition), biochemical measures (such as serum levels of nutrients), clinical measures (such as hemoglobin, hematocrit and serum albumin), and dietary intake of nutrients. The impact that an infection has on nutritional status is dependent on the baseline nutritional status, as well as the nature and level of severity of the infection.²⁷ During HIV infection, higher mortality rates are predicted by poor nutritional status, even when treatment is initiated.^{28,29} Again when compared to non-infected individuals, HIV infected patients have lower serum concentration of nutrients and were more susceptible to nutritional deficiencies.³⁰⁻³³

Early HIV studies reported a severe impact of the disease on nutritional status before the era of antiretroviral therapy (ART). Malnutrition, often associated with low serum levels of micronutrients was common regardless of the socio-economic status of the population infected, and serum nutrient deficiencies were associated with disease progression.^{11,32,34} Review articles that examined the prevalence and impact of micronutrient deficiency in HIV patients in the pre-ART era, reported deficiencies in vitamin A, C, E, B₁₂, zinc and selenium.^{11,35,36} Vitamin B₆, and D deficiencies were also reported in HIV patients prior to ART use.^{32,37} Since the advent of ART use, morbidity and mortality in HIV infected individuals has declined, however, poor nutritional status is still being reported among some populations.^{29,38} Studies conducted in developed countries among HIV patients receiving ART report conflicting results on micronutrient status, even when supplementation was sometimes provided.³⁹⁻⁴⁶ Some studies found significant differences in serum concentrations of α -tocopherol, α - and β -carotene, vitamin B₁₂ and folate between those receiving ART and controls.^{41,43,46} Other cross-sectional and longitudinal studies found no differences in vitamins A and E,^{42,43} B₆ and folate,⁴⁰ selenium, zinc, iron and copper between those receiving ART and controls.^{39,42} One study found those receiving ART to have lower plasma concentration of vitamin A compared to controls.⁴⁴ A recent study reported 77% of HIV infected study participants to be malnourished. It is unclear, however, whether these individuals were receiving ART treatment or not.⁴⁷ Most studies investigating micronutrient status in HIV infected individuals used serum or plasma measures.^{11,34} These measures have some limitation because (1) they may not be sensitive indicators of micronutrient status¹¹ and (2) most of these micronutrients are acute-phase reactants and will vary in body compartments during

an infection.³⁴ HIV infected individuals are susceptible to opportunistic infections; hence, unless other infections were accounted and controlled for in these studies, the results might have limitations. A consistent body of literature exists that supports a strong relationship between HIV infection and poor nutritional status.³⁴ Most evidence supports that this relationship is a reciprocal, vicious and deadly cycle, in which malnutrition and HIV infection advance each other.^{10,11}

Weight loss is another indicator of nutritional status and it has been linked to adverse outcomes during HIV infection.⁴⁸ Although ART treatment improved survival rates, weight loss (even as low as 5%) continued to be an independent predictor of morbidity and mortality in this population up until the mid-2000, when reports of increased overweight/obesity started to emerge among the population.^{15,49} In 2000, the Nutrition for Healthy Living (NFHL) found 13% of its 633 participants to have wasting at the time of enrollment to the study.³⁸ At follow-up visits, 18% and 21% had respectively lost >10% and >5% of their body weight, with 8% having a BMI of less than 20.³⁸ The weight loss observed in this group occurred in patients successfully treated with ART, in those in whom ART treatment failed and also in ART-naïve patients.³⁸ According to another NFHL study, the weight loss prevalence observed in this group is comparable to those observed in the 1990's.⁵⁰ The weight loss was also found to be a combination of fat and lean body mass loss, depending on initial body weight and etiology of weight loss,⁵¹ i.e., whether it is was a result of abnormalities in intake or altered metabolism.¹⁵

The NFHL also reported overweight in its cohort to be between 33% to 40% in men and 27% to 34% in women. Among this same cohort, obesity rates were 6% to 13%

in men and 21% to 29% in women.^{52,53} Other studies have also reported increasing overweight and obesity rates among HIV infected individuals, with several studies reporting higher prevalence of overweight and obesity compared to wasting in the study population.⁵⁴⁻⁵⁷ It appears that overweight/obesity is being reported at diagnosis, with continued weight gain during the HIV infection. One author suggests this to be a reflection of improved health status in this population, even as the trend mirrors what is being observed in the general public.⁵⁵ With between 46-60% overweight/obesity rates being reported in certain HIV infected populations, obesity and not weight loss or wasting, seems to be the new nutritional concern for this population, especially when coronary heart disease is on the rise in the ART treated individuals.^{55,56} Lack of access to nutritious foods, metabolic abnormalities, and illicit drug use, all of which can aggravate weight loss and the catabolic nature of the HIV disease are still common; hence, it is important not to completely rule out weight loss as a nutrition concern in this population.⁵⁸⁻⁶⁷ The new epidemic of overweight and obesity may be attributed to unhealthy eating habits, excessive caloric and fat intake and treatment related metabolic alterations especially with lipid metabolism.^{53,68-72} On the other hand, two studies by Samaras et al.⁷³ and Batterham et al.⁷⁰ found no association between dietary intake and visceral adiposity. Amorosa et al.,⁵⁴ however, found positive correlations of BMI with total cholesterol, non-HDL cholesterol as well as triglycerides.

Several studies have reported on issues of dietary and nutrient intake of HIV infected individuals.⁷⁴⁻⁸⁰ Caloric and fat over-consumption seems to be a consistent theme in developed areas.^{74,75,77-79} In low income settings, the opposite problem exists, with numerous studies reporting inadequate nutrient intake to be common among HIV infected

people, especially in those regions where ART is still not widely available.^{12,81,82} In resource adequate areas, low intakes have been reported in HIV infected sociodemographic groups at risk for healthcare disparities and adverse clinical outcomes such as women, drug abusers and minorities.^{13,81,83} On the other hand, adequate nutrient consumption is found in HIV infected men who are educated, high-income earners and supplements users.^{76,77} Two studies found nutrient intake among these economically advantaged HIV infected individuals to be higher than that reported by HIV un-infected populations.^{76,83} Some studies investigating biochemical markers such as hemoglobin, hematocrit and albumin among HIV infected people have consistently reported these parameters as low in this population.^{47,74,79,80,84-86} Most of the studies, however, have been conducted in low resource areas. A multicenter study, conducted among women in North America, reported low albumin levels in those HIV infected and concluded that baseline albumin level independently predicted mortality in this group, with 48% mortality rate in the lowest serum albumin category compared to 11% in the highest category.⁸⁷

Food Insecurity among HIV Infected Persons

Food insecurity has been defined as occurring “whenever the availability of nutritionally adequate and safe foods or the ability to acquire acceptable foods in socially acceptable ways is limited or uncertain.”⁸⁸ Food insecurity embodies one or many of the following characteristics listed: (1) insufficiency in the amount of food, (2) very little diversity in food group choices available, (3) poor food safety, (4) anxiety towards how food is accessed, and (5) acquiring food in socially unacceptable ways. Socially accepted

ways include not being reliant on emergency food assistance, and not begging, stealing or using any other negative coping mechanism to procuring food during times of shortage.⁸⁹

The USDA measures food security/insecurity levels in the United States at the individual, household and population levels. There are several instruments used in measuring food insecurity, however, the most widely used ones are the US Household Food Security Survey Module, the Household Food Insecurity Access Scale and the Radimer/Cornell Food Security Questionnaire.⁸⁹ The US Household Food Security Survey Module also has 10-item and 6-item short form versions. In 2006, USDA introduced new and revised labels to be used in describing the ranges of food insecurity severity.⁹⁰ They are defined below:

- 1) High food security: Households reporting no indications of food-access problems or limitations.
- 2) Marginal food security: Households having one or two reported indications –typically of anxiety over food sufficiency or shortage of food in the house, and having little or no indication of changes in diet or food intake in terms of quality, variety and quantity.
- 3) Low food security: Household reporting a reduction in the quality, variety, or desirability of diet, with little or no indication of reduction in quantity of food intake.
- 4) Very low food security: Households reporting multiple indications of disrupted eating patterns and reduced food intake due to lack of money and other resources.

Under the old food security description label, both the high food security and marginal food security were described as food security, low food security was categorized as food insecurity without hunger and very low food security was labeled food insecurity with hunger.⁹⁰

In 2011, more than 50 million individuals lived in households that experienced food insecurity.⁹⁰ According to the USDA, these included 17.9 million households; 11 million which experienced low food security and 5.7% experiencing very low food security.⁹⁰ Several studies have evaluated the prevalence of food insecurity among the HIV infected, and their reports suggests that the prevalence is higher than those recorded at the national level, especially in resource adequate settings. Campa et al.⁴⁹ found 81% of HIV infected drug users surveyed in Miami, who experienced wasting, to be food insecure, while another study conducted in Miami and Atlanta among a similar population reported 34% food insufficiency.⁹¹ In British Columbia, 48% of HIV positive study participants were reported to be food insecure,⁶¹ while another study conducted in the same province, but among HIV infected injection drug users had a food insecurity prevalence of 64%.⁹² Among homeless and marginally housed HIV infected individuals in San Francisco, Weiser et al.⁶⁴ estimated 49% food insecurity among the study population. A study involving HIV infected patients from eight veteran clinics, in the Veteran Aging Cohort Study, reported that 24% of participants receiving ART treatment were food insecure.⁹³

Food insecurity is also prevalent in resource constraint countries. A Kenyan study of patients receiving treatment from 17 HIV care centers estimated that 33.5% of the population was food insecure. The prevalence of food insecurity was as low as 20% in some clinics and as high as 50% in others.⁹⁴ In a recent longitudinal study conducted in Uganda, researchers reported a food insecurity prevalence of 40% among 458 participants followed for over 2 years.⁶⁶ Earlier studies from Uganda, involving HIV infected women from 144 households, suggest some level of food insecurity with 44%

assessing food assistance and 59% having low diversity in their food intake.⁹⁵ Correlates of food insecurity among HIV infected individuals include gender (being female) having low socioeconomic status (including unemployment, marginal/unstable housing), drug use, recent incarceration and having children in the household.⁹⁶

Food insecurity contributes to HIV transmission, especially among food insecure women responsible for their households.^{97,98} Several studies have found that individuals reporting hunger, or lack in resources to procure food, tend to engage in risky sexual behaviors.⁹⁷⁻⁹⁹ A study by Weiser et al.,¹⁰⁰ with over 2000 adults in Botswana and Swaziland, found that among women reporting food insufficiency, 80% were at increased odds of exchanging sex for money and/or other resources, while 70% had increased odds of having risky and unprotected sex. These increased odds were still present even after controlling for socioeconomic status. Among HIV positive drug users in Canada, food insecurity was significantly associated with having engaged in unprotected sex in the last 6 months.¹⁰¹ Food insecurity also impacts HIV transmission by compromising nutritional status, and consequently, immunological status.¹⁰² Inadequate nutrient intake may affect the mucosal integrity of the genitalia and gastrointestinal tract, leading to increased risk of HIV transmission. Compromised nutritional status has been associated with mother-to-child transmissions in resource constrained settings.⁹⁶

Though limited in number, some researchers have investigated the effect of food insecurity on accessing HIV related care and services, reporting that even with eligibility and free ART access, food insecure individuals refuse treatment because of lack of food and fear of being able to sustain the consumption of adequate food.¹⁰³⁻¹⁰⁶ A recent study found food insecurity to be associated with missed clinic visits, with 17% of study

participants having to give up ART treatment, while 30% and 32% did not access outpatient and inpatient treatment respectively because of competing demands for food.⁶⁶ HIV infected person who are food insecure, especially those with low socioeconomic status and limited resources, frequently need to choose between receiving HIV related services or food procurement .^{104,106}

Antiretroviral therapy for HIV infection is most effective when adherence to treatment is >95%.¹⁰⁷ Studies conducted in developed countries and resource-limited settings have identified that food insecure HIV infected individuals are less likely to adhere to treatment, compared to their food secure counterparts.^{64,108} Adherence to treatment, however, increased among those receiving food assistance, stressing the importance of food assistance among low income HIV infected patients.¹⁰⁹⁻¹¹¹

With regards to the impact of food insecurity on disease progression, management and survival, studies have reported associations between food insecurity and decreased CD4 levels, even though the etiology of causality remains unknown.^{61,63} Among participants of the Veterans Aging Cohort Study, those who were food insecure were found to be more likely to have unsuppressed HIV-1 RNA (a situation that could make treatment ineffective) compared to those who were food secure.⁹³ In another study involving homeless and marginally housed HIV positive individuals in San Francisco, researchers reported a 77% lower odd of viral suppression among those with severe food insecurity.⁶⁴ A study by Campa et al.,⁴⁹ in Miami among HIV infected drug users, found that food insecurity was an independent predictor of wasting; a condition that was prevalent in this population. In a recent study conducted in Uganda, food insecurity was associated with increased opportunistic infections, hospitalization, and worse physical

health-related quality of life.⁶⁶ The negative effect of food insecurity on hospitalization has also been reported in developed countries. In a recent study, Weiser et al.¹¹² showed that food insecurity among HIV infected individuals was associated with increased health care utilization. To conclude, although mortality had decreased among the HIV infected due to the introduction of ART, a longitudinal study conducted in British Columbia Canada, found that the odds of dying in an eight year follow-up period was two-times more likely among those food insecure and underweight compared to those who had neither characteristics.¹¹³

The Food Stamp/Supplemental Nutrition Assistance Program

It is difficult for low income earners, whether chronically ill or not, to access nutritious and safe (uncontaminated) foods with limited resources. The federal government currently funds several food assistance programs targeting such low income households to improve their diets for optimal health. The Food Stamp Program (FSP) is the largest and best known of the food assistance programs. According to the amended Food and Nutrition Act of 2008, the aim of the program is to “permit low income households to obtain a more nutritious diet through normal channels of trade by increasing food purchase power for all eligible households who apply for participation” (P.L. 110-246).¹¹⁴ This act also changed the programs’ name to Supplemental Nutrition Assistance Program (SNAP), in an effort to address insufficiencies with program participation and benefits¹¹⁴ *[(Discussions in this literature review pertaining to research/studies associated with the program prior to 2008 will maintain the name Food Stamp Program (FSP)].*

Established in 1964, the SNAP entitlement program is administered by the United States Department of Agriculture (USDA)'s Food and Nutrition Service Division. Eligibility is based on financial need, having to meet income, assets and employment requirements.¹¹⁵ To be income eligible, households must meet three criteria: (1) a gross income test, (2) a net income test and (3) an assets test. A household's gross monthly income must be below 130% of the Federal Poverty level, which in the fiscal year 2012, translates to \$2,422 for a household of four.^{115,116} Households that have an elderly or disabled member are exempt from this test, although they must meet the net income limit and have less than \$3,250 in assets.¹¹⁶ To pass the net income test, a household's income must be less than 100% of the federal poverty level. The net income limit is calculated by standard and itemized deductions to gross income. The assets limit for a household that doesn't have an elderly or disabled member is less than \$2,000.¹¹⁶ SNAP participating households are expected to spend 30% of their resources on food and as a result, the net monthly income of a household is multiplied by 0.3. The result obtained is then subtracted for the maximum benefit based on household size to determine the final SNAP benefit for that household. The maximum benefit that could be obtained by an individual in 2012 was \$200 per month.¹¹⁵

Application and recertification for SNAP are done at state and county offices. Applying households must provide information to determine eligibility. Recertification for eligibility is periodically assessed at the local offices' discretion and also based on volatility of household income.¹¹⁷ In 2011, about 45 million people participated in SNAP with an average of \$134 being provided per person to over 21 million households per month. The annual cost of SNAP in 2011 was over 70 billion dollars with 72%

participation rate for eligible participants.^{116,118} The SNAP program is deemed important because it helps prevent food insecurity, lifts individuals and families out of poverty and is key in supporting families through difficult economic times.¹¹⁶

Effects and Benefits of Food Stamp Program

Food Expenditure: Evidence from the literature suggests that participation in the food stamp program has been beneficial in consistently increasing household food expenditure compared to non-participants. In these studies, food expenditure was measured either as total food expenditure (i.e. foods eaten at home and away from home), or as expenditures of foods used at home. Currently benefits from participation in SNAP are applied towards only foods that are eaten at home. Authors of studies that used “total food expenditure”, however, suggest that participation in SNAP allows households to substitute foods eaten at home with those eaten away from home. A study by Hama and Chern,¹¹⁹ which investigated the impact of SNAP on food expenditure and nutrient availability in elderly households, found that participation led to an increase in per-capita food expenditure at home. An article by LeBlanc et al.¹²⁰ indicates that the Food Stamp Program or SNAP increases the purchasing power of a low income qualified household, providing about 25% of their total purchasing power. It is estimated that a dollar of food stamp benefit increases food spending by \$0.17 - \$0.47.¹²⁰ Unlike other food assistance programs, the SNAP gives participants the opportunity to purchase foods of their choice.

Household Nutrient Availability: Increasing purchasing power and household food expenditure may not necessarily translate into increasing household food energy and nutrient availability.¹²¹ Households may buy mostly non- nutritious foods because they

are convenient, palatable, or cheap, in an attempt to stretch their food dollars. Acquiring more expensive forms of similar foods may not result in significant gains in nutrients.¹²¹ Reports from studies investigating the effect of food stamp participation on these variables have been inconsistent.¹²¹ Whereas some studies have suggested that participation in food stamp programs can increase nutrient availability and intake,^{122,123} others have found no such association.^{124,125} The contradictions may be due to the differences in the data collection methods, as most of these studies were secondary analyses of large population surveys.¹²¹ It could also be due to the differences in standards used in assessing dietary and nutrient intake and to the changes undergone by the programs through time. Most of the studies were conducted in the 1970s and 1980s; the results from such studies may not represent current practices in the program.¹²¹ For example, food choices offered in grocery stores under the current FSP are broader than before and may influence dietary and nutrient intakes.¹²⁰

Studies that found positive nutritional impact indicate that participation in food stamp program increases:

- food energy,^{122,123,126,127} protein,^{123,126-128} and carbohydrates.¹²²
- the intake and availability of the following vitamins: A,¹²³ B₆,^{123,129} B₁₂,¹²² C,^{122,123,127} E,¹²⁹ niacin,¹²² riboflavin^{122,123} and thiamin.^{122,123,128}
- the availability of iron, magnesium, phosphorus and zinc.^{119,122,123,127}

Individual Nutrient Intake: Studies that investigated the effect of food stamp on individual dietary intake, focused on population subgroups, e.g. children and the elderly.¹²⁹⁻¹³³ Results from these studies are also contradictory and their limitations are similar to those discussed above in relation to the household nutrient availability

studies.¹²¹ Among children, one study found that FSP participants consumed more food energy than their non-participating counterparts.¹³⁰ Other studies also found increased energy intake in children, even though the difference in consumption was not significant.^{131,132,134} Moreover, in adults and the elderly, food stamp participation also led to an increase in energy intake, albeit not significant.^{131,133,135} Similarly, Fraker et al.¹³⁰ found that FSP participation had a significant impact on protein intake among children. Other studies, regardless of the type of study population (i.e. children, adults or elderly) did not report significant differences in nutrient intakes between participants and non-participants.^{130,131,135,136} Few studies found significant differences in the individual intake of carbohydrates and fats between FSP participants and non-participants.^{131,133,136} Several studies reported a significant impact of FSP on the intakes of vitamin A, niacin, thiamin,¹³⁶ iron, vitamin B₆,¹³² vitamin B₁₂, calcium, zinc,¹³⁴ and folate,^{131,132} among children. Some other studies reported finding no significant impact of participation in FSP on riboflavin, vitamin C and E intakes, regardless of the type of population being studied.^{131,134,136} In a review article, Fox et al.¹²¹ point out that the relationship between household nutrient availability and individual nutrient intake may be weakened because of (1) inequality in nutrient consumption by household members, (2) possible waste of food or consumption by non-family members and (3) consumption of food from other sources other than home.

Health Outcomes: The effect of FSP on biomarkers of nutrition and health outcomes such as hemoglobin, hematocrit, albumin and carotenoids have been reported,¹³⁷ even though results from other studies do not support these findings.^{138,139} Research considering the impact of FSP on general nutrition and health status is limited; however,

the evidence from such research found no differences between FSP participants and non-participants.¹³³

Food Security: Several recent surveys have reported the effect of SNAP in reducing food insecurity. The analyses from these studies have been difficult to interpret as individuals who feel food insecure are more likely to participate in the SNAP program, making it seem that program participants are more likely to be food insecure compared to non-participants.^{121,140} Controlling for selection bias, as well as other observable and unobservable differences between SNAP participants and non-participants using modeling and multivariate analysis, have shown mixed results.¹⁴¹⁻¹⁴⁵ The most recent of such studies, however, shows that participation in SNAP reduces the probability of food insecurity by 18% to 33% in those who are food insecure, and by 20% to 30% in those with very low food insecurity.¹⁴³⁻¹⁴⁵ Nord et al.,¹⁴⁶ in a 2011 published study, concluded that SNAP can ameliorate very low food insecurity in the range of 20% to 50%. In addition, individuals who leave the SNAP program experienced food insecurity when compared to those with continued participation.^{146,147}

Barriers to Participation in the Supplemental Nutrition Assistance Program (SNAP)

Participation in the SNAP program had increased substantially to 72% in 2009 among eligible individuals after a low of 54% in 2001 and 2002.^{116,148} The increase in participation has been attributed to changes in the economy, increases in outreach, as well as simplification and less restriction in eligibility requirements.¹¹⁶ Participation rates, however, vary among states, with Florida having one of the lowest participation rates in the country at 69%.¹⁴⁹ Among subgroups, children have the highest participation rate at

92% while the elderly have the lowest rate at 34%.¹¹⁶ About 33% of SNAP eligible participants do not participate in the program.¹⁵⁰ According to a nation-wide survey, 56% of the households contained an elderly or disabled member.¹⁵¹ SNAP participants also tend to be unemployed, have low education, live in female headed households and live with children.^{117,148,152}

Participation in the SNAP program may be an essential part of HIV disease management, through improvement of dietary and nutrient intake. There is, however, limited research on the utilization of these programs by HIV-positive persons, and the potential benefits that may be derived from participation.⁵⁸ Surveys conducted among these high risk populations suggest that less than one-third of those eligible are receiving benefits.⁵⁸ Evidence from the literature suggests that among eligible non-participants, the desire for personal independence, stigmatization, lack of awareness about program, confusion about eligibility requirements, homelessness, inadequacy of benefits, length and cost of the application process, as well as previous bad experiences are the barriers to participation in the food stamp program.¹⁵¹⁻¹⁵⁵

Among food pantry users in California, homelessness and limited English language skills were the primary barriers to FSP participation.¹⁵⁴ Seniors listed stigma and misinformation with program rules as participation barriers.¹⁵⁶ One the findings from the California Women's Health study was that 42% of eligible non-participants didn't participate in FSP because they "didn't need them".¹⁵² These women are part of eligible non-participants who perceived that their need for FSP is low because of food sufficiency, or because they were eligible for relatively limited benefits from FSP due to slightly higher income.^{141,152} Ninety six percent of eligible non-participants are aware of

the FSP program and 66% will participate if eligibility were certain.¹⁵¹ Several strategies are being put in place to increase SNAP participation among eligible non-participants, as the program is not being utilized to its maximum.¹⁵⁰ It is important to understand what drives the decision to participate in food assistance in eligible HIV positive people,¹⁵⁷ hence the need to study factors associated with SNAP participation to increase participation rates and the potential benefits derived from participation.

Food Assistance and Nutrition and Health Outcome in HIV infected

Nutritional interventions through the provision of food assistance have been conducted in several settings among HIV infected individuals. In resource limited settings, relatively few studies have been done; however, these programs have been beneficial in improving nutritional status and adherence to therapy but not immunologic outcomes.^{109,158-160} The food assistance delivered in these settings was either food rations/food baskets to supplement the local diet or packaged therapeutic diets for nutritional rehabilitation. The supplements mostly used were corn and soy blends, fortified blended foods, high-energy ready-to-use therapeutic foods (RUTF), and a nutrient dense spread suspended in fat.¹⁶¹

In a study conducted in Uganda, Rawat et al.¹⁶⁰ found that giving people living with HIV food assistance resulted in a mean weight gain of 0.36 kg in 12 months, compared to controls. They also reported that disease progression was slow in the experimental group even though the impact was described as minimal. In another study, 70% of the experimental group who received food assistance (corn soya blend), achieved 95% adherence to medication as compared to 48% in the control group.¹⁰⁹ A recent study

conducted in Zambia also reported >98% ART adherence rate among HIV adults receiving food assistance.¹¹¹ Among 491 HIV infected adults in Malawi, Ndekha et al.¹⁶² reported that after 3.5 months of intervention, individuals who received ready- to-use therapeutic spread had a greater increase in BMI compared to those who received corn-soy blend. It is important to note that the populations studied in the resource limited settings were all ART-naïve.

Food assistance interventions conducted in resource adequate settings, like the United States, have mainly provided supplemental formulas and, in some cases, counseling without providing actual foods, or directing those infected towards food assistance programs.¹⁶³⁻¹⁶⁶ Ingredients in these supplemental formulas have included oral formulas of amino acids (whey, glutamine, and arginine), lipids (triglycerides and omega-3 fatty acids) and a form of carbohydrate (maltodextrin).^{163,165,167-170} The studies that used formulas supplemented with amino acids were effective in increasing weight.^{163,169} Other trials that gave supplementation formulas, in addition to a normal diet, resulted in elevated energy and protein intake among the supplemented group compared to placebo.^{168,170} Although none of these interventions provided actual foods, some of the interventions were associated with significant changes in nutritional status (gain in weight and BMI) among participants.^{163,169} Like the studies conducted in resource constrained environments, however, these interventions did not result in significant differences in viral load and CD4 counts between treatment and control groups.^{163,167-169} Finally, a study conducted among HIV infected individuals in Haiti reported vast improvements in body composition and food security, but not as much with quality of life, among food assistant recipients compared to non-recipients.¹⁷¹

Knowledge Attitude and Self-Efficacy in Nutrition Education

Studies have shown that socioeconomic status (SES) affects dietary intake, with the disadvantaged and the poor adhering less to dietary guidelines, and having poor diet quality.¹⁷²⁻¹⁷⁴ While participation in the SNAP program may be helpful in improving nutritional status, which is important for disease management, food choices made by individuals is determined by more than socioeconomic factors.¹⁷⁴ Other parameters that affect dietary behavior and food choices include psychosocial factors like knowledge and beliefs about nutrition and health, and the confidence to make and implement dietary changes.^{174,175} Nutrition knowledge is measured either as declarative or procedural knowledge. Procedural knowledge is better related to behavior because it defines the manner in which an action is performed, while declarative knowledge on the other hand, gives factual information about things.¹⁷⁶ An example of procedural knowledge is how to decrease fat intake in the total diet, while an example of declarative knowledge is to be able to tell the fat content of whole milk. Irrespective of the scales used in measurement, several studies have shown that nutrition knowledge positively affects dietary intake, especially in the presence of a socioeconomic intervention.^{174,177,178} A study by Dickson-Spillman and Siegrist¹⁷⁶ reports that decreased nutrition knowledge is associated with decreased consumption of high quality foods. In their study, individuals with higher nutrition knowledge tended to be female, were younger and had considerably higher education. In addition to knowledge, a positive attitude towards nutrition affects food choices.^{179,180} Dissen et al.¹⁸⁰ concludes that higher nutrition knowledge is associated with a positive attitude towards nutrition, and hence a healthy dietary habit. Another study, however, found that a positive attitude towards nutrition influences food choices

greater than nutrition knowledge.¹⁸¹ A study conducted by McDermott et al.¹⁶⁴ reported that in HIV infected individuals, nutrition knowledge varied widely irrespective of socioeconomic status. Self-efficacy, defined as the confidence in one's ability to perform a particular behavior is another factor that affects dietary behavior. It is an important aspect of behavioral theories such as the social cognitive theory and uses goal-setting and self-monitoring to effect behavior change.¹⁸² Among American Indian populations, Gittelsohn et al. found that self-efficacy predicted food acquisition behavior, with the former being predicted by knowledge.¹⁷⁵ Several other studies have reported on self-efficacy mediating dietary behavior.¹⁸³ Based on the discussion above, it is important to include sessions to improve attitudes towards nutrition and increase nutrition knowledge and self-efficacy in a nutrition education intervention.^{179,180} Identifying nutrition knowledge, needs and concerns of low income HIV infected adults will help tailor education interventions to improve nutrition knowledge, dietary practices and nutrient intake. In a time where the Federal Government is cutting back on assistance programs for HIV infected people due to limited resources, it is crucial to provide evidence of the impact that both, a nutrition assistance program like SNAP and nutrition education, have on the nutritional status and quality of life of low income HIV infected individuals.

Nutrition Education among Low Income and Food Assistance Users

Nutrition education is defined as “any set of learning experiences designed to facilitate the voluntary adoption of eating and other nutrition related behaviors conducive to wellbeing”.¹⁸⁴ In a review examining the effectiveness of nutrition education

intervention, Contento and colleagues¹⁸⁴ concluded that nutrition education is an important aspect of improving dietary practice, if behavior change is established as the goal, and the educational strategy is targeted at this goal. In conducting interventions among low income groups, the one-on-one method of teaching has been proven most effective. Group interventions are also being found effective when combined with additional efforts to maintain adherence.¹⁸⁵ Nutrition education interventions are also effective among low income groups when they include provision of information, goal setting and barrier identification.¹⁸⁵ According to evidence from the literature, nutrition education positively influences dietary practices and intakes of low income individuals.¹⁸⁶⁻¹⁸⁹ In a study designed to improve dietary intake among African-American women in Washington DC, it was found that participants decreased their total caloric and calories from fat intake, although nutrition education did not significantly improve fruit and vegetable intake.¹⁸⁸ Another study among low income earners in Europe found that nutrition education significantly reduced saturated fat intake but not fruit and vegetable consumption among participants.¹⁸⁹ In a randomized control trial, Emmons et al.¹⁸⁷ reported that the percentage of intervention recipients consuming ≥ 5 fruits and vegetables increased by 3.3% while that of controls decreased by 3.8%. The SNAP program has an educational component that is optional for States to implement. The United States Department of Agriculture (USDA) provides funding for States that implement the educational component. In settings where these education programs have been implemented, the food buying, meal planning and preparation, as well as food safety practices, have improved among participants.¹⁹⁰ Where food stamps were provided without nutrition education, researchers report that participants had poor diet quality,

consuming convenience and fast foods, as well as snacks high in fat and sugar.¹⁹¹ Again, populations receiving food stamps without education had increased energy intake especially that from fat.¹⁹² Cason et al.¹⁹³ showed that food stamp participants and non-participants, who received nutrition education, significantly improved their dietary and nutrient intake, as well as food related behaviors. Among women participating in the food stamp program in North Carolina, nutrition education significantly improved nutrition knowledge, self-efficacy, stage of change and dietary behaviors.¹⁹⁴ The impact of nutrition education has been studied in populations receiving food assistance other than food stamps. The Special Supplemental Nutrition Program for Women, Infant and Children (WIC) participants, who received nutrition education, increased their self-efficacy and scored higher on infant feeding and dietary fat knowledge when compared to controls.¹⁹⁵ Our study investigated the combined effect of SNAP participation and nutrition education on the nutrition and health outcomes of HIV infected individuals.

Nutrition Education among HIV Infected Individuals

Nutrition education is recognized as an essential part of HIV care from early diagnosis to end-stage disease, as well as for therapy management for those receiving treatment.¹⁹⁶ It could stimulate better disease management and quality of life through improved nutrient intake.^{196,197} The needs identified among the HIV infected, for which nutrition education or counseling may be helpful, include immune system strengthening, decreasing disease symptoms and side effect from treatment, lessening the incidence and severity of opportunistic infections and improving quality of life.^{196,198}

In recognition of the importance of nutrition education in HIV care, the Ryan White program (a program funded by the federal government to provide HIV-related services to low income individuals) has as part of its service categories, a provision for nutrition counseling by a qualified dietitian not withstanding primary care visit.¹⁹⁹ It is unclear how much HIV infected individuals take advantage of this program and how successful it has been within the context of disease management. The evidence from several studies showed that nutrition education in HIV infected individuals has produced improved nutritional outcomes such as increases in dietary intake, total body weight and fat free mass.^{164,170,200,201} One of the studies investigating the effect of nutrition education on body composition reported a decrease in fat mass among the intervention group with increasing lean body mass.²⁰² Other outcomes include adherence to antiretroviral treatment, less side effects from medication, and a better capability to satisfy increased appetite.¹¹⁰ In a study conducted in Germany, Schwenk et al.¹⁷⁰ concluded that nutrition counseling was just as effective as dietary supplementation in increasing fat free mass in 8 weeks of intervention. A study by Van Niekerk et al.,²⁰¹ which examined the effect of nutrition education or counseling on body weight in ART naïve patients, found that body weight increased after approximately 4 months of follow up. The increase was greater in the intervention group compared to the control group, with 73% of the experimental group experiencing stable or increasing weights. The researchers also reported that nutrition counseling was able to offset gastrointestinal tract associated adverse effects, especially in patients with CD4 counts less than 200.²⁰¹ Though there is evidence that nutrition education may improve nutrition health outcomes among HIV infected people, it is uncertain that these improvement are entirely due to the intervention.¹⁹⁷ In HIV

infected populations receiving treatment, ART use could play a role in the intervention outcomes. In addition to treatment, socioeconomic status and food insecurity are also possible mediators of nutrition education outcome in this population.¹⁹⁷ Accounting for these variables in the design of the intervention and using in-depth data analysis will help to understand the effect of nutrition education on health and nutritional status of HIV infected individuals.

Theoretical Framework

The conceptual model used in the nutrition education intervention for this study is adapted from the StampSmart model, (Figure 1) used by Campbell et al.¹⁹⁴ This model employs both the Stages-of-Change concept of the Transtheoretical model and the Social Cognitive Theory in its development.¹⁹⁴ Although the same theoretical framework was used, two features were changed for this study: (1) the content of the education material and (2) the channel used in disseminating intervention materials. The Stage-of-Change theory is widely used in health promotion and has been applied to interventions in several areas including nutrition.²⁰³ This theory applies the logic that individuals go through different stages of change before developing a new behavior. The stages included in this theory are precontemplation, contemplation, preparation, action, and maintenance.²⁰⁴ Components of the educational program were developed to target each stage, focusing on processes involved in each stage. Some of these processes include consciousness raising through information and knowledge provision, self-re-evaluation by discussion with peer role models, self-liberation (belief in ability to change by drawing attention to individuals who have already made commitment to eat healthy), reinforcement management (giving

praise and recognition) and counter conditioning (using activities to learn how to substitute healthy behaviors for unhealthy ones).²⁰⁵

The Social Cognitive Theory integrates an individual with the social environment in which he or she is learning.¹⁸² It purports that learning is determined by an interrelationship between environmental influences, personal factors, and behavioral attributes.¹⁸² The focus of this theory is self-efficacy, which is an individual's self-confidence in performing a particular behavior at a certain competence level.¹⁸² To be able to perform a behavior, an individual must believe in their ability to do it and this makes self-efficacy an important characteristic to consider in behavior change. This intervention sought to increase self-efficacy through skill development and training to raise individual confidence. The intervention also pointed out and emphasized outcomes (long term benefits to eating healthy) as well as provided incentives that motivated behavior change.

As a modification to the original model, this intervention utilized an interactive and participant centered group seminar/discussion setting instead of multimedia in delivering education materials. In addition, written materials were also provided and these were tailored appropriately for the literacy level of participants. Learning methods applied in the model are lecture, practice and role play, all of which are drawn from the social cognitive theory discussed previously.

This conceptual model requires conducting a needs assessment prior to implementing nutrition education. It is based on the belief that focused nutrition education will increase self-efficacy and progress in stage of change, leading to change in eating behavior.

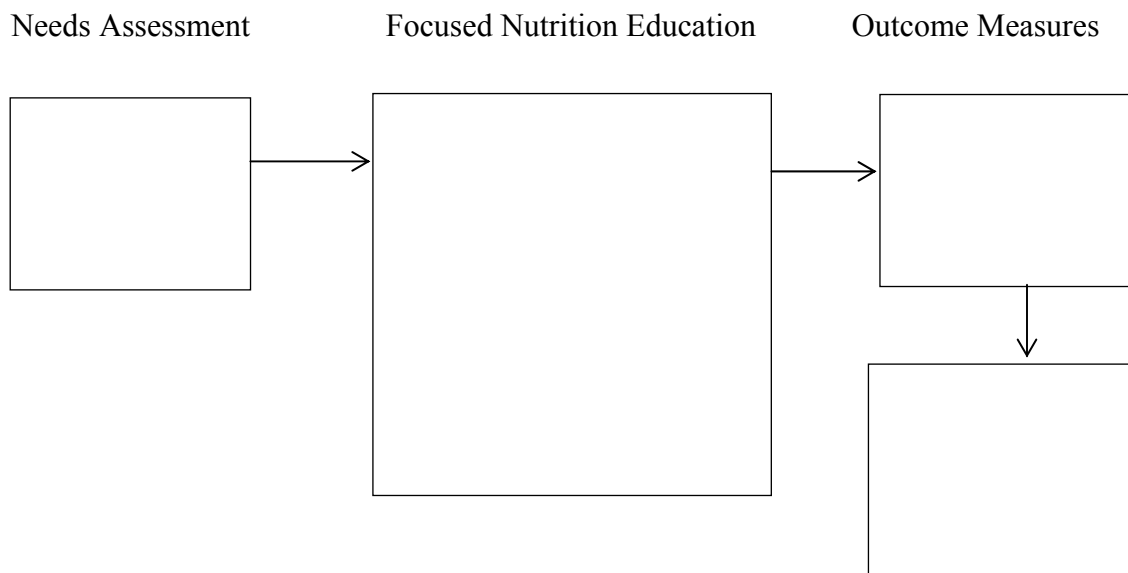


Figure1: Conceptual Model

Adapted from “Stamp Smart Model”, Campbell M K et al. Health Educ. Res. 1999;

14:257-26

Table 1: Summary of nutrition education intervention strategy

Key Strategies And Activities	Target Group	Group Size	Lead Staff	Frequency	Evaluation
Assessment Information dissemination /Education <ul style="list-style-type: none"> • Lecture • Group Discussion • Handouts/ Posters • Recipes Skill training <ul style="list-style-type: none"> • Experiential activities 	Low income HIV infected individuals	15 per group	A trained dietitian or nutritionist	Twice a month delivery of nutrition education for 2 months	Progression in Stage of Change Increase in self-efficacy Improvement in dietary practices Nutritional Status Disease Status Health Status Quality of Life

Literature Review Summary

HIV infection is associated with the destruction of the immune system, a condition that is aggravated by impaired nutritional status. The infection creates a vicious cycle with malnutrition that can exacerbate disease progression and affects chances of survival.^{10,11} Poor nutritional status may hasten the progression of the disease, leading to poor outcomes.¹¹ On the other hand, HIV infection is a nutrition-related disease that impairs dietary intake, digestion, absorption and utilization of nutrients, leading to weight loss, nutrient deficiencies, compromised immune function and competence, as well as susceptibility to infection.¹⁰ Food insecurity is prevalent among the HIV infected individuals, and has been associated with several indicators of low socioeconomic status such as low income, unemployment, homelessness, and poor physical and mental conditions,^{49,61,64,66,91-94} Among the HIV infected, food insecurity has been reported to be associated with HIV disease transmission, progression, management and survival.^{63,64,97,98} Food insecurity increases the probability of poor nutritional status in the HIV infected person.^{96,102} In most cases, provision of food assistance, whether in the case of food insecurity or compromised nutritional status, has ameliorated the effects of the disease.^{109,158-160,163,167-169} Coupling nutrition education with the provision of food assistance may enhance the intervention's outcomes.¹⁹⁰⁻¹⁹³

The Supplemental Nutrition Assistance Program (SNAP) is the largest food assistance program in the United States.¹¹⁶ Though the literature presents inconsistent and sometimes contradictory evidence, several studies have demonstrated some nutrition and health benefits of participation in the SNAP in non-HIV infected populations.¹²¹⁻¹²⁵ Few

studies have evaluated the participation rate for SNAP among HIV infected individuals, and to date, no known study has investigated the impact of this food assistance program on the nutrition and health of the HIV infected people in Miami. This study characterized the utilization of the SNAP program by disadvantaged HIV infected adults in Miami. It also assessed barriers to participation among eligible non-participants, and the impact of program participation on food insecurity, nutritional status, health status, disease stage, and quality of life of low income HIV infected individuals. In addition, this study determined the effectiveness of a nutritional education intervention in improving nutritional status through increasing nutrition knowledge, as well as self-efficacy skills in food selection and nutrient intake.

Table 2: Literature Review: HIV and Nutritional Status

Author/Study design	Study Purpose	Population	Findings
Dusingize JC, Hoover DR et al. ⁸⁵ 2012 <i>Observational study</i>	Determine if and how albumin can be used as an indication of malnutrition [Body Mass Index(BMI), Fat free mass index (FFMI) or Fat mass index (FMI)] in HIV infected and uninfected Africans	710 HIV infected and 226 HIV-uninfected women	Unadjusted models: In HIV-negative and HIV positive women with CD4>350 cells/μl: no significant association. In HIV+ women with CD4 200–350 cells/μl, (p<0.05): significant association. In HIV+ women with CD4<200 cells/μl (P<0.001): highly significant association. Multivariable linear regression: Albumin remained associated with FFMI in women with CD4 count<200 cells/μl (p<0.01) but not in HIV+ women with CD4>200. Albumin measures end stage disease and malnutrition in HIV infected individuals.
Liu E, Spiegelman D et al. ²⁸ 2011 <i>Observational study</i>	Investigate the associations between nutritional status, (body mass index (BMI), middle upper arm circumference (MUAC), and hemoglobin (Hgb) at ART initiation, and death in the first 3 months of ART.	18,271 HIV infected Tanzanian adults initiating antiretroviral therapy (ART)	Lower BMI, MUAC, and Hgb concentrations were strongly associated with a higher risk of death within 3 months of ART initiation. There was a risk of death associated with weight loss across all levels of baseline BMI. The highest risk however was observed among patients with BMI <17 kg/m ² (RR, 7.9; 95% CI, 4.4–14.4). Poor nutritional status at ART initiation and in the first 3 months of ART is strong independent predictors of mortality.
Khalili H, Soudkakhsh A et al. ⁴⁷ 2008 <i>Cross-sectional study</i>	Evaluate the nutritional status of newly diagnose Iranian HIV infected individuals and compare their serum zinc and selenium levels to uninfected individuals of the same sex and age.	100 newly diagnosed HIV infected Iranians and 100 uninfected controls	Severe, moderate and mild malnutrition were detected in 15%, 38% and 24% of newly diagnosed HIV+ individuals respectively. Compared with uninfected control group, serum zinc and selenium were significantly lower among HIV infected (P = 0.01 and P = 0.02 respectively). Malnutrition and low serum zinc and selenium levels were found to be prevalent in Iranian human immunodeficiency virus infected individuals
Hendricks KM, Mwanburi DM et al. ⁷⁶ 2008 <i>Longitudinal cohort study</i>	Assessed the association between dietary patterns (3 patterns identified: juice and soda; fast food and fruit drinks; and fruit, vegetable, and low-fat dairy and change in body mass index (BMI), CD4 count, and viral load (VL).	348 HIV-positive adult male with a BMI ≥20.5	Individuals with fast food and fruit drinks pattern had the lowest fiber intake, highest VL, and lowest CD4 count and had a lower income than did subjects in the other 2 clusters. Subjects in the fruit, vegetable, and low-fat dairy diet pattern had higher intakes of fiber, and micronutrients and the highest BMI and CD4 count. Individuals with juice and soda pattern had higher energy intakes and lowest BMI.
Hendricks KM, Willis K, et al. ⁵² 2006	Describe the prevalence of obesity among a cohort of individuals living with HIV infection, and to determine	321 HIV-positive adults (265 males, 56 females) living in the greater Boston, MA and	13% and 29% males and females were respectively obese. Energy intake per kilogram decreased as body mass index (BMI) decreased in both genders (p <0.05). Mean total fat and saturated fat intakes were above recommendations for both genders and for all BMI categories,

<i>Cross-sectional study</i>	differences in dietary intake among those subjects who are normal weight, overweight, and obese	Providence, RI, areas	while total grams dietary fiber decreased as BMI increased. Micronutrient intakes were below the Dietary Reference Intakes for individuals in all BMI categories. Serum markers of insulin resistance differed significantly by BMI category for both genders. Diet quality for the HIV infected may have implications for cardiovascular disease, metabolic syndrome, and other health risks associated with overweight and obesity
Campa A, Zhifang Y et al. ⁴⁹ 2005 <i>Observational study</i>	Document the prevalence of HIV-related wasting and of associated factors, including food intake, viral load, quality of life, and HAART use	119 HIV infected homeless drug users in Miami FL	The prevalence of HIV-related wasting was 17.6%. A greater number of participants experiencing wasting received HAART, however, their HIV RNA levels were more than twice as high (mean \pm standard deviation [SD], 166,689 \pm 238,002 copies/mL; median log HIV RNA level \pm SD, 10.2 \pm 2.7 log ₁₀ copies/mL) compared to those not experience wasting (mean \pm SD, 72,156 \pm 149,080; median log HIV RNA level \pm SD, 9.2 \pm 2.3 log ₁₀ copies/mL). Wasting was related to heavy alcohol drinking and cocaine use. HIV-related wasting continues to be common among HIV infected drug users, even among HAART recipients.

Table 3: Literature Review: HIV and Food Insecurity

Author/Study design	Study Purpose	Population	Findings
Weiser SD, Hatcher A et al. ¹¹² 2013 <i>Longitudinal cohort study</i>	Examined association between food insecurity and hospitalizations, emergency department (ED) visits, and non-ED outpatient visits.	347 marginally housed and homeless HIV infected individuals in San Francisco	56% participants were food insecure at baseline. Compared with food-secure persons, individuals reporting severe food insecurity had increased odds of hospitalizations [(AOR) = 2.16, (95 % CI) = 1.50-3.09] and ED visits (AOR = 1.71, 95 % CI = 1.06-2.30). Odds of an outpatient visit were 41 % higher for severely food insecure individuals, results were not statistically significant. Mild/moderate food insecurity was also associated with increased hospitalizations (AOR = 1.56, 95 % CI = 1.06-2.30), ED visits (AOR = 1.57, 95 % CI = 1.22-2.03), and outpatient visits (AOR = 1.68, 95 % CI = 1.20-2.17). Food insecurity is related to greater health services utilization HIV infected individuals.
Weiser SD, Tsai AC et al., ⁶⁶ 2012 <i>Longitudinal cohort study</i>	Understand the association between food insecurity and morbidity as well as healthcare utilization patterns among HIV infected individuals receiving antiretroviral therapy program.	458 HIV infected individuals in Uganda	40% participants were severely food insecure at baseline. Opportunistic infections, increased hospitalizations and worse physical health summary were associated with severe food insecurity. Mild/moderate food insecurity was associated with missed clinic visits. Policies and programs are needed to address food insecurity as part HIV treatment programs.
Wang EA, McGinnis KA et al., ⁹³ 2011 <i>Observational study</i>	Examine the impact of food insecurity on HIV disease outcomes among HIV infected patients receiving antiretroviral medications.	2353 HIV infected veterans receiving antiretroviral treatment	24% were food insecure. Food insecure participants were more likely to have an unsuppressed HIV-1 RNA (AOR 1.37, 95% CI 1.09, 1.73) compared to food secure participants. Antiretroviral medication adherence and body mass index did not mediate the association between food insecurity and unsuppressed HIV-1 RNA. Food insecurity was not independently associated with low CD4 counts.
Weiser SD, Frongillo EA et al. ⁶⁴ 2009 <i>Cross-sectional study</i>	Assess the effect of food insecurity on viral load suppression and antiretroviral adherence.	104 marginally housed and homeless HIV infected individuals in San Francisco	51% experienced food security, 24% were mildly/ moderately food insecure and 25% experienced severe food insecurity. Individuals with severe food insecurity were less likely to achieve adherence ≥80%. Severe food insecurity was associated with a 77% decreased odds of viral suppression (95% CI = 0.06-0.82). Severe food insecurity was associated with an 85% lower odds of viral suppression (95% CI = 0.02-0.99) among those with ≤80% adherence and a 66% lower odds among those with >80% adherence (95% CI = 0.06-1.81).

Weiser SD, Fernandes K et al. ⁶⁵ 2008	Assess the associations between food insecurity and mortality in HIV infected antiretroviral therapy (ART)-treated and whether body mass index (BMI) modified associations.	1119 HIV infected individuals initiating ART treatment in Vancouver, British Columbia (BC)	48% were food insecure and 14% were underweight (BMI <18.5). 14% died from non-accidental deaths after a median follow-up time of 8.2 years. After controlling for covariate variables, food insecure and underweight individuals were nearly two times more likely to die [(AHR)=1.90, (95% CI)=1.05-3.46] compared with food secure and normal weight individuals. A trend towards increased mortality risk was observed among food insecure and not underweight individuals (AHR= 1.40, 95% CI=0.91-2.16). In contrast, being underweight and yet food secure was not associated with risk of death (AOR=0.83, 95% CI=0.33-2.11). Food insecurity is a risk factor for mortality among ART-treated individuals in BC, particularly among individuals who are underweight.
<i>Longitudinal cohort study</i>			
Weiser SD, Leiter K et al. ¹⁰⁰ 2007	Examine the association between food insufficiency and inconsistent condom use, sex exchange, and other measures of risky sex.	1,255 HIV –infected adults in Botswana and 796 adults in Swaziland	Food insufficiency was reported among 32% and 22% of women and men respectively. Food insufficiency was associated with inconsistent condom use with a non-primary partner [(AOR) = 1.73, (95% CI) = 1.27–2.36], sex exchange (AOR 1.84, 95% CI 1.74–1.93), intergenerational sexual relationships (AOR 1.46, 95% CI 1.03–2.08), and lack of control in sexual relationships (AOR 1.68, 95% CI 1.24–2.28). Food insufficiency is an important risk factor for increased sexual risk-taking among women.
<i>Cross-sectional study</i>			

Table 4: Literature Review: HIV, Nutrition Programs and Impact on Health Outcomes

Author	Study Purpose	Population	Findings
Tirivayi N, Koethe JR et al. ¹¹¹ 2012 <i>Cohort study</i>	Compare antiretroviral therapy (ART) adherence, weight gain, and CD4+ lymphocyte count change in HIV infected food assistance recipients to control non-recipients.	145 HIV infected adults receiving food assistance and 147 HIV infected non-recipient control group in Lusaka Zambia	Food assistance recipients had higher ART adherence compared to non-recipients (98.3% vs. 88.8%; p<0.01) after 6 months. No significant effects were observed for weight or CD4+ lymphocyte count change. Adherence rates was greater for individuals who received ART for < 230 days, and among those with BMI<18.5 kg/m ² , a higher HIV disease stage, or a CD4+ lymphocyte count ≤ 350 cells/μl.
Ivers LC, Chang Y et al. ¹⁷¹ 2010 <i>Prospective observational cohort study</i>	Evaluate the impact of food assistance on patient outcomes in a comprehensive HIV program	600 HIV infected individuals enrolled in HIV care in Partners In Health (PIH) programs in rural Haiti.	Food security improved significantly among food assistance recipients compared to controls (-3.55 vs. -0.16; P < 0.0001); BMI decreased significantly less in the intervention group compared to controls (-0.20 vs. -0.66; P = 0.020). Food assistance was associated with improved food security (-3.49 vs. -1.89, P = 0.011) and BMI (0.22 vs. -0.67, P = 0.036) at 12 months. At 6 month and 12 months, food assistance was associated with improved adherence to monthly clinic visits; (P < 0.001) and (P = 0.033) respectively.
Rawat R, Kadiyala S et al. ¹⁶⁰ 2010 <i>Cohort study</i>	Evaluate the impact of food assistance (FA) on change in weight and disease progression	14,481 HIV infected FA recipients and control non-recipients from the AIDS Support Organization (TASO) in Uganda	Among individuals receiving food assistance but not anti-retroviral the assistance resulted in a mean weight gain of 0.36 kg compared to their matched controls. The highest weight gain of 1.9 kg was observed among individuals with the most advanced disease at baseline. Receiving food assistance had only minimal impact on disease progression.
Kaiser L ¹⁵² 2008 <i>Longitudinal study</i>	Determine the factors associated with Food Stamp Program (FSP) participation in a potentially eligible population	527 FSP female participants and 1405 potentially eligible non-participants in California	Factors associated with participation: single mother with children; unemployed; on welfare; on WIC (the Special Supplemental Nutrition Program for Women, Infants, and Children); and US-born. Barriers to participation: females < 25 years and > 54 years, being Hispanic, perception of need and or eligibility for program, lack of knowledge about application process, stigma, and citizenship status.
Perez-Escamilla R, Ferris AM et al. ¹³² 2000 <i>Cross-sectional study</i>	Examine the association of the Food Stamp Program (FSP) with the food security and dietary intake of low income children	99 low income FSP participating and non-participating preschoolers enrolled in the WIC from Hartford, CT	Among FSP recipients, benefits lasting <4 weeks was associated with food security (OR= 0.10, 95% CI = 0.02–0.56) FSP use was related to above-median intakes of vitamin B-6 (3.13, 1.16–8.45), folate (2.92, 1.09–7.81) and iron (3.72, 1.31–10.54). The NFS children were more likely to consume <8 mg iron/d (3.73, 1.09–12.80). FSP is associated with preschoolers' food security and micronutrient intake.

Table 5: Literature Review: Nutrition Education in HIV infected Individuals

Author	Study Purpose	Population	Findings
Segal-Isaacson CJ, Tobin JN et al. ²⁰⁰ 2006 <i>Quasi-experimental design</i>	Determine whether nutrition education can succeed in improving longer-term dietary patterns in disadvantaged populations with HIV/AIDS	466 disadvantaged women with HIV/AIDS	Nutrition education led to significant improvement in dietary patterns for all participants even after 18 months after intervention. There were decreases in the consumption of high fat and high sugar foods.
McDermott AY, Shevitz A et al. ¹⁶⁴ 2003 <i>Quasi-experimental design</i>	Determine the effectiveness of intensive dietary counseling plus an oral nutrition supplement on energy and protein intake, weight, and fat-free mass	39 HIV infected persons with documented wasting receiving nutrition intervention and 56 controls who did not receive intervention	Nutrition education resulted in marked improvements in dietary intake, weight, and body composition, during and after intervention.
Van Niekerk C, Smego RA et al. ²⁰¹ 2000 <i>Randomized control trial</i>	Determine the effect of nutritional education and dietary counseling on body weight in HIV/AIDS patients.	90 HIV/AIDS antiretroviral naïve treatment(ART) naïve individuals	After a mean follow-up period of 4.2 months, body weight compared to baseline was greater in intervention group compared to controls ($P < 0.01$). Intervention helped to offset the adverse effects of gastrointestinal tract or systemic infection (especially in patients with CD4+ counts < 200 cells mm^{-3}).
Berneis K, Battagay M et al. ²⁰² 2000 <i>Quasi-experimental design</i>	Assess the effect of an oral nutritional supplement combined with nutritional counseling on whole body protein metabolism	8 HIV infected patients with a body mass index < 21 kg m^{-2} or CD4-T cells < 500 in stable clinical condition who received intervention and 7 identical controls.	Leucine oxidation decreased in nutritional intervention after 12 weeks ($P < 0.05$) with no change in the control group. Lean body mass increased in the intervention group ($P < 0.05$) and fat mass decreased ($P < 0.05$) with no changes in the control group. The intervention had no significant effect on lymphocyte CD4 counts and on quality of life.
Schwenk A, Steuck H et al. ¹⁷⁰ 1999 <i>Randomized non-blinded control trial</i>	Compare nutritional counseling with and without oral supplements in HIV infected patients with recent weight loss	HIV infected patients with recent weight loss. n=24: counseling and normal food n=26: counseling and fortified supplements	Fat free mass increased from baseline to week 8 ($P < 0.05$) with no difference between the two groups ($P = 0.97$). Body cell mass and weight gain were not significant and equal between groups. Total energy intake was not different between groups at weeks 6 and 8.

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CHAPTER III: SUPPLEMENTAL NUTRITION ASSISTANCE PROGRAM (SNAP) AND THE HIV INFECTED POPULATION IN MIAMI: WHO PARTICIPATES, WHO DOESN'T AND WHY.

Abstract

The Supplemental Nutrition Assistance Program (SNAP), formerly the Food Stamp Program (FSP) is the largest food assistance program in the country.^{1,2} With approximately 45 million participants in 2011, it is the safety net for low income households, alleviating some negative effects of poverty in the country.^{2,3} Though participation has surged in recent years among several of the demographic and economic subgroups,⁴ mainly due to changes in the economic environment,² little is known about the participation of low income individuals who are chronically ill. A cross-sectional study was conducted to examine the nutrition and health impact of SNAP participation in 123 HIV infected SNAP participants, compared to 52 eligible HIV infected SNAP non-participants. In addition, we evaluated the barriers for participation among the latter group. Student's t-test, Chi square tests, and logistic regression were used in the data analysis. SNAP participation rate was 70.3% which is close to the national participation rate of 72% for all eligible persons in 2009. Antiretroviral use, having income less than \$1000 per month and being born in the US remained positively and independently associated with SNAP participation, $P < .001$, $P = .006$ and $P < .001$ respectively. Twenty seven percent (26.9%) of non-participants cited the rejection of their application as the reason for not participating in the program. Recent incarceration was a barrier for 17.4% of program non-participants. Equal percentages (15.4%) were non-participants either because they were not aware of eligibility or they lived in shelters that didn't allow participation. Our study findings are similar to those reported in other populations at

nutritional risk,⁵⁻⁷ however, recent incarceration and living in a shelter are barriers that seem to be specific to HIV infected people in Miami. Outreach programs similar to Community Partnerships and Supportive Services for HIV Infected People Leaving Jail (COMPASS) are needed in Miami, which are especially developed for people living with HIV. These programs will enhance linkages to healthcare after leaving jail, improve management of the HIV disease, and develop strategies to overcome barriers to participation in social services such as nutrition programs.⁸

Keywords: Supplemental Nutrition Assistance Program (SNAP), Food assistance program, HIV infection

Introduction

The purpose of the Supplemental Nutrition Assistance Program (SNAP), formerly the Food Stamp Program (FSP) is to increase purchasing power and permit low income households to obtain a nutritious diet.^{1,2} Being the most funded (\$70 billion in 2011) of the domestic nutrition assistance programs, the program has been successful in alleviating some of the negative effects of growing poverty in the United States.^{2,3} Evidence from the literature suggests that participation in SNAP has been beneficial in consistently increasing household food expenditure compared to non-participation, with a recent report by the United States Department of Agriculture (USDA) indicating that individuals participating in SNAP spend more on food and wouldn't have done so without the program.^{2,9,10} As such, SNAP has been described as a safety net for low income individuals and families.

Participation in the SNAP program increased substantially from a low of 54% in 2001 and 2002 to 72% in 2009 among eligible individuals, although an estimated 33% of SNAP eligible participants do not participate in the program.^{2,4,11} The participation surge has been credited to changes in eligibility requirements, economic changes, and increased outreach.² Generally, reasons identified for non-participation among eligible non-participants include fear of stigmatization, the desire for personal independence, lack of awareness about program eligibility and benefits, confusion with requirements for eligibility, homelessness, length and cost of application, inadequacy of benefits, and past bad experiences.^{5-7,12,13} A California study of pantry users listed homelessness and limited English language skills as the primary barriers to SNAP participation.⁷ Other studies among immigrants, which are relevant to the State of Florida and Miami-Dade County,

listed the following as barriers: language, having to payback benefits, and consequences on future citizenship application.^{14,15} The latter two are misconceptions primarily identified by Hispanic immigrants.¹⁴ Senior adults listed stigma and misinformation with program rules as participation barriers.¹⁶ Among low income women in California, lack of perceived need was the most identified reason for non-participation, with almost 43% stating that they did not need SNAP.⁵ Some eligible non-participants may have a low perception of need for SNAP because of personal pride or relatively low allotment or benefits, even though they may be experiencing food insufficiency.^{5,17} Ninety six percent of eligible non-participants are aware of the SNAP program and 66% would participate if eligibility were certain.¹³ As the federal government is adopting several strategies to increase SNAP participation among eligible non-participants,¹¹ it is important to “understand what leads some and not others to use food assistance”¹⁸ among various sub-groups in order to maximize participation rates.

Participation varies among different population groups and according to recent USDA reports, children have the highest participation rate at 92% while the elderly have the lowest rate at 34%.² Participation rates among the various ethnicities have been inconsistent, as some studies report higher rates among Blacks, while others reported their rates to be lower when compared to other ethnicities.^{6,17,19} While little is known about the rate at which low income, chronically ill individuals access the SNAP program, for HIV infected individuals living below the poverty rate, participation may be an essential part of success with disease management.²⁰ Food insufficiency is prevalent in this population and has been suggested to be a health threat as it affects disease transmission, progression, management and survival.²⁰⁻²³ Without adequate and nutritious

food, HIV infected individuals are less likely to adhere to treatment, leading to poor disease outcomes, such as difficulty with viral load suppression; an association that has been reported in several HIV infected populations.²⁴⁻²⁶ Food insufficiency among HIV infected persons has also been associated with risky sexual behavior²⁷⁻²⁹ and increased utilization of healthcare,^{30,31} two situations that affect the national cost of HIV disease management. There is limited research on the utilization of food assistance programs, especially the SNAP program by HIV infected persons. Surveys conducted among these high risk populations suggest that less than one-third of those eligible are receiving benefits.³² Since the program has shown to be effective in alleviating poverty and food insufficiency among the general public,^{2,33,34} it is critical to examine whether it is being utilized by low income HIV infected persons who are known to experience food insufficiency at rates higher than the general public. The aim of this study was to (1) describe the characteristics of HIV infected eligible SNAP participants, (2) determine factors associated with SNAP participation in this population and (3) identify barriers to participation.

Methods

Study Design and Setting

This was a cross-sectional study conducted in Miami, Florida and was approved by the Institutional Review Board of the Florida International University. From April 2011 to August 2012, participants were recruited by a trained researcher from the Borinquen Health Care Center (BHCC), and other centers that provide HIV-related services to individuals in Miami-Dade County. The BHCC provides comprehensive range of health and social services to a culturally diverse low income community in

Miami-Dade County. To qualify for inclusion in the study, participants must be 18 years or older, provide documentation of HIV seropositive status, have income below 130% of the federal poverty level and be eligible to participate in the Supplemental Nutrition Assistance Program, even if they are not currently participating. Determination for SNAP eligibility was achieved using the ACCESS Florida's Pre-screening eligibility tool.³⁵ This tool gathers information on income, assets, household size, and expenditure and is used as a basic prescreening tool by the State for SNAP eligibility. Potential participants were approached for enrollment in the study and, once eligibility was determined, willing participants gave their written informed consent. After obtaining informed consent, the study visit included completing the field-tested self-administered questionnaire to assess sociodemographic and health-related characteristics, barriers to participation (among eligible non-participants), incidence of pathological symptoms, and quality of life. Participants were given \$10 in appreciation for completing the survey. Participation in the supplemental nutrition assistance program was defined as having received SNAP benefits for at least one month in the last 12 months.

Survey Instruments

The questionnaires used in the study were pre-tested using twenty one (N=21) low income HIV infected persons, with characteristics similar to the study population. The questionnaire was minimally revised, based on pre-testing results.

Demographic and Socioeconomic Information: Several questions were used to assess the participants' sociodemographic and economic state. Information collected included age, gender, ethnicity, country of birth, marital status, education, employment, household size, monthly income, and use of other community food resources such as food banks. In

addition, the questionnaire assessed health-related characteristics such as smoking status, recreational drug use and alcohol use. It also queried the type and frequency of each substance used, and assessed regular intake of vitamins.

Participation Barriers: A list of possible barriers were identified and compiled based on the researcher's interviews with dietitians and case managers serving this population and also from the literature. Several reasons were identified as barriers for non-participation and are summarized under the following categories: (a) perceived need, (b) stigma, (c) awareness of eligibility, (d) access, and (e) eligibility restrictions. To the best of our knowledge, this study was the first that identified and reported recent incarceration as a reason for non-participation. This questionnaire lists various reasons for non-participation in the SNAP program and was used to assess barriers to participation among individuals who qualified for the program and yet did not participate.

Food Security: The six-item US Household Food Security Survey Module was used to assess food security status. Scores of this survey ranges from 0-6, with higher scores indicating severity of food security. Scores of 0-1 were classified as food secure, while 2-4 and 5-6 were classified as low food security and very low food security respectively. Low food security and very low food security were merged as food insecurity during analysis.

Incidence of Pathological Symptom: At the assessment visit, study participants were asked if within the past month, they had experienced symptoms pertaining to general malaise and also those related to HIV. These included diarrhea, constipation, nausea, fever, fatigue, and unexplained changes in weight.

Quality of Life: Quality of life was assessed using the Spitzer Quality of Life Index (SQLI). This is a brief questionnaire measuring an individual's physical, social and emotional wellbeing as well as the capability to perform the tasks of ordinary living without much hindrance. It contains five main domains namely activity, daily living, health, social support and outlook. Each domain has a three point scale ranging from 0 to 2, with the highest number regarded as the best quality of life. The total score ranges from 0 to 10, with scores ≤ 8 deemed as having a reduced quality of life. The SQLI has demonstrated both construct validity and reliability among patients with chronic physical diseases and has been successfully used in HIV infected populations. Assessment of internal consistency yielded a Cronbach's α of 0.775 and an interrater Spearman rank correlation (ρ) of 0.81, which was significant ($P < 0.001$).³⁷

Statistical Analysis

Descriptive statistics were used in characterizing the participants and were expressed as mean \pm standard deviation, or percentages. Univariate analysis was performed to determine differences in characteristics between SNAP participants and eligible non-participants. Student's t-test was used to compare continuous variables and Chi square test for categorical variables. Analysis of barriers to participation was limited to eligible non-SNAP participants. Chi-square tests were used to identify factors associated with SNAP participation. To determine which characteristics independently predicted SNAP participation, logistic regression was used. Statistical significance of $P < .05$ was used in all analyses. SPSS version 21 was used in conducting all analysis.

Results

Participant Characteristics

A total of 175 HIV infected adults participated in the study with an average age of 46.9 ± 7.8 . Two thirds of the respondents were male (66%, n=116), three quarters were African-American (74%, n=130) and 70% were single (n=123). Approximately eighty two (81.7%) percent had incomes less than \$1000 per month, with almost eighty seven percent (86.6%) being unemployed and/ or on disability. Over half (53%, n= 93) of respondents had more than a high school education. Thirty one percent reported using recreational drugs with nearly double that number (63%) reporting they smoke cigarettes. Alcohol use was reported by nearly 55% of participants. Only 30% of the population had reduced quality of life, scoring less than eight on the quality of life composite score. About 43% of participants reported reduced activity levels, scoring less than 2 on the quality of life activity index. The top five most reported pathological symptoms were: headache (41.1%); fatigue (34.3%); unexplained changes in weight (34.3%); cough (28.3%); and diarrhea (24%). The rate of SNAP participation in this population was 70.3%, with 58.3% of the population experiencing food insecurity.

Factors Associated with SNAP Participation

SNAP participants were more likely than non- participants (91.1% vs. 67.3%, $P < .001$) to be born in the United States or its territories, to have incomes less than \$1000 per month (85.4% vs. 73.1%, $P = .055$) and be on disability (48.8% vs. 25%, $P = .012$), (Table 1). SNAP participants also reported more recreational drug use (38.2% vs. 15.4%, $P = .003$) but were also more likely to be receiving antiretroviral treatment than non- participants (94.3 vs. 67.3, $P = .001$), (Table 2). Sixty four percent of SNAP non-

participants experienced food insecurity compared to 56% among SNAP participants although it did not reach significance (Table 3).

There was a significant difference in mean quality of life composite score, with SNAP participants having a significantly higher mean score ($M = 8.40$) compared to non-SNAP participants ($M = 7.69$), $P = .037$. As shown in Table 4, there was no significant difference between the two groups with regards to percent reaching cut-off point scores of quality of life, measured by a composite score of less than 8, and individual sub-scores less than 2. In general, however, a higher percentage of non-SNAP participants (36.5%) reported reduced quality of life (SQOL score < 8) compared to SNAP participants (27%).

Non-SNAP participants also reported a higher prevalence of pathological symptoms compared to SNAP participants, although only fever reached significance, $P = .047$. Twenty three percent of non-SNAP participants reported having fever in the last month compared to only 11% in the SNAP group.

Results from the logistic regression analysis showed that being born in the United States and territories, antiretroviral use and having income less than \$1000 per month remained positively and independently associated with SNAP participation (Table 6). HIV infected adults born in the US were 16.5 times more likely to participate in SNAP than those born in other countries ($P < .001$). Those with incomes less than \$1000 per month were more than five times likely to participate in SNAP (AOR = 5.28; $P = .006$) while those on treatment were fifteen times more likely to participate in the program (AOR = 15.18; $P < .001$). The regression analysis also indicated that individuals with less than high school education were 50% less likely to receive SNAP benefits (AOR = 0.33; $P = .003$). This may be due to the inability to complete all paper work required for

SNAP participation. Univariate analysis using unadjusted odds ratio indicated that SNAP participants were almost three times more likely to be on disability, and half as likely to be unemployed, however, these differences disappeared in the multivariate analysis.

Barriers to SNAP Non-Participation

Barriers given by SNAP non-participants are shown in Table 7. The main barrier given by HIV infected persons for not participating in the program was “I was denied participation.” Though they had thought themselves eligible and applied for SNAP, nearly 27% of non-participating respondents stated they were denied. Seventeen percent of respondents stated that they had been released from prison in the last 12 months and that was the reason for not participating in the SNAP program. About 15% stated they were not aware of their eligibility status, while an equal percentage indicated that they lived in shelters and as a result were not allowed to participate in the program. An equal percentage of respondents (9.6%) stated that it was “too hard to apply” or that they were “worried about citizenship requirements.” Only approximately 6% of non-SNAP participants indicated they didn’t need the benefits of the program. Stigma, which has been reported as barriers in other cohorts, was not reported as a reason for not participating in SNAP among this HIV infected population.

Discussion

Findings from this study indicates that the SNAP participation rate (70.3%) among this HIV positive cohort is fairly close to that reported for all eligible persons in the United States for fiscal year 2009 (72%).⁴ The rate is also similar to the 69% participation rate reported in 2009 for the State of Florida.³⁸ The findings are also consistent with the characteristics reported by other studies of SNAP participants.^{5,7}

Similar to these studies, HIV infected SNAP participants tend to be low income and US citizens.^{5,7} Characteristics that were associated with participation in this study, such as being unemployed, disabled or having a household with children were not expressed by the study participants as reasons for SNAP participation.^{17,19} Our findings also did not show ethnicity to be an independent predictor of SNAP participation, as it has been found in other studies.^{6,17} In contrast with results by Duffy et al.,³⁹ our study showed that individuals with higher education were more likely to participate in SNAP. This may be due to ease of understanding eligibility requirements, including completing the paperwork for application.

A strong association was found between SNAP participants and receiving antiretroviral treatment. This finding has implication for HIV disease management as adherence to treatment has been associated with food sufficiency.^{30,40,41} Antiretroviral therapy in HIV infection is most effective when adherence to treatment is high (>95%).⁴² Some studies have identified that HIV infected individuals, who are food insufficient, are less likely to adhere to treatment compared to their food sufficient counterparts.^{25,43} As shown in the findings from this study, SNAP participants experience less food insecurity than non-participants. This is consistent with previous findings in the general population showing that SNAP participation plays a role in increasing food sufficiency.^{33,44} HIV infected SNAP participants, who are also receiving treatment, are more connected into the healthcare system, and receive intense case management. These circumstances may translate into receiving more social benefits such as SNAP participation.

SNAP participants also had a better quality of life compared to non-participants. Quality of life measures the burden of a chronic disease on several aspects of life and

HIV disease has been reported to decrease quality of life among those infected.⁴⁵ The finding that SNAP participants had a better quality of life may be an indication of the programs ability to reduce the psychological and emotional burden associated with having to maintain adequate nutritional status and its economic costs due to presence of a strongly nutrition-related disease. SNAP participation may decrease stress associated with acquisition of food in this low income population. It may also provide the ability to transfer income to other health related spending, lessening the pressures associated with achieving good health.

The main reason chosen by non-participants as a barrier for receiving SNAP was denial of participation into the program. This was not unexpected as the screening tool used in the study is not used as the final determinant of eligibility by the SNAP office. Besides not meeting eligibility requirements, there are several reasons for SNAP denials; including failure to provide verification of needed documentation and non-compliance with rules regarding application and recertification. Another important barrier to SNAP participation in this study sample was recent incarceration. This is important as the USDA has recently started working in conjunction with other state agencies to assist those released from prison to transition into society.⁴⁶ The State of Florida, however, still maintains a ban put in place by the Personal Responsibility and Work Opportunity Act of 1996, preventing states from providing SNAP benefits to drug related convicted felons.^{47,48} It is possible for low income HIV infected adults who are prone to recreational drug use, to also be prone to possible incarceration as drug related felons. As such, although only 15.4% of non-SNAP participants indicated they used drugs, there could be high felony convictions rate within the group, disqualifying them from SNAP

participation. This study did not gather data on reason for incarceration, and we cannot assess if incarceration was related solely to illegal drug felony. For program non-participants who were indeed incarcerated as drug related felons, they currently cannot receive SNAP benefits in Florida. SNAP program administrators, however, need to work with the local justice system to seek out and reach out to other felons in transition, as there is a myth of SNAP ineligibility for all felonies.⁴⁷ In addition, access to social services such as the SNAP program have been shown to contribute in providing stability for felons after release from jail and to prevent relapse to substance abuse⁸

Living in a shelter was another reason for non-participation. Since food insecurity is common in HIV infected populations and having adequate nutrition is essential for their disease management, it is important for SNAP and shelter administrators to work together to give program access to individuals who may need it the most. Other barriers listed were in relationship to knowledge about eligibility and difficulty with the eligibility process. These findings are similar to those reported by Martin et al.⁶ among Food Stamp (aka SNAP) participants. Outreach efforts need to be invested in this population to increase participation rates. Compared to a study among women, a greater proportion of respondents in our study did not apply for program benefits because they were worried about their citizenship status.⁵ Again, only 6% of our study non-SNAP participating respondents stated that they did not need the benefits provided by the program, a much smaller percent than that reported in a study conducted among women in California where 42% of non-participants cited “don’t need them” as a reason for not applying for program benefits.⁵

The findings from our study are not generalizable, since the data were collected from one city in South Florida. There needs to be caution in trying to generalize results to other HIV infected populations, as there is evidence that persons living with HIV in Miami-Dade may have specific characteristics that make them unique, such as being a more heterosexual with higher rates of drug use than other populations.^{21,49} Similar studies need to be conducted among persons infected with HIV in other cities and areas in the country to help better understand how different socio-economic conditions and risk factors relate to participation in food assistance programs such as the SNAP program.

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Table 1: Demographic characteristics of HIV infected by SNAP participation status

Variable	Total (N=175)	SNAP (n=123)	Non-SNAP (n=52)	P-value
Age ^{a*}	46.89 ± 7.78	46.96 ± 7.48	46.65 ± 8.57	.813
Gender				.870
Male	166 (66.3)	82 (66.7)	34 (65.4)	
Female	59 (33.7)	41 (33.3)	18 (34.6)	
Ethnicity				.426
African American	130 (74.3)	94 (76.4)	36 (69.2)	
Hispanic	28 (16.0)	20 (16.3)	8 (15.4)	
White	9 (4.1)	5 (4.1)	4 (7.7)	
Other	8 (4.6)	4 (3.3)	4 (7.7)	
Country of Birth ^{**}				<.001
US born	147 (84.0)	112 (91.1)	35 (67.3)	
Non-US born	28 (16.0)	11 (8.9)	17 (32.7)	
Marital Status				.714
Married	17 (9.7)	13 (10.6)	4 (7.7)	
Single	123 (70.3)	87 (70.7)	36 (69.2)	
Divorced/Widowed	35 (20.0)	23 (18.7)	12 (23.1)	
Child Status				.301
Children at home	22 (12.6)	14 (14.4)	8 (15.4)	
Children not at home	69 (39.4)	53 (43.1)	16 (30.8)	
No Children	84 (48.0)	56 (45.5)	28 (53.8)	
Education				.228
< High School	82 (46.9)	54 (43.9)	28 (53.8)	
≥ High School	93 (53.1)	69 (56.1)	24 (46.2)	
Employment Status*				.012
Unemployed	79 (45.1)	50 (40.7)	29 (53.8)	
Employed	23 (13.1)	13 (10.6)	10 (19.2)	
On disability	73 (41.7)	60 (48.8)	13 (25.0)	
Income/ month				.055
< \$1000	143 (81.7)	105 (85.4)	38 (73.1)	
≥ \$1000	32 (18.3)	18 (14.6)	14 (26.9)	
Living condition				.569
Alone	67 (38.3)	48 (39.0)	19 (36.5)	
With family	79 (45.1)	57 (46.3)	22 (42.3)	
Shelter	29 (16.6)	18 (14.6)	11 (21.2)	
Uses of other food assistance				.736
Yes	26 (14.9)	19 (15.4)	7 (13.5)	
No	149 (85.1)	104 (84.9)	45 (86.5)	

^{a*}Reported as mean ± SD; All other variables are reported as n (%)

P* < .05, *P* < .01

Table 2: Health related characteristics of HIV infected by SNAP participation status

Variable	Total (N=175)	SNAP (n=123)	Non-SNAP (n=52)	<i>P</i> -value
Smokes Cigarettes	110 (62.9)	80 (65.0)	30 (57.7)	.358
Alcohol use	88 (50.3)	67 (54.5)	21 (40.4)	.089
Drug use*	55 (31.4)	47 (38.2)	8 (15.4)	.003
On ART*	151 (87.3)	116 (94.3)	35 (67.3)	.001
Vitamins intake	81 (46.3)	56 (45.5)	25 (48.1)	.757

**P* < .05, †All variables reported as n (%)
ART: Antiretroviral therapy.

Table 3: Food security status of HIV infected adults by SNAP participation status

Food Security Status	Total % (n)	SNAP % (n)	Non-SNAP % (n)	<i>P</i> -value
Food Security	41.7 (74)	27.0 (33)	36.5 (19)	NS
Food Insecurity	58.3 (102)	56.1(69)	63.5 (33)	NS

NS: Not Significant

Table 4: Quality of Life (QOL) of HIV infected by SNAP participation status

Quality of Life (QOL) [†]	SNAP % (n)	Non-SNAP % (n)	P-value
Composite <8	27.0 (33)	36.5 (19)	.211
Activity <2	39.3 (48)	51.9 (27)	.125
Daily Living <2	14.8 (18)	21.2 (11)	.300
Health <2	32.0 (39)	36.5 (19)	.558
Support <2	21.3 (26)	30.8 (16)	.182
Outlook <2	23.8 (29)	28.8 (15)	.481

[†]Composite scores < 8 and Sub-score < 2 = poor quality of life

Table 5: Pathological symptoms of HIV infected by SNAP participation status

Symptoms	SNAP % (n)	Non-SNAP % (n)	P-value
Headache	37.4 (46)	50.0 (26)	.122
Weight changes	34.1 (42)	34.6 (18)	.952
Fatigue	32.5 (40)	38.5 (20)	.449
Diarrhea	22.8 (28)	26.9 (14)	.556
Sharp pains	20.3 (5)	11.5 (6)	.164
Mood changes	19.5 (24)	11.5 (6)	.201
Constipation	19.5 (24)	13.5 (7)	.338
Visual changes	18.7 (23)	17.6 (9)	.870
Chills	17.9 (22)	19.2 (10)	.833
Difficulty breathing	16.3 (20)	17.3 (9)	.865
Impaired concentration	16.3 (20)	15.4 (8)	.855
Shortness of breath	15.4 (19)	17.3 (9)	.759
Numbness	14.6 (18)	17.3 (9)	.655
Abdominal discomfort	12.2 (15)	23.1 (12)	.069
Fever*	11.4 (14)	23.1 (12)	.047

* $P < .05$

Table 6: Factors associated with SNAP participation among HIV infected

Variable	Unadjusted OR	95 % CI	P-value	Adjusted OR	95 % CI	P-value
US born	4.95**	2.12,11.55	.001	16.50**	3.61,75.47	.001
Unemployed	0.54	0.28,1.05	.066	0.81	0.20,3.26	.755
On disability	2.86 **	1.39,5.87	.004	1.32	0.33, 5.30	.696
<High school	0.67	0.35,1.29	.228	0.33**	0.12, 0.87	.003
< \$1000 income	2.15	0.98,4.74	.055	5.28**	1.62,16.95	.006
Alcohol use	1.77	0.92,3.41	.089	1.59	0.56, 4.49	.387
Drug use	3.40**	1.47,7.85	.003	2.15	0.62, 7.42	.228
On ART	8.05**	3.09,20.98	.001	15.18**	4.34, 52.65	.001

* $P < .05$, ** $P < .01$, ART: Antiretroviral therapy

Table 7: Barriers to SNAP participation among HIV infected (N=52)

Reason	n	%
I was denied participation	14	26.9
Recent incarceration	9	17.3
Not aware of eligibility	8	15.4
Not allowed in shelter	8	15.4
Too hard to apply	5	9.6
Worried about citizenship	5	9.6
I don't need them	3	5.8

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CHAPTER IV: ASSOCIATION OF SUPPLEMENTAL NUTRITION ASSISTANCE PROGRAM (SNAP), WITH FOOD SECURITY AND NUTRITIONAL STATUS OF HIV INFECTED PATIENTS

Abstract

The high rates of morbidity and mortality among persons infected with HIV have decreased since the introduction of antiretroviral treatment (ART). Issues of poor nutritional status are, however, still common with HIV infection.^{1,2} Poor nutritional status in HIV infected persons is a predictor of morbidity and mortality.^{3,4} Therefore, it is critical to institute interventions to improve nutritional status, prevent disease progression and improve disease management.

Nutritional status can also be compromised by food insecurity which is common among HIV infected persons.⁵⁻⁷ Recent studies have shown that food assistance programs help to improve food insecurity and nutritional status among HIV infected.⁸ We conducted a cross-sectional study to evaluate the effect of participating in the largest food assistance program in the United States: the Supplemental Nutrition Assistance Program, (SNAP) on food insecurity and nutritional status among 159 HIV infected adults. Univariate and multivariate analyses showed no significant differences in the food security level and nutritional status between SNAP participants and eligible non-participants, even after controlling for demographic and health characteristics. More than half (56%) of the sample experienced food insecurity and had inadequate intake of half of the nutrients assessed. More than 90% of the sample had inadequate intakes for vitamin D, E, and magnesium. Food security and adequacy of nutrient intake were negatively associated with drug and alcohol use, which were prevalent among SNAP participants. After controlling for demographic and health characteristics, including SNAP participation,

individuals experiencing very low food security compared to those who were food secure, were 4.7 times more likely (95% CI: 1.29-17.38) to use illicit drugs, but were 5 times less likely [0.21 (95% CI: 0.06-0.67)] to drink alcohol, and were 8.3 times less likely [0.12 (95% CI: 0.02-0.85)] to have children at home. Drug use was also associated with intakes below Dietary Reference Intake (DRI) requirements for vitamins B₁ (AOR: 2.86, *P* = .032) and B₂ (AOR: 3.29, *P* = .021), with marginal association for vitamin B₆ (AOR: 2.48 *P* = .063). Our results do not support an association between SNAP participation and food security or nutritional status in this cohort of HIV infected individuals. However, it demonstrates that food insecurity and inadequate nutrient intake continue to be prevalent among HIV infected adults.

Keywords: Supplemental Nutrition Assistance Program (SNAP), Food security, Nutritional status.

Introduction

HIV disease and poor nutrition create a vicious cycle that aggravates disease progression and affects chances of survival.⁹ Whereas poor nutritional status may accelerate disease progression and lead to poorer outcomes, HIV infection also impairs nutrient intake and utilization which leads to further deficiencies, compromised immunity and weight loss.^{9,10}

Nutritional status is a good predictor of morbidity and mortality in the course of HIV infection,^{3,4} even during antiretroviral treatment.^{2,11} When compared to non-infected counterparts, HIV infected patients have lower serum concentration of nutrients and are more susceptible to nutritional deficiencies.¹²⁻¹⁵ With the advent of antiretroviral treatment, morbidity and mortality in HIV infected individuals have improved, and HIV has become a chronic disease; however, poor nutritional status is still being reported among some populations.^{1,2} In an effort to improve nutritional status, nutrition interventions that include the provision of food assistance for HIV infected individuals have been conducted in several settings. In resource-limited settings, where relatively few of these studies have been conducted, provision of food assistance was beneficial in improving nutritional status and adherence to therapy but did not have any effect on immunologic outcomes.¹⁶⁻¹⁹ A recent study conducted in Haiti found that HIV infected adults who lived in severe socioeconomic conditions and with low BMI, were able to significantly increase their BMI when provided food assistance.⁸ Similar results have been observed in resource adequate settings like the United States, although the interventions were in the form of supplemental formulas with occasional counseling.²⁰⁻²³ Even though none of these interventions provided actual food, some of the interventions

were associated with significant changes in nutritional status among participants;^{20,24} an indication that nutritional assistance in some form is beneficial especially for HIV patients with poor socioeconomic status.

Food insecurity, defined as an individual's limitation or uncertainty to acquire healthy and adequate foods in socially acceptable ways,²⁵ has been associated with several indicators of poor socioeconomic status such as low income, unemployment, homelessness, as well as poor physical and mental conditions.^{6,7,26} Food insecurity has also been reported to be prevalent among HIV infected individuals regardless of setting.^{6,7,26-31} Food insecurity and HIV disease are intricately linked by poverty, poor outlook of life, diminished functional capacity and unemployment, in a cycle that affects the severity of each condition.³² Food insecurity impacts HIV disease transmission, through increases in risky behaviors.^{31,33-35} It has also been associated with poor access to healthcare, and under circumstances where treatment is accessed, food insecurity may affect adherence to ART which leads to poor disease progression and survival.^{7,31,35}

Food insecurity in the HIV infected person increases the chances of experiencing compromised nutrition.^{5,32} Provision of food assistance, in the presence or absence of food insecurity and compromised nutritional status, has, in most cases, ameliorated the adverse effects of the disease on nutrition.^{16-20,24,36,37}

The Supplemental Nutrition Assistance Program (SNAP), formerly the Food Stamp Program, is the largest food assistance program in the country, and is provided by the federal government to alleviate problems of food insufficiency in low income families.³⁸ Several studies have reported that SNAP has been effective in ameliorating

food insecurity in the general population, and demonstrated nutritional and health benefits from participation. However, these results have been inconsistent.³⁹⁻⁴³ SNAP is possibly the food assistance program mostly used by low income HIV infected adults, because it is the largest food assistance program for adults in the United States. There are, however, very few studies that have evaluated the SNAP participation rate of HIV infected individuals, and to date, there is no known study that has investigated the potential benefits derived from SNAP participation with regards to nutritional status and perceived food security in HIV infected adults. The aim of this study was to investigate the impact of SNAP participation on food security and nutritional status of HIV infected adults in Miami, FL.

Methods

Study Design and Setting

This was a cross-sectional study that compared nutritional status and food security among HIV infected adults who were participating in SNAP or were eligible for SNAP but who were not currently participating. It was approved by the institutional Review Board of the Florida International University (FIU). Participants were a convenience sample recruited consecutively through the FIU-Borinquen HIV Research clinic, located in the Borinquen Health Care Center (BHCC), and other local centers that provide HIV related services. BHCC provides healthcare and social services to low income HIV infected individuals in the Miami-Dade County. Participants were considered eligible if they:

- (1) were 18 years or older,
- (2) were participating in and/or were eligible to participate in SNAP
- (3) had medical documentation of HIV seropositive status.

Eligibility for SNAP was determined by the ACCESS Florida's Pre-screening eligibility tool, which gathers information on income, assets, household size, and expenditure, and is used as a basic prescreening tool by the State of Florida for SNAP eligibility. Informed consent was obtained from willing participants, after which they were scheduled to complete a study visit that included completing a self-administered questionnaire, as well as dietary, anthropometric and body composition assessments. Participants were also required to bring documentation of recent blood work (within three months of visit) done for their medical follow-ups. The questionnaire was pre-tested among 21 HIV infected individuals, a sample recruited from the same sources as the rest of the study population, and was minimally revised as needed, based on pre-testing results. The study visit lasted approximately one hour and all assessments were completed by a trained nutritionist. Participants were given \$10.00 for completing the study requirements. This study was conducted between April 2011 and August 2012.

Survey Instruments

Demographic, Socioeconomic and lifestyle Information: Several questions were used to assess the participants' socio-demographic and economic status. Information collected included age, gender, race/ethnicity, country of birth, marital status, child status, education, employment, living conditions, monthly income, smoking status, recreational drug use, alcohol use, antiretroviral (ART) medication use, vitamin use and the use of other food assistance programs.

Food Security: Recent food security status was measured using the 6-Item US Household Food Security Survey Module developed by the National Center for Health Statistics. This brief survey was selected in order to decrease participant's response

burden, instead of the longer versions. Although it is short in length, it has been shown to measure food security and distinguish it from food insecurity with enough specificity, sensitivity and minimal bias compared to the original modules.⁴⁴ Food security scores were coded and calculated using standard methods. Responses of “often true”, “sometimes true”, “almost every month”, “some months but not every month” and “yes” were coded as affirmative (1) and the total sum of affirmatives for all questions was considered the food security score. The maximum score that can be obtained is 6 with higher scores indicating severity of food insecurity. Scores of 0-1 were classified as food secure, while 2-4 and 5-6 were classified as low food security and very low food security respectively.

Nutritional Status Assessment

Nutrient Intake: A 24-hour dietary recall was used to assess dietary and nutrient intake by a trained Dietitian. At the study visit, participants were queried about foods and beverages consumed the day before. The brand of food, cooking method used, and the amount consumed were all recorded to ensure the comprehensiveness of information collected. Food models and measuring cups were used as props to accurately estimate the quantity of food consumed. The dietary information collected was analyzed using NutriBase Professional Nutrition Software Version 9 (Cybersoft Inc, 2011) to determine caloric and micro- /macronutrient composition.

Body Composition: Participants’ height and weight were measured at the time of data collection. Height was measured without shoes using a wall mounted stadiometer and was recorded to the nearest 0.5 inch. Measurement was done with participants’ heels touching the base of the stadiometer. Weight was obtained to the nearest 0.1 lbs. using a

standard calibrated scale, without shoes and in light clothing. BMI was calculated using Weight (kg)/ Height (m²). Body composition assessments were conducted using the bioelectrical impedance analysis (BIA) method. As part of body composition measurements, participants' waist circumference (cm) was measured using a non-stretch tape measure at the narrowest point of the waist and hip circumference (cm) was measured, at the widest point of the hip.⁴⁵ These were used to calculate waist-to-hip ratio.

Biochemical Indicators: Laboratory measurements of serum albumin, hemoglobin and hematocrit concentration were obtained to assess nutritional status. These measurements were provided as part of the documentation of recent (within the last three months) laboratory work from their last follow-up visit with their primary care physician. This documentation was required to be less than 3 months old from the day of the study visit and needed to contain complete blood chemistry results.

Statistical Analysis

Statistical analyses were conducted using IBM SPSS version 2.10 for Windows (Released 2012. Armonk, NY: IBM Corp). Descriptive statistics were used in characterizing the participants and were expressed as mean \pm standard deviation, or percentages. Differences in characteristics by SNAP participation status were compared using student's t-test for continuous normally distributed variables, chi-square test for categorical variables, and Mann-Whitney U test for continuous variables that were not normally distributed.

Average nutrient intakes were adjusted for total calorie intake and the Mann-Whitney U test assessed the differences in mean nutrient intakes between SNAP participants and eligible non-participants. Some of the body composition and blood

chemistry variables were not normally distributed; as a result, both the Mann-Whitney U test and student's t-test were used to assess the differences in the variables between the groups. When the results from both tests were similar, thus, only the results from the student's t-test were reported. Adequacy of nutrient intake was determined using the Estimated Average Intake (EAR) requirements for each nutrient and Adequate Intake (AI) for nutrients whose EAR are yet to be determined.⁴⁶ The differences in percentages were compared using chi square tests.

Chi-square tests were used to compare the severity of food insecurity by SNAP participation status. The associations between SNAP participation and 1) food insecurity and 2) nutritional status (dietary intake), were examined using logistic regression. The association between SNAP participation and nutritional status indicators (body composition and blood chemistries) was assessed using multiple linear regression. Variables controlled for in the logistic and multiple linear regression analyses were age, gender, ethnicity, country of birth, child status, work status, household size, ART use, smoking status, alcohol use, drug use, vitamin use, and use of other food assistance programs. $P < 0.05$ was set as the significance level for all analyses.

Results

Demographic Characteristics

After providing informed consent, 175 participants were recruited. However, due to missing data (n=16) only 159 were included in the final analyses. There were no differences in demographic characteristics between those used in analyses and those who were not. Participants were mostly male (67.3%), African-American (74.8%), with a mean age of 46.81 ± 8.03 years. Over 90% were single, with nearly half (48.4%) of the

total having no children. Over half (53.2%) reported having more than a high school education, with about 45% of participants claiming unemployment (Table 1). More SNAP participants (48.7%) were on disability than non-participants (23.9%), but fewer (39.8%) were unemployed compared to the non-participants (56.5%). As shown in Table 2, more SNAP participants used drugs (38.1%) than non-participants (13.0%), and nearly all SNAP participants (83.8%) were on ART compared to the non-participants (65.2%).

Using the Mann-Whitney U test, the distribution of alcohol use between the two groups differed significantly ($P = .031$), with 44% of SNAP participants drinking alcohol at least 2-3 times/week compared to only 26% of non-participants.

Association between SNAP Participation and Food Security

About thirty-two percent of the sample experienced low food security while 23.9% experienced very low food security. There was no significant difference in the level of food security between groups. Nearly half (46%) of SNAP participants were food secure while 39% of non-SNAP participants experienced food security (Table 3).

Logistic regression examined the association between food security and SNAP participation controlling for age, gender, ethnicity, country of birth, child status, work status, household size, ART use, smoking status, alcohol use, drug use, vitamin use, and use of other food assistance programs (Table 4). SNAP participation status was not significant in the logistic regression.

The logistic regression also identified relationships between some demographic characteristics and experiencing lower levels of food security (Table 5). In the model, individuals experiencing very low food security compared to those food secure were 4.7 times more likely (95% CI: 1.29-17.38) to use illicit drugs, but were 5 times less likely

[0.21 (95% CI: 0.06-0.67)] to drink alcohol, and were 8.3 times less likely [0.12 (95% CI: 0.02-0.85)] to have children at home. Those experiencing low food insecurity compared to those who were food secure were 3.6 (95% CI: 1.10-11.48) times more likely to be drug users, but were 5.6 [0.18 (95% CI: 0.06-0.51)] times less likely to use alcohol and were 4.2 (95% CI: 1.21-14.37) times more likely to use other food assistance programs.

Association between SNAP Participation and Nutritional status

Nutrient Intake: As shown in Table 6, no significant differences were seen in the macro and micronutrient intake between SNAP participants and non-participants. Mean caloric intake for both groups was below 2000 kcals per day. Energy adjusted protein intake for both groups was below the recommendation for healthy adults while carbohydrate intake was above recommendation. For about half of the nutrients assessed, more than 50% of the sample had intakes below the recommended Dietary Reference Intakes (DRI), whether EAR or AI. More than 90% had intakes below DRI requirements for choline, vitamin E, potassium and magnesium. Vitamin D intake was below EAR for 100% of the study sample. There were no statistically significant differences in percentages with intake below DRI for any of the nutrients by SNAP participation status (Table 7).

Logistic regressions of SNAP participation status on adequacy of nutrient intakes showed no significant results (Table 8). Several demographic characteristics were associated with the ability to achieve adequacy of nutrient intakes. Adequacy of calcium intake was associated with older age ($P = .042$), while adequacy of vitamin A intake was associated with younger age ($P = .009$) and not having children at home ($P = .023$). Adequacy of vitamin B₁₂ and iron intake was associated with being male ($P = .021, .007$,

respectively). Of the lifestyle related variables, drug and alcohol use were found to be associated with below EAR intake for some nutrients. After adjusting for control variables, the odds of drug users having below EAR intakes were 2.9 (95% CI: 1.09-7.49) for vitamin B₁, 3.3 (95% CI: 1.20-9.01) for vitamin B₂, 2.5 (95% CI: 0.95-6.45) for vitamin B₆, and 2.6 (95% CI: 1.00-6.56) for zinc. Alcohol users were 2.5 (95% CI: 1.02-6.14) times more likely to have below EAR intake for copper compared to non-drinkers. Use of ART was associated with above EAR intake for iron. (AOR= 5.6, 95% CI: 1.17-26.40).

Body Composition and Biochemical Indicators: Average BMI for this population was 27.81 ± 5.82 with an average waist-to-hip ratio close to 1. There were no significant differences in mean values of body composition and biochemical indicator variables by SNAP participation status (Table 9). Gender was significantly related to all variables except albumin. Being female was associated with having higher body mass index ($\beta = 0.34, P < .001$), higher fat mass ($\beta = 0.47, P < .001$), lower lean body mass ($\beta = -0.50, P < .001$) and lower waist-to-hip ratio ($\beta = -0.27, P = .004$). Multiple linear regression analyses were conducted to assess the association of SNAP participation status on body composition and biochemical variables. As indicated in Table 10, about 30% of the variability of most variables (with the exception of albumin and waist-to-hip ratio) was explained by the control variables. However, SNAP participation status explained less or equal to 1.4% additional variability of body composition and biochemical variables after controlling for these variables.

Discussion

The current study did not find an association between SNAP participation and food security, although some^{47,48} but not all studies^{49,50} have found that participation in SNAP alleviates food insecurity in the general population. More than half (56%) of the participants in this study experienced lower levels of food security. This rate is higher than both the national food insecurity rate of 14.9% and the state of Florida rate of 15.4% reported in 2011.⁵¹ The prevalence of very low food security in our study population was more than four times what was reported for the general public in the same year.⁵¹ High food insecurity rates have consistently been reported among persons living with HIV in North America. Eighty one percent of HIV infected adults in a study conducted in Miami, with a similar population, experienced food insecurity in addition to wasting.²⁶ Another study by Vogenthaler et al.,²⁹ in Atlanta and Miami, reported a 34% food insecurity rate among those living with HIV. In Canada, rates of between 48-64% have been reported, with studies from California also reporting similar rates.^{6,7,27,31} It is possible that the ability of SNAP to alleviate the effects of heightened food insecurity in HIV infected people is minimal compared to that observed in the general population, due to the increased nutritional demands, poor nutritional status and the severe socio-economic conditions surrounding this population in Miami.

Illicit drug use had a strong association with lower levels of food security in our population. Drug users were more than three times likely to experience food insecurity. Our findings are consistent with those noted in other HIV infected cohorts across the country.^{52,53} Similarly, Himmelgreen et al.⁵⁴ reported that drug using Hispanic women in

Connecticut experienced higher levels of food insecurity compared to non-drug users. The use of other food assistance programs was also associated with food insecurity and this finding was not surprising. Individuals having difficulty attaining food sufficiency are more likely to use several food assistance programs. Demographic characteristics like income, unemployment and instability in housing were not associated with food insecurity in this study sample. An unexpected finding was that alcohol use was associated higher levels of food security. The association between food security and alcohol use has rarely been explored; however, our results indicate that this relationship needs further research using measures of alcohol intake, alcohol-related behaviors and alcoholism.

The progression and management of HIV infection is mediated by several factors including diet and nutritional status. Nutrients are especially important because of the roles they play in immunity, cell differentiation, and enzymatic processes.¹⁰ Due to the collaborative interaction between nutrient status, infection and immunity, marginal or low nutrient intake becomes a cause for concern in HIV infection.^{10,55} Several studies have reported differently on the caloric and macronutrient intake of persons infected with HIV.⁵⁶⁻⁵⁹ Our data shows that calorie and macronutrient intake in this population is lower than what is recommended for healthy adults. Due to the demands of the disease, individuals infected with HIV have increased caloric and macronutrients needs.⁶⁰ Vitamins A, E and B12 have all been associated with HIV disease progression. Low serum levels of these vitamins have been linked to neurological abnormalities, increased oxidative stress and increased risk of mortality.^{61,62} Our HIV infected cohort had

inadequate intake of B₁₂ (46% of participants), and Vitamins A and E (>80% of participants). These percentages with inadequate nutrient intakes were higher than those reported for another HIV cohort, where 21%-64% of the women had below DRI intakes for several vitamins including vitamins A and E.⁵⁹ Other studies conducted in resource adequate setting have also reported lower intakes for vitamins A and E; however, in these studies the researchers compared mean/median intakes to DRI's (specifically, RDA: Recommended Daily Allowance) without specifying proportions consuming below the DRIs.^{56,57,63} Other studies have investigated the potential role of vitamin D in HIV infection due to its identified effect on immunity, and its association with decreased CD4 cell count and increased mortality.⁶⁴ A recent study found vitamin D status to be positively associated with disease progression, anemia and mortality.⁶⁵ Vitamin D deficiency is common among HIV infected adults, and Blacks or Hispanics have been found to be at increased risk for deficiency.⁶⁶ In our study, 100% of participants had below DRI intake for vitamin D, which is a concern, as more than half of the standard ART combinations used in Miami include tenofovir, which have been known to contribute to altered Vitamin D metabolism.⁶⁷ In addition, 75% of our participants are African Americans and 15% Hispanics; two ethnic groups at heightened risk for vitamin D deficiency. Vitamin D status needs to be a priority for Nutrition Practitioners in South Florida. Further investigation to assess serum vitamin D levels is warranted for this population, as deficiency may be a mediator of disease progression and other comorbidities.

Two key micronutrients identified to influence HIV progression are selenium and zinc. As part of selenoproteins, selenium plays a role in immunity especially as an antioxidant.⁶⁸ Its deficiency, which may be due to malabsorption and depletion, is common in HIV infection, especially among persons not using ART.^{69,70} Poor selenium status is associated with increased disease progression and risk of mortality.^{55,61,71} Selenium supplementation, however, is not routinely recommended during HIV infection due to lack of sufficient evidence in support of the benefits of supplementation.⁷² The absolute selenium intake range for our population was between 72 μ g -81 μ g which seems to be higher than the recommended DRI of 45 μ g for health adults. With energy adjustments, however, this range decreased to 36 μ g - 42 μ g, with more than a third of our participants also consuming below DRI requirements. Selenium deficiency has been suggested to be prevalent only among HIV infected individuals with poor dietary intakes as not all HIV cohorts have reported deficiencies.⁵⁵ Several studies have reported low intake and serum concentration of zinc among HIV infected persons, which seem to increase with increasing disease progression.^{56,69,73} We found nearly 62% of our study population to have inadequate zinc intake. With zinc deficiency still common among persons living with HIV, emphasis to increase zinc intake may play an important role for disease management. Baum et al.⁷⁴ recently showed that adequacy of zinc intake achieved through supplementation leads to a fourfold decrease in the chances of developing immunological failures.

Recent HIV studies reported a trend of increasing weight among several cohorts⁷⁵⁻
⁷⁷ and this was shown in our study as well. About 32% of our population was overweight

and 30% obese, with only 1.9% being underweight. This trend reflects the nations' obesity epidemic. Interestingly in this cohort, although calorie and macronutrient intakes were low, overweight and obesity were still prevalent. The cause of overweight and obesity observed among HIV infected persons are multifaceted as in the general population; however, diet and specific ART agents are mediators of weight gain.⁷⁸ Other important biochemical indices for measuring nutritional status during HIV infection are hemoglobin, hematocrit and albumin levels, with the latter predicting survival.^{58,79,80} The averages for these indicators in our study population are within normal limit set for healthy individuals. A similar finding was reported for albumin in another HIV infected cohort.^{58,79} Overall, we did not find any significant association between SNAP participation and nutritional status. However, we think our results may have been mediated by significant alcohol and drug use among SNAP participants. Findings of inadequate nutrient intake and poor diet quality have been reported among HIV drug users compared to non-users. To the best of our knowledge, this is the first study examining the nutrition and food security benefits derived from the participation in SNAP of persons living with HIV. Several other studies have explored the use of food assistance programs to improve the nutritional status of HIV infected adults.^{8,20,24,37,81} This research differs from the others in two ways: 1) participants received financial assistance to spend on food and not food ration/supplemental formulas and 2) participants and not the researchers controlled the type of food consumed. Findings from this study could serve as basis for other studies exploring the use of public food assistance programs to help improve the food security and nutritional status of HIV infected persons. Such

studies will help us better understand where to invest resources to improve the lives of persons living with HIV.

The limitations of this study include its cross-sectional nature, relying on self-reported data which may weaken links between SNAP participation and better food security and nutritional outcomes. Our study did not take into account the differences in amounts received as SNAP benefits, neither did it have information on the food security nutritional status of SNAP participants prior to participation in the program. The external validity of the study is also decreased because we used a convenience sample of HIV infected persons from Miami. The generalization of study results to other HIV infected populations needs to be executed with caution. Finally adequacy of nutrient intakes was based only on one 24-hr recall, which may not represent usual intake.

In light of these limitations, however, this study confirms that food insecurity and inadequate nutrient intake continues to exist among persons infected with HIV. This has implications for treatment, management, and cost of disease, as such resources and efforts are needed to address food insecurity among HIV infected.

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Table 1: Demographic characteristics by SNAP participation status among HIV infected adults

Variable	Total (N=159)	SNAP (n=113)	Non-SNAP (n=46)
Age ^{a*}	46.81 ± 8.03	46.81 ± 7.52	46.80 ± 8.76
Gender			
Male	107 (67.3)	77 (68.1)	30 (65.1)
Female	52 (32.7)	36 (31.9)	16 (34.8)
Ethnicity			
African American	119 (74.8)	88 (77.9)	31 (67.4)
Hispanic	24 (15.1)	17 (15.0)	7 (15.2)
White	8 (5.0)	4 (3.5)	4 (8.7)
Other	8 (5.0)	4 (3.5)	4 (8.7)
Country of Birth ^{**}			
US born	133 (83.6)	103 (91.2)	30 (65.2)
Non-US born	26 (16.4)	10 (8.8)	16 (34.8)
Marital Status			
Married	14 (8.8)	11 (9.7)	3 (6.5)
Single	145 (91.2)	102 (90.3)	43 (93.5)
Child Status			
Children at home	21 (13.2)	13 (11.5)	8 (17.4)
Children not at home	61 (38.4)	47 (41.6)	14 (30.4)
No Children	77 (48.4)	53 (46.9)	24 (48.8)
Education			
< High School	76 (47.8)	50 (44.2)	26 (56.5)
≥ High School	83 (52.2)	63 (55.8)	20 (43.5)
Employment Status [*]			
Unemployed	71 (44.7)	45 (39.8)	26 (56.5)
Employed	22 (13.8)	13 (11.5)	9 (19.6)
On disability	66 (41.5)	55 (48.7)	11 (23.9)
Income/ month			
< \$1000	129 (81.1)	95 (84.1)	34 (73.9)
≥ \$1000	30 (18.9)	18 (15.9)	12 (26.1)
Living condition			
Alone	62 (39.0)	44 (38.9)	18 (39.1)
With family	70 (44.0)	52 (46.0)	18 (39.1)
Shelter	27 (17.0)	17 (15.0)	11 (21.7)
Uses of other food assistance			
Yes	23 (14.9)	16 (14.2)	7 (15.2)
No	136 (85.5)	97 (85.8)	39 (84.8)

^{a*}Reported as mean ± SD; All other variables are reported as n (%)

P* < .05, *P* < .01

Table 2: Lifestyle related characteristics by SNAP participation status among HIV infected adults

Variable	Total (N=159)	SNAP (n=113)	Non-SNAP (n=46)	P-value
Smokes Cigarettes				.133
Yes	104 (65.4)	78 (69.0)	26 (56.5)	
No	55 (34.6)	35 (31.0)	20 (43.5)	
Alcohol use				.057
Yes	81 (50.9)	63 (55.8)	18 (39.1)	
No	78 (49.1)	50 (44.2)	28 (60.9)	
Drug use*				.002
Yes	49 (30.8)	43 (38.1)	6 (13.0)	
No	110 (69.2)	70 (61.9)	40 (87.0)	
On ART*				.001
Yes	136 (85.5)	106 (93.8)	30 (65.2)	
No	23 (14.5)	7 (6.2)	16 (34.8)	
Vitamins intake				.952
Yes	81 (46.3)	51 (45.1)	21 (45.1)	
No	94 (53.7)	62 (54.9)	25 (54.3)	

* $P < .05$, ART: Antiretroviral therapy

All variables reported as n (%)

Table 3: Food security status by SNAP participation status among HIV infected adults*

Food Security Status	Total (N =159)	SNAP (n = 113)	Non-SNAP (n = 46)
Food Security	70 (44.0)	52 (46.0)	18 (39.1)
Low food security	51 (32.1)	35 (31.0)	16 (34.8)
Very low food security	38 (23.9)	26 (23.0)	12 (26.1)

Variables are reported as: n (%)

* P -value between groups not significant.

Table 4: Logistic regression of food security on SNAP participation status among HIV infected adults

Food Security Status	SNAP Participation			
	Unadjusted		Adjusted	
	OR	95 % CI	OR	95 % CI
Food Secure	----	----	----	----
Low food security	0.76	0.34-1.68	0.69	0.24-1.98
Very low food security	0.75	0.32-1.79	0.45	0.14-1.46

Model controlled for age, gender, ethnicity, country of birth, child status, work status, household size, ART use, smoking status, alcohol use, drug use, vitamin use, and use of other food assistance programs

Table 5: Logistic regression of food security on demographic and health characteristics among HIV infected adults

Variable	Low Food Security ^a			Very Low Food Security ^a		
	OR	95 % CI	<i>P</i> -value	OR	95 % CI	<i>P</i> -value
Drug use	3.56*	1.10-11.48	.033	4.73**	1.29-17.38	.019
Alcohol use	0.18**	0.06- 0.51	.001	0.21**	0.06- 0.67	.009
Children at home ^b	0.32	0.07- 1.47	.142	0.12*	0.02- 0.85	.034
Have no children ^b	0.40	0.16- 1.03	.057	0.57	0.21- 1.58	.278
Use other food assistance	4.18*	1.21-14.37	.023	3.62	0.92-14.25	.066

P* < .05, *P* < .01

Other variables in the model included: age, gender, ethnicity, country of birth, work status, household size, smoking status, vitamin use and SNAP use.

^aReference: Food Security

^bReference: Children not at home

Table 6: Mean nutrient intake by SNAP participation status among HIV infected adults

Nutrient	SNAP Status	Unadjusted Intake		Energy-adjusted Intake	
		Mean \pm SD	<i>P</i> -value	Mean \pm SD	<i>P</i> -value
Calories <i>kcal</i>	Yes	1977.92 \pm 787.87	.829	—	—
	No	1977.45 \pm 838.91			
Protein <i>g</i>	Yes	84.40 \pm 39.91	.302	44.14 \pm 16.34	.203
	No	78.61 \pm 37.48		41.32 \pm 15.19	
Carbohydrates <i>g</i>	Yes	247.68 \pm 115.48	.568	126.13 \pm 34.04	.253
	No	261.77 \pm 123.00		132.25 \pm 28.75	
Fats <i>g</i>	Yes	70.29 \pm 35.72	.172	34.67 \pm 11.14	.149
	No	63.50 \pm 35.86		31.89 \pm 10.29	
Vitamin A μ g	Yes	347.29 \pm 437.98	.371	165.65 \pm 183.98	.286
	No	274.02 \pm 311.91		131.90 \pm 144.15	
Thiamin <i>mg</i>	Yes	1.32 \pm 1.32	.958	0.66 \pm 0.57	.909
	No	1.12 \pm 0.74		0.57 \pm 0.33	
Riboflavin <i>mg</i>	Yes	1.40 \pm 0.12	.566	0.72 \pm 0.61	.231
	No	1.17 \pm 0.77		0.59 \pm 0.35	
Niacin <i>mg</i>	Yes	17.32 \pm 12.59	.789	8.93 \pm 6.35	.823
	No	16.43 \pm 12.09		8.23 \pm 5.02	
Pantothenic acid <i>mg</i>	Yes	3.39 \pm 2.51	.647	1.80 \pm 1.64	.657
	No	3.35 \pm 2.05		1.78 \pm 1.00	
Vitamin B6 <i>mg</i>	Yes	1.43 \pm 1.37	.349	0.72 \pm 0.81	.344
	No	1.24 \pm 1.08		0.60 \pm 0.44	
Vitamin B12 μ g	Yes	3.72 \pm 5.12	.391	1.74 \pm 1.96	.439
	No	2.69 \pm 2.87		1.47 \pm 1.56	
Vitamin C <i>mg</i>	Yes	68.70 \pm 88.44	.261	35.98 \pm 47.43	.216
	No	47.67 \pm 52.85		26.33 \pm 35.20	
Calcium <i>mg</i>	Yes	632.58 \pm 429.01	.470	339.71 \pm 237.25	.161
	No	582.57 \pm 401.94		289.31 \pm 184.00	
Choline <i>mg</i>	Yes	198.68 \pm 180.36	.955	98.61 \pm 80.55	.952
	No	188.99 \pm 154.34		94.30 \pm 69.25	
Vitamin D μ g	Yes	1.00 \pm 1.37	.164	0.51 \pm 0.75	.148
	No	1.19 \pm 1.33		0.59 \pm 0.65	
Vitamin E <i>mg</i>	Yes	2.50 \pm 3.46	.404	1.19 \pm 1.54	.203
	No	1.78 \pm 1.63		0.87 \pm 0.75	
Folate μ g	Yes	328.91 \pm 315.17	.911	164.29 \pm 153.41	.955
	No	315.31 \pm 294.47		161.05 \pm 143.00	
Magnesium <i>mg</i>	Yes	156.40 \pm 112.54	.783	80.32 \pm 46.44	.992
	No	150.32 \pm 90.46		78.79 \pm 43.92	
Phosphorus <i>mg</i>	Yes	836.84 \pm 524.84	.644	415.56 \pm 186.66	.599
	No	755.04 \pm 409.41		395.53 \pm 187.99	
Potassium <i>mg</i>	Yes	1507.20 \pm 1033.53	.522	787.01 \pm 483.95	.332
	No	1301.87 \pm 811.50		670.51 \pm 369.31	
Sodium <i>mg</i>	Yes	3334.06 \pm 1510.84	.492	1760.08 \pm 728.07	.356
	No	3228.60 \pm 1741.62		1301.87 \pm 603.01	
Copper <i>mg</i>	Yes	0.69 \pm 0.54	.714	0.36 \pm 0.23	.918
	No	0.67 \pm 0.44		0.36 \pm 0.26	
Iron <i>mg</i>	Yes	16.38 \pm 11.93	.352	8.19 \pm 5.11	.234
	No	13.84 \pm 8.26		6.96 \pm 3.20	
Selenium μ g	Yes	72.71 \pm 56.65	.229	36.53 \pm 23.75	.141
	No	81.00 \pm 55.87		43.45 \pm 26.60	
Zinc <i>mg</i>	Yes	8.98 \pm 8.19	.358	4.37 \pm 2.99	.302
	No	1.24 \pm 4.59		3.96 \pm 2.92	

Table 7: Percentages with nutrient intakes below Estimated Average Requirements (EAR) by SNAP participation status among HIV infected adults

Nutrient	Total (N=159)	SNAP (n=113)	Non-SNAP (n=46)	<i>P</i> -values
Vitamin A μ g	130 (81.8)	92 (81.4)	38 (82.6)	.860
Thiamin <i>mg</i>	77 (48.4)	56 (49.6)	21 (45.7)	.655
Riboflavin <i>mg</i>	74 (46.5)	53 (46.9)	21 (45.7)	.866
Niacin <i>mg</i>	60 (37.7)	43 (38.1)	17 (37.0)	.897
Pantothenic acid <i>mg</i> [†]	129 (81.1)	91 (80.5)	38 (82.6)	.771
Vitamin B6 <i>mg</i>	87 (54.7)	60 (53.1)	27 (58.7)	.520
Vitamin B12 μ g	73 (45.9)	50 (44.2)	23 (50.0)	.509
Vitamin C <i>mg</i>	108 (67.9)	75 (66.4)	33 (71.7)	.511
Calcium <i>mg</i>	115 (72.3)	82 (72.6)	33 (71.7)	.916
Choline <i>mg</i> *	149 (93.7)	105 (92.9)	44 (95.7)	.520
Vitamin D μ g	159 (100.0)	113 (100.0)	46 (100.0)	1.00
Vitamin E <i>mg</i>	57 (98.7)	111 (98.2)	46 (100.0)	.364
Folate μ g	98 (61.6)	70 (61.9)	28 (60.9)	.899
Magnesium <i>mg</i>	146 (91.8)	102 (90.3)	44 (95.7)	.261
Phosphorus <i>mg</i>	56 (35.2)	41 (36.3)	15 (32.6)	.660
Potassium <i>mg</i> *	157 (98.7)	111 (98.2)	46 (100.0)	.364
Sodium <i>mg</i> *	16 (10.1)	10 (8.8)	6 (13.0)	.425
Copper <i>mg</i>	92 (57.9)	68 (60.2)	24 (52.2)	.354
Iron <i>mg</i>	20 (15.7)	18 (15.9)	7 (15.2)	.911
Selenium μ g	54 (34.0)	43 (38.1)	11 (23.9)	.088
Zinc <i>mg</i>	98 (61.6)	67 (59.3)	31 (67.4)	.341

[†]AI was used; EAR for nutrient not yet determined

Table 8: Logistic regressions of adequacy of nutrient intakes on SNAP participation status among HIV infected adults

Nutrient	SNAP Participation			
	Unadjusted Results		Adjusted Results	
	OR	95 % CI	OR	95 % CI
Vitamin A μg	1.08	0.44-2.66	1.69	0.43-6.63
Thiamin mg	0.86	0.43-1.70	0.84	0.34-2.07
Riboflavin mg	0.95	0.48-1.89	0.79	0.44-3.28
Niacin mg	0.95	0.47-1.94	0.80	0.32-1.97
Pantothenic acid mg	1.15	0.47-2.81	1.58	0.47-5.38
Vitamin B6	1.26	0.63-2.51	0.79	0.31-2.04
Vitamin B12 μg	1.26	0.63-2.51	0.93	0.38-2.27
Vitamin C mg	1.29	0.61-2.73	1.49	0.56-4.01
Calcium mg	0.96	0.45-2.06	0.81	0.32-2.07
Folate μg	0.96	0.47-1.93	1.03	0.41-2.57
Phosphorus mg	0.85	0.41-1.76	0.52	0.19-1.46
Copper mg	0.72	0.36-1.44	0.62	0.24-1.60
Iron mg	0.95	0.37-2.45	0.32	0.08-1.35
Selenium μg	0.51	0.24-1.11	0.38	0.20-1.82
Zinc mg	1.42	0.69-2.92	1.26	0.67-5.55

Models controlled for age, gender, ethnicity, country of birth, child status, work status, household size, ART use, smoking status, alcohol use, drug use, vitamin use and use of other food assistance programs

Table 9: Mean values for body composition and biochemical indicators by SNAP participation status among HIV infected adults

Variable	SNAP Status	Mean \pm SD	P-value
Height <i>in</i>	Yes	68.39 \pm 3.67	.033
	No	67.03 \pm 3.43	
Weight <i>lbs</i>	Yes	183.64 \pm 39.67	.441
	No	178.44 \pm 35.65	
Waist/Hip ratio	Yes	0.90 \pm 0.08	.844
	No	0.90 \pm 0.07	
BMI <i>lbs/in²</i>	Yes	27.54 \pm 5.65	.172
	No	28.07 \pm 5.98	
LBM <i>lbs</i>	Yes	134.05 \pm 24.71	.255
	No	129.31 \pm 21.28	
Fat mass <i>lbs</i>	Yes	49.60 \pm 27.32	.965
	No	49.39 \pm 28.68	
Hemoglobin <i>g/dl</i>	Yes	13.18 \pm 1.84	.968
	No	13.18 \pm 1.64	
Hematocrit %	Yes	39.28 \pm 5.59	.631
	No	39.73 \pm 4.88	
Albumin <i>g/dl</i>	Yes	4.11 \pm 0.38	.231
	No	4.03 \pm 0.41	

BMI: Body Mass Index, LBM: Lean body mass

Table 10: Multiple linear regressions of body composition and biochemical indicators on SNAP participation status among HIV infected adults

Variable	R ² Change ^b	B	SE(B)	β	P-value
Waist/Hip Ratio	0.000	-0.002	0.016	-0.010	.918
BMI <i>lbs/in²</i>	0.001	-0.590	1.081	-0.047	.586
LBM <i>lbs</i>	0.002	2.728	4.431	0.052	.539
Fat mass <i>lbs</i>	0.000	-0.067	4.877	-0.001	.989
Hemoglobin <i>g/dl</i>	0.000	-0.160	0.329	-0.041	.627
Hematocrit %	0.006	-1.141	1.027	-0.097	.268
Albumin <i>g/dl</i>	0.014	1.122	0.084	0.141	.148

BMI: Body Mass Index, LBM: Lean body mass

Full model R² (Waist-to-Hip ratio) = 0.158, R² (BMI) = 0.296, R² (LBM) = 0.312, R² (Fat mass) = 0.379, R² (Hemoglobin) = 0.323, R² (Hematocrit) = 0.267, R² (Albumin) = 0.094,

^bR² Change after controlling for: age, gender, ethnicity, country of birth, child status, work status, household size, ART use, smoking status, alcohol use, drug use, vitamin use and use of other food assistance programs

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CHAPTER V: ASSOCIATION OF SUPPLEMENTAL NUTRITION ASSISTANCE PROGRAM (SNAP) WITH HEALTH RELATED QUALITY OF LIFE AND DISEASE STATE OF HIV INFECTED PATIENTS

Abstract

As with other chronic diseases, HIV infection can cause devastation to health and quality of life.¹ The literature on the potential clinical and non-clinical benefits of participation in food assistance programs for individuals infected with HIV is scanty.²⁻⁵ We conducted a cross-sectional study of 165 HIV infected adults to determine the impact of the Supplemental Nutrition Assistance Program (SNAP) on HIV disease status and health related quality of life (HRQOL). SNAP is the assistance program most widely used by the majority of low income HIV infected persons in the United States⁶ to supplement their diet. There was no significant association between participation in SNAP and disease status; CD4 cell count ($\beta = 0.02, P = .837$) and viral load ($\beta = 0.02, P = .836$). The mean scores for all the HRQOL domains, categorized further into physical and mental components, were lower compared to the US population, but none were associated with SNAP participation status. Higher scores on the general health (GH) domain, were marginally associated with SNAP participation ($\beta = 0.16, P = .071$). CD4 cell count was not associated with any of the quality of life components. Viral load, however, was inversely associated with the mental component score of the HRQOL ($\beta = -0.30, P = .003$). Having increased pathological symptoms was associated with having low physical and mental components scores for HRQOL ($\beta = -0.20, P = .013$ and $\beta = -0.38, P < .001$) respectively. Higher scores on the HRQOL were associated with being younger, not being born in the US, not using other food assistance programs, not having symptoms, not using ART, and having lower viral loads. Drug and alcohol use were not

associated HRQOL. Alcohol use was associated with decreased CD4 cell count ($\beta = -0.16$, $P = .05$), while drug use was strongly associated with increased viral load ($\beta = 0.20$, $P = .008$). In our study of HIV infected adults, SNAP participation status was not associated with disease status or health related quality of life.

Keywords: Health related quality of life, HIV disease state, Supplemental Nutrition Assistance Program.

Introduction

There are approximately 34 million people infected with the human immunodeficiency syndrome (HIV) worldwide.⁷ The introduction of antiretroviral treatment (ART) has led to declines in disease associated morbidity and mortality, making HIV infection a chronic disease.⁸ As a result, the focus of healthcare providers have shifted from being focused only on the clinical status, towards a balance between clinical outcomes and patient centered health related quality of life (HRQOL).

HRQOL is a subjective measure of a patients' view of their wellbeing and functionality in relation to their chronic disease. Poor quality of life has long been associated with HIV disease progression, therefore, measuring HRQOL among persons living with HIV gives practitioners valuable feedback on treatment efficacy and effectiveness as well as disease prognosis.⁹ Improved quality of life has consistently being associated with survival and healthcare utilization in this population.¹⁰⁻¹³

Patient demographic and lifestyle characteristics associated with poor quality of life during HIV infection include being Black or Hispanic, being female, older age, having less education and using recreational drugs.¹⁴⁻¹⁷ Immunologic and virologic status also affects HRQOL with decreased CD4 cell counts always associated with poorer quality of life. Such association, however, has not been consistently reported with higher viral load.^{14,18-21} Other disease related factors of HRQOL are the presence of symptoms, whether HIV related or not.^{17,22,23} Antiretroviral therapy (ART) may improve HRQOL;⁹ however, other investigators have found a negative impact with long term ART use due to treatment side effects and toxicities.²⁴ In addition, several studies have reported that psychological and social support influences HRQOL in this population, sometimes even

mediating the relationship of quality of life with symptomatology and/or treatment side effects.²⁵⁻²⁸

The importance of nutrition in improving health related quality of life for the chronically ill has been documented for other conditions.^{29,30} It is possible that such a relationship exists with HIV disease, but there is currently no evidence from research. It is well known, however, that the presence of adequate nutrition during HIV infection produces better nutritional and clinical outcomes, allowing for better disease management.³¹ This has led to recommendations to incorporate food assistance as part of HIV treatment, as well as in other support programs, especially in the developing world.^{32,33} These recommendations, however, are not based on evidence-based research that has been conducted with groups similar to the target beneficiaries.³⁴ Therefore, documentation on quantitative benefits derived from providing targeted food assistance is scarce.³⁵ A recent study showed that such a program improved treatment adherence but not clinical outcomes.³ Another study reported vast improvements in body composition and food security among food assistance recipients compared to non-recipients, but no relationship with quality of life.⁴ In the United States, the largest food assistance program is the Supplemental Nutrition Assistance Program (SNAP)⁶ and we recently reported that the participation rate in this program among our cohort is fairly high, similar to nationwide participation levels (unpublished). While there are no food assistance programs targeted specifically at HIV infected individuals, these types of programs may be beneficial in ameliorating clinical disease burden and improving quality of life. To our knowledge, no study has investigated such a relation with SNAP which is not specific for the HIV infected population. The aim of this study, therefore, was to determine the

impact of participation in SNAP on HIV disease status and health related quality of life in HIV infected individuals.

Methods

Study Design and Setting

This was a cross-sectional study approved by the institutional Review Board of the Florida International University. The research was conducted among HIV infected adults eligible to participate or participating in SNAP. The study was conducted between April 2011 and August 2012 and participants were a consecutive convenience sample recruited mainly from the Florida International University HIV Research clinic located in the Borinquen Health Care Center (BHCC), as well as other centers providing care to HIV patients. BHCC provides various HIV-related services to persons with low socioeconomic status living with HIV/AIDS in Miami-Dade County. Eligibility for SNAP was determined using ACCESS Florida's Pre-screening eligibility tool. This is a basic prescreening tool by the State to determine SNAP eligibility using information such as income, assets, household size, and expenditure. Other inclusion criteria were being 18 years or older and documentation of HIV seropositive status. Individuals, who signed informed consent after being informed of study protocol, were included in the study. At the study visit, participants completed a self-administered questionnaire that gathered information on sociodemographic characteristics as well as information on health related quality of life. Presence of symptoms, immunologic (CD4 cell count) and virologic (viral load) variables were also assessed. Patients were required to present documentation of their most recent virology and immunology results from their last medical visit. Each

participant was given \$10 as appreciation for completing the study requirements and as reimbursement for expenses derived from participation.

Survey Instruments and Variables Assessed

Demographic and Socioeconomic Information: Information collected to determine socio-demographic and economic status were age, gender, ethnicity, marital status, education, employment status, monthly income, country of birth, antiretroviral medication use, use of community food resources and substance abuse (smoking, drug use, alcohol use).

Health Related Quality of Life: The SF-36v2³⁶ health survey was used to assess health related quality of life. It consists of 36 items aggregated into eight health domains scales, and further into two component summary measures, namely the Physical and Mental summary scores (PCS and MCS) respectively. The physical health measure is made up of (1) Physical Functioning (PF), which measures limitations for performing physical activity, (2) Role-Physical (RP), which measures limitations in the kind of work/activities and capacity to work or engage in usual activities, (3) Bodily Pain (BP), which measures intensity of bodily pain and the magnitude to which it affects normal work activities, and (4) General Health (GH), which covers perceptions and expectation of the respondent's health.

The mental health measures are comprised of (1) Vitality (VT), which measures energy and fatigue levels, (2) Social Functioning (SF), which assesses health related burden on the number and quality of social activities, (3) Role Emotional (RE), which is a measure of the impact of mental health on time spent on work/activities, the amount of work/activity achieved and the care devoted to activities performed, and lastly (4) Mental

Health (MH) which addresses four mental health dimensions: anxiety, depression, loss of behavioral/emotional control and psychological wellbeing.³⁶

The reliability scores for all the domains are reported to be high, ranging from 0.84-0.95.³⁶ Scoring for the scales was performed using the Quality Metric Health Outcome Software and two scores were computed, one based on a standard scoring scale between 0 and 10, a second based on norm-based T-scores. The norm-based scores were used in calculating the component summary scores.³⁷ The norm-based scoring, allows for comparison both between and within the domains and summary scores. It also allows for a direct comparison with the general US population scores where the normed mean is 50 and the standard deviation is 10. A low score on any of the domains is indicative of a poor state.³⁷ The scores using the scoring software were exported to SPSS for analysis.

Disease Status: Viral load and CD4 cell counts were assessed as part of clinical outcomes. These were obtained from participant's medical reports. The participants either provided the documentations themselves or signed a medical release form to obtain information directly from their provider.

Symptoms: A symptomatology questionnaire developed for use in a similar HIV population was used to evaluate incidence of symptoms.³⁸ Study participants were asked about any symptoms that were experienced (pertaining to general malaise and also those related to HIV) within the past month. These included diarrhea, constipation, nausea, fever, fatigue, and unexplained changes in weight. Number of symptoms ranged from 0 to 9.

Statistical Analysis

A descriptive analysis of participants' sociodemographic, lifestyle and clinical profile was completed and the results were expressed as mean \pm standard deviation or percentages. The square root of CD4 cell count and the log of viral load were calculated and used in the analysis, since their distributions were not normal. Viral load was also categorized based on levels indicative of degree of virologic control while CD4 cell count was categorized based on guidelines for initiating treatment.³⁹ To test differences in variables between SNAP participants and non-participants, Student's t-test was used for continuous variables and chi-square test for categorical variables. The means of the various quality of life health domain scales and component summaries were calculated and compared with the US general population using a one sample t-test.

Univariate analysis using Pearson's correlation was performed to test the relationship of demographic characteristics with immunological and virologic variables as well as quality of life domains. Pearson's correlation analysis was also performed to assess association of SNAP participation with disease status and health related quality of life. Multiple linear regression models were used to further assess the associations. Regression models were constructed with log viral load, square root CD4 cell count, MCS, PCS and all the other HRQOL scales as dependent variables. Independent variables used in the analysis were identified from the literature. These were age, gender, ethnicity, education, employment status, income, marital, child status, household number, ART use, smoking status, alcohol and drug use. All statistical analyses were performed using SPSS version 21. Statistical significance for all analyses was $P < .05$.

Results

A total of 165 participants were included in the study of which 109 (66%) were male. The mean age of the sample was 46.99 ± 7.87 years. As shown in Table 1, most study participants were African American (74.5%) and were born in the US (83.6%), with the latter being significantly different between the SNAP participation and non-participation groups (91.5% vs. 64.6%, $P < .001$). Significantly more non-SNAP participants were employed and fewer reported disability compared to SNAP participants. Also a significantly higher percentage of SNAP participants reported having less than \$1000 monthly income (84.6% vs. 70.8%, $P < .042$). Table 2 compares the two groups on health and lifestyle characteristics. A significantly greater percentage of SNAP participants used recreational drugs (36.8%) than the non-participants (12.5%), $P = .002$. On the other hand, a significantly higher percentage of the SNAP participants received ART treatment compared to non-participants (94% vs. 70.8%, $P < 0.001$). The means of the standard and norm-based scores for the study sample for the HRQOL domains and component summaries are reported in Table 3. Both PCS and MCS scores were significantly lower than the US general norms.

Relationship between SNAP Participation and HRQOL

Table 4 compares the domain and summary scores between groups and also with the general population. SNAP participants ($M = 45.63$) had somewhat more bodily pain than the non-participants ($M = 49.69$), $P = .065$, (highest score indicates “no pain or limitations due to pain”). SNAP participants scored significantly lower on all HRQOL domains than the general population, with the exception of vitality. The non-SNAP participants scored significantly lower on four of the HRQOL domains. Multiple

regression models were constructed to further assess the relationship of all of the HRQOL domain scales on SNAP participation status. All the models, which included SNAP participation and all the independent variables, were significant. The models for PCS and MCS explained 23.4% and 38% of their respective variance. After controlling for the independent variables, neither PCS nor MCS were significantly associated with SNAP participation status. SNAP participation status was not significant for any of the HRQOL domain scales, although it approached significance in the regression model for general health. In this model, SNAP participation status explained 1.6% additional variability, $\beta = 0.16$, $P = .071$. Higher general health scores were associated with SNAP participation.

Several demographic characteristics were significantly associated with many of the HRQOL domains, however only those related to PCS and MCS are reported. In the regression model, higher PCS scores were associated with having fewer symptoms ($\beta = 0.20$, $P = .013$), being younger ($\beta = 0.21$, $P = .014$), not using other food assistance programs ($\beta = 0.19$, $P = .017$), and not being born in the US ($\beta = 0.22$, $P = .035$). Higher MCS scores were associated with having fewer symptoms ($\beta = 0.38$, $P < .001$), having a lower viral load ($\beta = 0.30$, $P = .003$), having more than a high school education ($\beta = 0.20$, $P = .009$), not using ART ($\beta = 0.18$, $P = .030$), and not being born in the US ($\beta = 0.18$, $P = .050$).

Relationship between SNAP Participation and Disease Status

In the univariate analysis, participation in SNAP was not associated with the disease parameters, although a higher observed percentage of SNAP participants had controlled viral load compared to non-participants; 49.6% vs. 37.5% (Table 5). Further

analysis of these relationships did not show significance, even though the regression models were significant at $P < .001$ (Tables 8a and 8b). Participation in SNAP, in addition to all the control variables, explained 41% and 52.5% of the variability in CD4 cell count and viral load respectively. In these models, several demographic characteristics were associated with these parameters. Higher CD4 cell counts were associated with having a lower viral load ($\beta = -0.63, P < .001$), not using ART ($\beta = -0.24, P = .003$), having monthly income higher than \$1000 ($\beta = -0.18, P = .019$), and not drinking alcohol ($\beta = -0.16, P = .05$). Lower viral loads were associated with using ART ($\beta = -0.26, P < .001$), higher CD4 cell count ($\beta = -0.51, P < .001$), larger household size ($\beta = -0.22, P = .003$), not using drugs ($\beta = 0.21, P = .008$), using vitamins ($\beta = -0.18, P = .006$), and more symptoms ($\beta = -0.12, P = .043$).

Discussion

Most of the findings from the analyses of demographic data were expected. Individuals who were US citizens, disabled, unemployed, and had lower income were more likely to participate in SNAP.⁴⁰ The larger number of males and African Americans represented in this study population is a reflection of the epidemic's distribution pattern with respect to gender and ethnicity in Miami-Dade County. The epidemic also disproportionately affects African-Americans compared to other ethnicities.⁴¹ The differences observed between SNAP participants and non-participants with respect to drug and alcohol use, with those participating in SNAP using more alcohol, may be related to having more income to spend on non-nutritive items, since the income for food was supplemented by SNAP. Those participating in SNAP were more likely to receive

ART, which may be related to the fact that they were more connected into service systems.

The low norm-based score (less than 47) reported for both the physical and mental domain of the HRQOL among this sampled population, compared to the US general population, was expected and this is an indication of the functional impairment from having a chronic disease.⁴³ Compared to individuals with other types of chronic diseases, however, the mean physical and mental health components summaries of this cohort of HIV infected individuals were higher, although they were low compared to general population scores.⁴³ Similar to other chronic diseases, HIV infection has been shown to affect HRQOL.^{14,18,19}

SNAP Participation, HRQOL and Disease Status

The main goal of our study was to examine whether participation in SNAP could ameliorate the detrimental effect that HIV disease has on clinical outcomes and quality of life, with the aim of determining if there was any relationship between participating in SNAP and improved disease status and quality of life. The relationships between HRQOL domains and participation in SNAP in the present study were not significant. Nor were the relationships between parameters of disease status and SNAP participation significant. These results are consistent with those from previous studies that evaluated the relationship of nutritional status and food assistance with disease parameters among individuals infected with HIV. After a 12 week nutrition intervention which provided macro and micronutrients, Barneis et al.² found no significant improvement in CD4 cell counts and health related quality of life. Similarly, Keithly et al.⁵ reported finding no differential effect on immune parameters after providing oral food assistance to HIV

infected persons for 1 year. In a recent study conducted in Zambia, food supplementation was not found to significantly improve clinical outcomes.³ Most of these studies were conducted in conditions where ART was not readily available. Another study that provided food assistance to HIV infected Haitians found only marginal improvements in HRQOL, with none of the results being significant.⁴ This lack of relationship might be due to the severity of the impact of the disease on quality of life, or to the inadequacy of the food assistance to improve nutritional status by itself or both. However, provision of food assistance may indirectly affect disease status and quality of life through its association with improved food security, dietary/nutrient intake and adherence to medication, all of which have been shown to positively influence disease status and HRQOL.^{3,4,35} Some other factors may mediate the relationships between attaining adequate diet/nutrition and improved disease states as well as attainment of a sense of wellbeing. It is possible that several negative psychosocial factors weaken this relationship, even negating improvements achieved by attaining optimum nutrition. Therefore, studies are warranted to investigate the possible synergy between nutrition and psychosocial factors as pertaining to clinical and non-clinical outcomes of HIV disease.

Immunologic Parameters, Demographic Characteristics and HRQOL

As part of further analysis, we looked at the relationships between immunological parameters and HRQOL. There is inconsistency in the literature concerning these relationships. Most studies found higher CD4 cell counts to be associated with better HRQOL.¹⁷⁻¹⁹ This was not found in our cohort; CD4 cell count was not associated with any of the HRQOL domains or scales. Decreased viral load, on the other hand, was associated with improvements in the mental component of the HRQOL but not with the

physical component. This finding contrasts with that reported by Call et al.,¹⁹ who found viral load to be an independent predictor of the physical component score (PCS), role physical (RP), and bodily pain (BP), all of which describe physical health. Role Physical was the only physical scale we found to be associated with viral load. Though not a surprising finding, the number of symptoms was associated with increased viral load and poor scores on all the HRQOL domain and scales except physical function (PF). This supports what has already been reported by other studies, emphasizing the need to treat these symptoms immediately, in order to decrease their impact on the consequence of the disease.^{18,22,23}

Several studies investigating the demographic and behavior related factors that affect HRQOL have reported older age, being of Hispanic origin, having less education and using recreational drugs as common factors.^{14,15,17} These were all consistent with our findings, and in addition, our study identified being born in the United States, using other food assistance programs, and use of antiretroviral agents as factors associated with HRQOL. Drug and alcohol use were not associated with HRQOL in our study, which is contrary to reports from other studies.^{14-16,42} Drug and alcohol use were, however, associated with decreased CD4 and increased viral load.

A major limitation of our study is its cross-sectional nature and small sample size. Generalizability of our findings is also limited because study participants were recruited from only one US city and may not reflect results from varying HIV infected populations. Nevertheless, this study shed light on the relationships between HIV disease state and HRQOL outcome in SNAP and non-SNAP participants. For people living with HIV in

Miami, SNAP participation may need to be adjusted to improve the management of the disease and the impact of the program on their quality of life.

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Table 1: Sociodemographic characteristics by SNAP participation status

Variables	Total (N=165)	SNAP (n=117)	Non-SNAP (n=48)
		n (%)	
Male	109 (66.1)	77 (65.8)	32 (66.7)
Ethnicity			
African American	123 (74.5)	90 (76.9)	33 (68.8)
Hispanic American	27 (16.4)	19 (16.2)	8 (16.7)
White	7 (4.2)	4 (3.4)	3 (6.2)
Other	8 (4.8)	4 (3.4)	4 (8.3)
US Born***	138 (83.6)	107 (91.5)	31 (64.6)
Single	148 (89.7)	82 (88.9)	44 (91.7)
No children	76 (46.1)	50 (42.7)	26 (54.2)
Less than High School	77 (46.7)	52 (44.4)	25 (52.1)
Employment Status***			
Unemployed	77 (46.7)	49 (41.9)	28 (58.3)
Employed	19 (11.5)	11 (9.4)	8 (16.7)
On disability	69 (41.8)	57 (48.7)	12 (25.0)
Monthly income <1000*	133 (80.6)	99 (84.6)	34 (70.8)
Living condition			
Alone	63 (38.2)	46 (39.3)	17 (35.4)
With Family	75 (45.5)	54 (46.2)	21 (43.8)
Shelter	27 (16.4)	17 (14.5)	10 (20.8)
Uses other food assistance	24 (14.5)	18 (15.4)	6 (12.5)

* $P < .05$, *** $P < .001$

Table 2: Health and behavior related characteristics by SNAP participation status

Variable	Total (N=165)	SNAP (n=117)	Non-SNAP (n=48)	P-value
Has Symptoms	128 (77.6)	90 (76.9)	38 (79.2)	.753
Smokes Cigarettes	103 (62.4)	77 (65.8)	26 (54.2)	.161
Uses Drugs**	49 (29.7)	43 (36.8)	6 (12.5)	.002
Drink Alcohol ⁺	80 (48.5)	62 (53.0)	18 (37.5)	.071
On ART***	144 (87.3)	110 (94.0)	34 (70.8)	<.001
Takes Vitamins	77 (46.7)	54 (46.2)	23 (47.9)	.837

+ $P < .10$, ** $P < .01$, *** $P < .001$

ART: Antiretroviral therapy.

All variables reported as n (%)

Table 3: Standard and T-scores for HIV infected cohort in Miami compared to the general population (N=165)

SF-36 Domains and Summaries	Standard Scores		Norm-based (T) Scores	
	Mean	SD	Mean ^a	SD
Physical Component Summary			46.58***	10.77
Physical Functioning	71.97	28.12	45.23***	11.83
Role-Physical	63.33	30.90	42.49***	12.11
Bodily Pain	63.77	30.40	46.81**	12.85
General Health	65.52	23.83	47.46**	11.36
Mental Component Summary			44.64***	13.18
Vitality	61.67	22.50	51.67+	11.24
Social Functioning	68.33	26.39	43.03***	11.52
Role –Emotional	65.66	32.86	39.86***	15.33
Mental Health	68.21	21.93	46.19***	12.35

SD: Standard Deviation; ^a Comparison with general population mean of 50

+ $P < .10$, ** $P < .01$, *** $P < .001$

Table 4: Mean T scores by SNAP participation status compared to the general population (N=165)

SF-36 Domains and Summaries	SNAP Participants		Non-SNAP Participants	
	Mean ^a	SD	Mean ^a	SD
Physical Component Summary	45.90***	10.76	48.25	10.71
Physical Functioning	44.51***	11.76	46.99	11.96
Role-Physical	41.57***	12.08	44.71**	12.02
Bodily Pain	45.63***	12.70	49.69	12.89
General Health	47.67*	11.30	46.96	11.61
Mental Component Summary	44.20***	13.55	45.72*	12.30
Vitality	51.26	10.71	52.68	12.50
Social Functioning	42.59***	11.46	44.12**	11.71
Role –Emotional	38.77***	15.11	42.52**	15.69
Mental Health	45.89**	12.68	46.90	11.62

* $P < .05$, ** $P < .01$, *** $P < .001$

SD: Standard Deviation, ^a Comparison with general population mean of 50

Table 5: Immunologic and virologic parameters by SNAP participation status

Variable	Total (N=165)	SNAP Participants (n=117)	Non-SNAP Participants (n=48)	P-value
CD4 cell count				.166
<199	32 (19.4)	21 (17.9)	11 (22.9)	
200-499	52 (31.5)	42 (35.9)	10 (20.8)	
>500	81 (49.1)	54 (46.2)	27 (56.2)	
Viral Load				.097
<=75	76 (46.1)	58 (49.6)	18 (37.5)	
76-9999	49 (29.7)	29 (24.8)	20 (41.7)	
>10000	40 (24.2)	30 (25.6)	10 (20.8)	

All variables reported as n (%)

Table 6: Pearson's correlations of disease status parameters and quality of life domains with SNAP participation status (N=165)

Variables	Correlation Coefficient	P-value
Log viral load	-0.053	.500
Sqrt CD4 cell count	-0.022	.782
PCS	-0.100	.203
MCS	-0.053	.502
Physical Function (PF)	-0.095	.223
Role Physical (RP)	-0.118	.131
Bodily Pain (BP)	-0.144	.065
General Health (GH)	0.028	.716
Vitality (VT)	-0.057	.465
Social Functioning (SF)	-0.061	.437
Role Emotional (RE)	-0.111	.154
Mental Health (MH)	-0.037	.636

PCS: Physical Component Summary; MCS: Mental Component Summary

Table 7a: Regression of Physical Component Summary (PCS) on SNAP participation status (N=165)

Variable	B	SE(B)	β	P-value
SNAP participation	0.31	2.16	0.01	0.888
Significant control variables:				
Number of symptoms	-1.11	0.44	-0.20*	.013
Age	-0.28	0.11	-0.21*	.014
Use other food assistance	-5.71	2.36	-0.19*	.017
US born	-6.35	2.98	-0.22*	.035

* $P < .05$

Note: Model $R^2 = .234$, $F(23,141) = 1.87$, $P = .015$. ΔR^2 (SNAP participation) = .000

Other control variables were gender, ethnicity, education, child status, employment status, income, household size, smoking status, alcohol use, drug use, ART use, vitamin use, viral load and CD4 cell counts.

Table 7b: Regression of Mental Component Summary (MCS) on SNAP participation status (N=165)

Variable	B	SE(B)	β	P-value
SNAP participation	1.47	2.38	0.05	.538
Significant control Variables:				
Number of symptoms	-2.62	0.48	-0.38***	<.001
Viral load	-2.69	0.88	-0.30**	.003
Less than high school	-5.37	2.03	-0.20**	.009
ART use	-7.08	3.23	-0.18*	.030
US born	-6.48	3.29	-0.18*	.050

* $P < .05$, ** $P < .01$, *** $P < .001$

Note: Model $R^2 = .380$, $F(23,141) = 3.75$, $P < .001$. ΔR^2 (SNAP participation) = .002

Other control variables were age, gender, ethnicity, child status, employment status, income, household size, smoking status, alcohol use, drug use, vitamin use, use other food assistance, and CD4 cell count.

Table 7c: Regression of Physical Functioning Score (PF) on SNAP participation status (N=165)

Variable	B	SE(B)	β	P-value
SNAP participation	-0.13	2.43	-0.01	.957
Significant control variables:				
Age	-0.40	0.13	-0.26**	.003
US born	-8.54	3.36	-0.27*	.012

* $P < .05$, ** $P < .01$

Note: Model $R^2 = .194$, $F(23,141) = 1.48$, $P = .088$. ΔR^2 (SNAP participation) = .000

Other control variables were gender, ethnicity, child status, education, employment status, income, household size, smoking status, alcohol use, drug use, ART use, vitamin use, use of other food assistance programs, presence of symptoms, viral load and CD4 cell count.

Table 7d: Regression of Role Physical Score (RP) on SNAP participation status (N=165)

Variable	B	SE(B)	β	P-value
SNAP participation	0.58	2.37	0.02	0.807
Significant control variables:				
Number of symptoms	-1.87	0.48	-0.30***	<.001
US born	-9.52	3.27	-0.29**	.004
Viral load	-2.22	0.87	-0.27*	.012
Use other food assistance	-6.16	2.59	-0.18*	.019
Household size	-1.99	0.90	-0.20*	.029

* $P < .05$, ** $P < .01$, *** $P < .001$

Note: Model $R^2 = .272$, $F(23,141) = 2.29$, $P < .001$. ΔR^2 (SNAP participation) = .000

Other control variables were age, gender, ethnicity, child status, education, employment status, income, smoking status, alcohol use, drug use, ART use, vitamin use, and CD4 cell counts.

Table 7e: Regression of Bodily Pain Score (BP) on SNAP participation status (N=165)

Variable	B	SE(B)	β	P-value
SNAP participation	-1.67	2.53	-0.06	.511
Significant control variables:				
Use other food assistance	-8.58	2.77	-0.24**	.002
Number of symptoms	-1.55	0.52	-0.23**	.003
Hispanic	-11.26	4.13	-0.33**	.007

** $P < .01$

Note: Model $R^2 = .260$, $F(23,141) = 2.15$, $P = .003$. ΔR^2 (SNAP participation) = .002

Other control variables were age, gender, country of birth, child status, education, employment status, income, household size, smoking status, alcohol use, drug use, ART use, vitamin use, viral load and CD4 cell count.

Table 7f: Regression of General Health Score (GH) on SNAP participation status (N=165)

Variable	B	SE(B)	β	P-value
SNAP participation	3.89	2.14	0.16	.071
Significant control variables:				
Number of symptoms	-2.11	0.44	-0.36***	<.001
No children	4.48	1.87	0.20*	.018
Hispanic	-8.31	3.49	-0.27*	.019
Use other food assistance	-5.08	2.34	-0.16*	.031
Disability	-5.98	2.89	-0.26*	.040

* $P < .05$, *** $P < .001$

Note: Model $R^2 = .326$, $F(23,141) = 2.96$, $P < .001$. ΔR^2 (SNAP participation) = .016

Other control variables were age, gender, country of birth, education, income, household size, smoking status, alcohol use, drug use, ART use, vitamin use, viral load and CD4 cell count.

Table 7g: Regression of Vitality Score (VT) on SNAP participation status (N=165)

Variable	B	SE(B)	β	P-value
SNAP participation	-0.19	2.18	-0.01	.930
Significant control variables:				
Number of symptoms	-2.14	0.44	-0.37***	<.001

*** $P < .001$

Note: Model $R^2 = .283$, $F(23,141) = 2.42$, $P = .001$. ΔR^2 (SNAP participation) = .000

Other control variables were age, gender, ethnicity, country of birth, child status, education, employment status, income, household size, smoking status, alcohol use, drug use, ART use, vitamin use, use of other food assistance programs, viral load and CD4 cell counts.

Table 7h: Regression of Social Functioning Score (SF) on SNAP participation status (N=165)

Variable	B	SE(B)	β	P-value
SNAP participation	-3.32	2.11	0.13	.117
Significant control variables:				
Number of symptoms	-2.11	0.43	-0.35***	<.001
US born	-9.54	2.92	-0.31**	.001
ART use	-6.16	2.87	-0.18*	.033
Hispanic	-7.40	3.45	-0.24*	.034

* $P < .05$, ** $P < .01$, *** $P < .001$

Note: Model $R^2 = .359$, $F(23,141) = 3.44$, $P < .001$. ΔR^2 (SNAP participation) = .011

Other control variables were age, gender, child status, education, employment status, income, household size, smoking status, alcohol use, drug use, vitamin use, use of other food assistance programs, viral load and CD4 cell count.

Table 7i: Regression of Role Emotional Score (RE) on SNAP participation status (N=165)

Variable	B	SE(B)	β	P-value
SNAP participation	-0.33	2.91	0.01	.911
Significant control Variables:				
Number of symptoms	-2.33	0.59	-0.29***	<.001
US born	-11.22	4.02	-0.27**	.006
Less than high school	-5.14	2.49	-0.17**	.008
Use other food assistance	-8.53	3.18	-0.20*	.016
Viral load	-2.61	1.07	-0.25*	.041

* $P < .05$, ** $P < .01$, *** $P < .001$.

Note: Model $R^2 = .314$, $F(23,141) = 2.80$, $P < .001$. ΔR^2 (SNAP participation) = .000

Other control variables were age, gender, ethnicity, child status, employment status, income, household size, smoking status, alcohol use, drug use, ART use, vitamin use, and CD4 cell count.

Table 7j: Regression of Mental Health Score (MH) on SNAP participation status (N=165)

Variable	B	SE(B)	β	P-value
SNAP participation	0.86	2.23	0.03	.702
Significant control variables:				
Number of symptoms	-2.35	0.46	-0.37***	<.001
Viral load	-2.95	0.82	-0.35***	<.001
Less than high school	-4.22	1.91	-0.17*	.029
Smoking	-4.17	2.00	-0.16*	.039
ART use	-6.11	3.03	-0.17*	.046

* $P < .05$, *** $P < .001$.

Note: Model $R^2 = .377$, $F(23,141) = 3.71$, $P < .001$. ΔR^2 (SNAP participation) = .001
 Other control variables were age, gender, ethnicity, country of birth, child status, employment status, income, household size, alcohol use, drug use, vitamin use, use of other food assistance and CD4 cell count.

Table 8a: Regression of CD4 cell count on SNAP participation status (N=165)

Variable	B	SE(B)	β	P-value
SNAP participation	0.26	1.28	0.02	.837
Significant control variables:				
Viral load	-3.19	0.39	-0.63***	<.001
ART use	-5.16	1.69	-0.24**	.003
Income <1000	-3.35	1.42	-0.18*	.019
Alcohol use	-2.29	1.17	-0.16*	.052

* $P < .05$, ** $P < .01$, *** $P < .001$.

Note: Model $R^2 = .411$, $F(23,141) = 4.5$, $P < .001$. ΔR^2 (SNAP participation) = .000
 Other control variables were age, gender, ethnicity, country of birth, education, child status, employment status, household size, smoking status, drug use, vitamin use, number of symptoms, and using other food assistance programs.

Table 8b: Regression of SNAP Viral Load on SNAP participation status (N=165)

Variable	B	SE(B)	β	P-value
SNAP participation	0.05	0.23	0.02	.836
Significant control variables:				
CD4 cell count	-0.10	0.01	-0.51***	<.001
ART use	-1.14	0.29	-0.26***	<.001
Household size	-0.26	0.08	-0.22**	.003
Vitamin use	-0.52	0.19	-0.18**	.006
Drug use	0.65	0.24	0.21**	.008
Number of symptoms	-0.09	0.05	-0.12*	.043

* $P < .05$, ** $P < .01$, *** $P < .001$.

Note: Model $R^2 = .525$, $F(23,141) = 7.13$, $P < .001$. ΔR^2 (SNAP participation) = .000

Other control variables were age, gender, ethnicity, country of birth, education, child status, employment status, income, smoking status, alcohol use, and using other food assistance programs.

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CHAPTER VI: NUTRITION EDUCATION PROGRAM FOR LOW INCOME HIV INFECTED ADULTS

Abstract

The obesity rate among persons living with HIV is on the rise, reaching a proportion similar to that observed in the general public.¹⁻³ As a result, susceptibility to comorbidities that are usually associated with increasing weight are also on the increase.⁴ There are several reasons for the increased obesity rate, including poor dietary habits.⁵ Among the potential interventions for reducing this obesity epidemic in HIV infected patients may be a nutrition education intervention targeted at improving dietary habits through improvements in nutrition knowledge, self-efficacy and readiness to change.⁵⁻⁷

This pilot study evaluated the effect of a nutrition education intervention on nutrition knowledge, stage of change, nutritional status, disease state and the quality of life of HIV infected adults. Participants were randomized into intervention and control groups and completed pretest, posttest, and 3 month assessments and surveys administered before and after the intervention program. The program's outcomes were not statistically significant in any of the areas evaluated after the two-month intervention. However there was a trend towards improved nutrition knowledge and self-efficacy scores in the intervention group compared to the control group. In addition, fewer individuals in the control group progressed in the stage of change continuum compared to intervention group for all dietary habits assessed. Although the intervention was tailored and targeted for the HIV population, there may be several possible explanations for the lack of program effect, such as small sample size, and duration and intensity of the intervention. Despite these limitations, the program's results were encouraging and showed positive outcomes.

Introduction

Nutritional status during HIV infection is related to disease outcome and health status.⁸ As such, the maintenance of optimal nutritional status is essential for health and immune system support in people living with HIV, making nutrition management an integral part of HIV care.⁷ Nutrition intervention, through education and counseling, has been shown to be effective in improving health outcomes in HIV infected individuals.⁹ Though limited in number, research providing this evidence has been conducted among HIV infected individuals, most of whom were experiencing undernutrition and weight loss;⁹⁻¹¹ some of these studies combined oral nutrient supplementation with counseling.¹²⁻¹⁴ Nutrition education and counseling interventions led to increases in weight and lean body mass, greater adherence to treatment medication, and an improved dietary patterns even though immunologic parameters did not improve.¹⁰⁻¹³

While HIV disease continues to put infected individuals at nutritional risk, nutritional issues have shifted from undernutrition and weight loss to obesity and metabolic imbalances,^{1,15} even though inadequacy in nutrient intake persists. This is especially true in resource adequate settings where there is widespread use of antiretroviral agents.¹⁶ Regardless of the use of the agents, however, the trend towards obesity observed among HIV infected individuals mirrors that observed in the general public, making them susceptible to comorbidities.^{1,3,15} The consequences of obesity include a higher cardiovascular disease (CVD) risk, dyslipidemia, atherosclerosis, and risk for type 2 diabetes.⁴ Among persons living with HIV, earlier studies showed increased BMI to be associated with slower disease progression.^{17,18} Recent studies, however, found obesity to be associated with lower levels of immune cell counts.^{2,19} In

addition, a recent study reported obesity to increase the adverse effects that HIV infection has on functional impairment, especially as related to balance and gait.²⁰

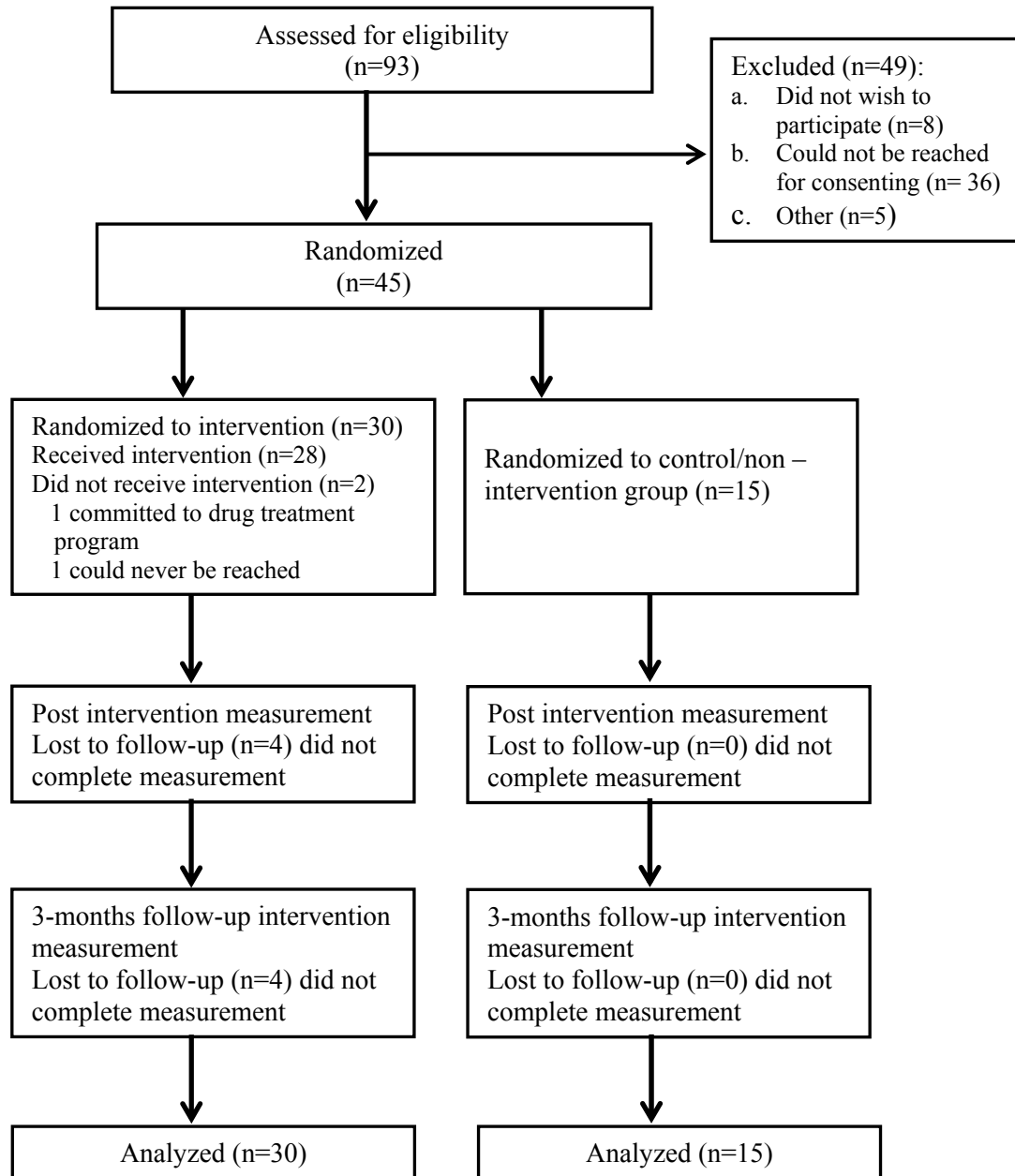
Lifestyle modification, including consuming a healthy diet, is the number one approach to the management of obesity observed in people living with HIV.⁵⁻⁷ Nutrition education focusing on healthy dietary intake and patterns, while emphasizing requirement for disease state, may be the most appropriate way of confronting the current nutritional issues related to HIV infection. There are, however, several factors, such as socioeconomic status (SES), and psychological state, that affect dietary intake with those who are economically disadvantaged, adhering less to dietary guidelines, or having poor diet quality.²¹⁻²³ In addition, dietary habits are affected by knowledge and beliefs about nutrition and health, and by patient's self-efficacy in implementing dietary changes.^{22,24} Taking such variables into consideration when planning and implementing nutrition education interventions have been shown to improve behavior outcomes.²² Michie et al.²⁵ suggested that interventions that are effective among low income individuals, and promote behavior change, are those that are focused and involve few intervention techniques. Nutrition education interventions conducted among HIV infected individuals rarely take into account these factors. In light of this, a pilot nutrition education intervention was designed and implemented among HIV infected adults, with the following aims: 1) to determine the effect of a nutrition education on nutrition knowledge, stage of change, and self-efficacy in HIV infected adults and 2) to determine the effect of nutrition education on nutritional status, disease stage, and quality of life.

Methods

Study design and setting

This study was approved by the Institutional Review Board (IRB) of Florida International University. Participants included in the study were recruited from the Borinquen Healthcare Center in Miami Florida. This center provides healthcare services to low income HIV infected individuals in Miami-Dade County. Participants were considered eligible if they were HIV positive, were 18 years old or older and were low – income (defined as eligibility to participate or participating in the Supplemental Nutrition Assistance Program (SNAP) for the purpose of this study). SNAP eligibility was ascertained using the state of Florida’s ACCESS Pre-screening eligibility tool. After signing informed consent, SNAP participants were randomly assigned to intervention (15 participants) or control (15 participants), while the 15 eligible non-SNAP participants were assigned to intervention randomly from the larger group of 97 eligible non-SNAP participants in the study. However, due to small sample sizes, the two intervention groups were combined for the analysis (Figure 1). A study visit was then scheduled to complete baseline data collection. Survey and assessment data collected during the baseline visit were repeated immediately following the intervention (posttest) and again at three months post intervention (follow-up). The entire duration of the study was 6 months. Study visits lasted approximately 45 minutes. Individuals in the control group did not receive any intervention during the follow-up period. They were however provided with intervention education materials at follow-up visits.

Figure 1: Randomization Flowchart



Variables Measured

Demographic Characteristics: Structured questions were used to assess participant characteristics. Variables assessed included gender, age, ethnicity, education, employment status, monthly income, marital status, drug use, alcohol use, smoking status, and use of antiretroviral treatment (ART).

Nutrition Knowledge: Participants nutrition knowledge was assessed using a 20-item instrument developed by Pawlak et al.²⁶ It assessed knowledge on the nutrient content of food, recommendation for fruit and vegetable intake and association between diet and chronic diseases. Possible range for the knowledge score was 0-20 for summed items (or 0-100 for percent of correct answers).

Stage of Change: Staging algorithms validated for measuring readiness to make changes of intakes of fruits and vegetables, dietary fiber as well as dietary fat²⁷ were used to categorize participants into one of the five stages of the Transtheoretical framework described by Prochaska.²⁸ First, the algorithms determined if the recommendation regarding intake for the particular food was being met. Participants who met the recommendations were classified into the action or maintenance stage depending on how long they had been meeting recommendations (i.e. less than, or greater than or equal to 6 months). Depending on their intention to change behavior, participants who were not meeting the recommendation criteria were categorized into precontemplation (no intention of changing behavior in the next 6 months), contemplation (intend to change behavior in the next 6 months) and preparation (intend to change behavior in the next 30 days).²⁷

Self-Efficacy: Participants ability to confidently make changes in their dietary intake was assessed using a survey developed by Robinson et al.²⁷ The self-efficacy scale for fruit and vegetable intake was made up of six items, while that for dietary fiber and dietary fat intakes had eight and five items, respectively. The items were measured using a five point scale with 1 being “not confident at all” and 5 being “extremely confident”. Statements regarding grocery shopping self-efficacy were also included in the questionnaire. They were developed by Pawlak et al.,²⁶ and measured confidence in the ability to shop for healthy food options. The scale used was 1= not confident at all, 2= not confident, 3= somewhat confident and 4= very confident.

Nutritional Status: Macronutrient and caloric intake were measured using a 24 – hour recall questionnaire. Participants were asked at each study visit about foods consumed in the last 24 hours prior to visit. Food models were used during the dietary recall interviews in order to achieve accuracy with estimates of the amount of food consumed. This data was later analyzed using the NutriBase Professional Nutrition Software Version 9 (Cybersoft Inc., 2011). Participants’ hemoglobin, hematocrit and albumin levels were also evaluated as part of nutritional status. These were obtained from participants’ recent (within three months of the study visit) medical records from their follow up visits with their primary care physician. In addition, each participant’s height and weight were measured and these were used to calculate their body mass index (BMI). Height was measured to the nearest 0.5 inch using a stadiometer; weight was measured to the nearest 0.1lbs using a standard calibrated scale.

Disease State: Clinical state of HIV disease was assessed by viral load and CD4 cell counts. These clinical data were also obtained from medical reports (within six months before study visit), and it detailed results from participants' recent blood work.

Health Related Quality of Life (HRQOL): Participants wellbeing and functionality as related to quality of life was measured using SF-36Vv2 health survey. It has 36-items categorized into eight health domains, which are further summarized into two component scores; the Physical Component Summary (PCS) score and the Mental Component Summary (MCS) score. The PCS and MCS scores were both used in the analysis.

Intervention

The conceptual model in this intervention was developed based on the StampSmart model by Campbell et al. (Figure 2). This model is rooted in the Social Cognitive Theory and the Transtheoretical model of stages of change. Our model differs from the StampSmart model in that multimedia was not used in delivering the nutrition message. In addition, the messages were not individualized. However, needs assessment was conducted to identify nutritional needs and concerns of participants. Major nutritional needs and areas of interest identified were associated with food acquisition, preparation and food safety. Over 60% of participants were interested in learning how to shop for healthy foods, 54.8% in how to shop on a limited budget, 54.2% in healthy cooking habits, 49.7% in food safety, and 48% in making healthy food choices when eating out.

Other areas covered by the needs assessment were: dealing with side effects of medication, learning how to read food labels, weight management, physical activity, fatigue, and stress management. However, very few study participants indicated these as

areas of concern. Intervention materials were therefore developed to address the major topics of interest, making the education intervention targeted specifically to the interests of this study sample.

The education program consisted of four sessions delivered twice a month over a period of two months. Each session was delivered on the same day to two groups, each with approximately 15 participants per group. The sessions were taught from a manual that was developed based on results from the needs assessment and each session was taught by the same nutritionist. Figure 2 details the elements covered in each session. The sessions lasted about 45-60 minutes, each was comprised of both information delivery and activity sessions. All the sessions ended by providing take home reinforcers to participants, reminding them of the concepts discussed in the session. To reinforce healthy eating habits, participants were provided healthy snacks at each session. In addition, participation in discussions was encouraged by giving the most involved participant a token at the end of each session. This was usually vouchers of \$10.00 for use in the neighborhood grocery store.

One of the aims of this nutrition education intervention was to effect possible progression in the stages of change with dietary behavior. Several components of the education program were designed to target each stage, focusing on the processes involved in each stage. Examples of some of these stages include providing knowledge and information to raise consciousness about behavior, and using discussions with peer role models to promote self-evaluation.²⁹ Reinforcement management (giving praise and recognition) and role playing were some of the strategies used to promote self-efficacy.³⁰

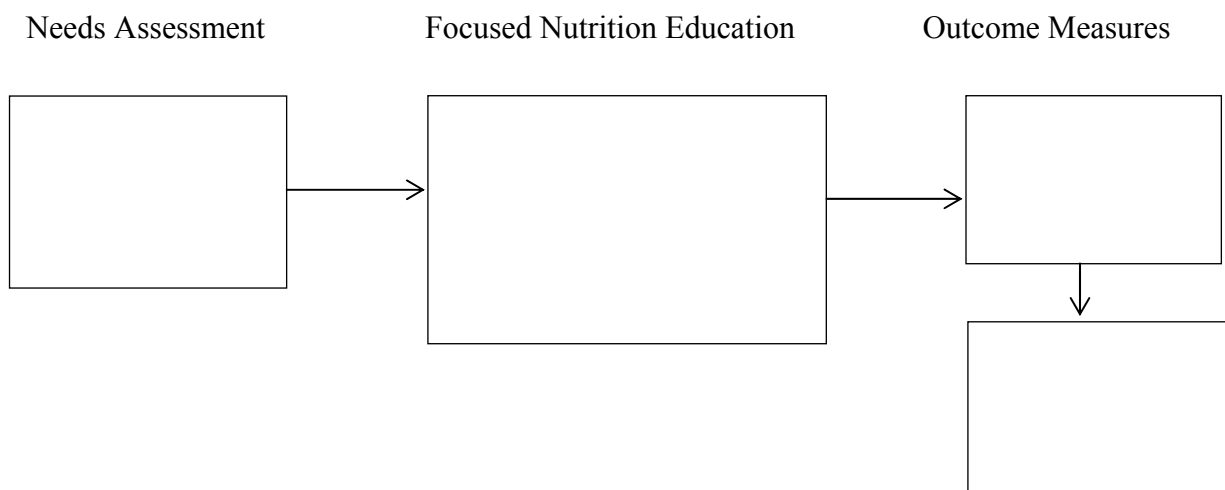


Figure 2: Adapted from “Stamp Smart Model”, Campbell M K et al. Health Educ. Res. 1999; 14:257-267

- Session 1: What Happens Between HIV and Nutrition
- Information about HIV effect on the body
 - Discussion about the importance of nutrition during HIV infection
 - Discussion on obtaining and maintaining adequate diet
- Session 2: The Green Effect: Eating on a Shoestring Budget
- Discussion on how to navigate a grocery store (product placement relative to food item being healthy or not.
 - Tips for saving money and price conscious grocery shopping
 - Discussion and practice on how to read food labels
 - Discussion of participants current shopping practices (Acknowledgement of good practices and suggestions on what could be done differently during the next shopping trip for the “not so good practices”).
- Session 3: Take Charge of your Diet
- Practice knowledge on which food belongs with which food group
 - Information on recommended servings from each food group and illustrations of adequate portion sizes.
 - Discussion and tips on healthy cooking methods.
 - Re-enforcement activity on “Making Healthful Changes to Diet”
- Session 4: Keep the Bugs Out
- Discussion and activity on how to practice food safety when grocery shopping
 - Discussion and activity on how to store food safely (Temperature and environment)
 - Discussion and activity on food safety during meal preparation

Figure 3: Elements discussed during education sessions.

Statistical Analysis

PASW Statistics 21 (SPSS, Inc., 2011, Chicago, IL) was used in analyzing group comparisons at various stages of the study. All participants were included in the analyses and had at least one study and/or intervention visit. To minimize the effects of loss of subjects to follow-up, the Last Outcome Measure Carried Forward (LOCF) technique was employed. Data from baseline was imputed for missed follow-up visits for 4 participants in the intervention group. A descriptive analysis for the baseline demographic data was carried out using Student's t-test for continuous variables and chi-square test for categorical variables. For non-normally distributed variables, the Mann-Whitney U test was used. The results were reported as mean \pm SD or as percentages. The Mann-Whitney U test was also used to test the difference in changes along the stages of change continuum between the two groups. The program's impact on outcome variables (knowledge, self-efficacy, nutritional status, disease stage and quality of life) over time was analyzed using repeated measures analysis of variance, with group (intervention and control) and time (baseline, posttest and follow-up) as independent variables. *P*-value of less than .05 was termed as statistically significant for all analyses.

Results

Participant characteristics

This pilot study had a sample of 45 participants with an average age of 47.4 years. The majority of the individuals were male (60%), African-American (77.8%), and single (73.3%). Sixty-seven percent of the participants had at least high school education. Only 8.9% were employed; most were either on disability (46.9%) or unemployed (44.4%). The two groups were comparable in baseline characteristics as shown in Table 1. Table 2

depicts the comparability of the groups with regards to behavior and health related characteristics. About eight percent of the population used recreational drugs, while 44 % drank alcohol and 64% smoked cigarettes.

Nutrition Knowledge

There was no difference in nutrition knowledge scores between the intervention and control groups at baseline (Table 3). Although the intervention group showed a consistent increase in their mean knowledge score at posttest and follow-up visits compared to the control group, there was not a significant interaction by groups and time on the nutrition knowledge score, $F(2,86) = 0.68$; $P = .49$.

Self-Efficacy

Self-efficacy scores, as related to healthy eating and shopping were similar between the groups at baseline, with both groups reporting moderate scores for all four efficacy items. There was an immediate (posttest) increase in self-efficacy scores among participants in both groups for all categories except dietary fat intake. The intervention group's confidence in the ability to increase fruit and vegetable intake continued to increase, even at the 3-month follow-up visit (Table 4). However, no significant interaction of groups by time were found on any of the self-efficacy scores fruit and vegetable intake $F(2, 86) = 1.167$; $P = .31$, dietary fiber intake $F(2, 86) = 0.47$; $P = .60$, dietary fat intake $F(2, 86) = 1.13$; $P = .32$, or healthy shopping $F(2, 86) = 0.20$, $P = .82$.

Stages of Change

Increasing fruits and vegetables intake to the recommended amounts was the most difficult dietary behavior to achieve and maintain in this population. As shown in Table 5, at baseline and during the follow-up periods, none of the participants identified being

at action or maintenance phase for consumption of more fruits and vegetables. There were similar percentages of individuals at the precontemplation stage in the two groups at baseline for fruit and vegetable intake, but at the 3-month follow-up visit, this percentage decreased to 30% in the intervention group while the control group actually increased to 53.3%. Similarly, 10% of the intervention group and 13% of the control group reported being at the contemplation stage at baseline with fruit and vegetable intake, but at the follow-up visit, this percentage increased to 20% in the intervention group while that for the control group decreased to 0%.

With regards to dietary fiber staging, more than half (53%) of the control group did not progress in their readiness to increase their fiber intake, compared to only 27% in the intervention group. Similarly, only 23% of the intervention group did not improve in their readiness to lowering dietary fat intake compared to 47% in the control group.

Dietary Intake and Nutritional Status

As shown in Table 6, caloric and micronutrient intakes were higher in the control group compared to intervention group at baseline, although the difference was not statistically significant. Further analysis shows that the intervention did not significantly impact nutrient intake although the intervention group increased their calorie intake compared to the control group. Table 7 shows the mean values for nutritional status indicators. Overall, there were no significant interactions on mean scores by group and time for BMI: $F(2, 86) = 1.22, P = .28$; hemoglobin: $F(2, 86) = 1.10, P = .90$; hematocrit: $F(2, 86) = 0.13, P = .88$ and albumin $F(2, 86) = 0.39, P = .63$.

Disease State and Quality of Life

There were no significant differences between groups at baseline for viral load, CD4 cell count, PCS, or MCS. Similar to other results, the nutrition intervention did not make any significant impact compared to the control group; on viral load: $F(2, 84) = 2.25$, $P = 0.16$; CD4 cell count: $F(2, 86) = 0.49$, $P = .60$; PCS: $F(2, 86) = 1.09$, $P = .34$ and MCS: $F(2, 86) = 2.30$, $P = .11$.

Discussion

Dietary intake has been associated with obesity and metabolic changes observed in HIV infected individuals.⁵ Previous studies showed that HIV infected individuals who had significantly higher intakes of dietary fiber and complex carbohydrates and low intakes of dietary fat were less likely to have fat deposits.³¹⁻³³ Among the general population, promotion of lifestyle modification which includes healthy eating habits has been significant in managing obesity.^{34,35} In the present pilot study, the intervention program did not have significant impact on any of the targeted behavior areas. As a result, there were no significant changes in nutritional status, disease state and quality of life.

Participants in the control group reported positive gains in many of the targeted behavior areas, similar to that of the intervention group at the posttest and follow-up visits, although they were not exposed to the intervention. It is possible that multiple exposures to survey materials and assessments (where researchers sometimes explained assessment measures) led to the realization of research outcome and, in an attempt to impress researchers, reported favorable information. In addition, although the aim of the intervention was to improve dietary and nutrient intake intakes, only caloric intake

increased consistently in the intervention group with a subsequent increase in BMI over the study period. This could be explained by possible overeating by the participants under the guise of eating “healthy”.

Our findings are similar to that of Almeda et al.,³⁶ who provided a 12-month nutrition counseling intervention to improve diet and prevent morphological and metabolic changes related to HIV treatment. Though their intervention produced slight dietary and morphological changes in the intervention group, the differences were not statistically significant. Similar to the present study, Almeda et al.³⁶ did not provide nutritional supplementation in addition to the counseling, however, they provided individualized counseling as opposed to the group education method utilized in our current study. The literature is scanty on the successful use of nutrition education and counseling to achieve dietary behavior change and subsequent positive nutrition and health outcomes, especially weight loss and/or weight management as opposed to weight gain in the HIV population.⁹ There are, however, a few studies that showed the successful use of nutrition education intervention to improve cardiovascular disease risk factors.^{37,38} In a recent study, Lazzaretti et al.³⁸ reported a decrease in fat intake and an increase in carbohydrate and fiber intake in a randomized control trial with HIV infected individuals. The intervention also resulted in improvement in lipid profile. It is important to note that the nutrition education provided in that study was focused on changes in dyslipidemia and not on modification in dietary habits, as was the focus of our pilot study. In addition, their intervention also provided individual diet programs as part of their nutrition intervention.

Previous studies evaluating the effectiveness of nutrition education to improve health and nutritional status in HIV infected individuals used various education strategies that included group and one-on-one counseling sessions to achieve the intervention goal. One major difference between our study and prior studies is that intervention was tailored towards the sample population based on a needs assessment. Although that was necessary to promote participation interest, the minimal intervention impact indicates a mixed education strategy that included group and one-on-one sessions may have been beneficial for our target population to achieve intervention goals. The use of one-on-one counseling would have been consistent with the concept of the Transtheoretical model. This model targets intervention at each stage to move individuals forward in the stages of change. We utilized observational learning (using demonstrations and role-play strategies) in our intervention which is consistent with the Social Cognitive theory. We believe that achieving self-efficacy to implement dietary behavior changes and subsequent improvement in dietary habits would have been achieved with a mixed education strategy.

The lack of intervention effect observed in our pilot study can also be explained by other factors. First, the participation rate in intervention sessions was low; only 56.7% of the intervention group attended two or more of the four education sessions. Another possible explanation may be that the intervention lacked the intensity needed to affect behavior and health outcome changes. An increase in the number of sessions provided may have produced changes in dietary behavior. Other study limitations may have been small sample sizes and relatively short study duration. The duration of our study was supported by the literature; although, a longer duration may have produced better

intervention results. Several outcomes from the pilot study were encouraging, because it helped participants improve their readiness for behavior change. Further studies are needed to ascertain the use of a nutrition education intervention to effect changes in the nutritional status, disease state and quality of life of HIV infected individuals.

Acknowledgements

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Table 1: Baseline sociodemographic characteristics by group

Variables	Intervention (n=30)	Control (n=15)
Mean Age (SD)	48.33 (7.06)	46.40 (9.13)
	n (%)	n (%)
Gender		
Male	19 (63.3)	8 (53.3)
Female	11 (36.7)	7 (46.7)
Ethnicity		
African American	22 (73.3)	13 (68.8)
Other ^a	8 (26.7)	2 (16.7)
Marital Status		
Married	8 (26.7)	1 (6.7)
Single	22 (73.3)	14 (93.3)
Education		
< High School	10 (33.3)	5 (33.3)
≥ High School	20 (66.6)	10 (66.7)
Employment Status		
Unemployed	12 (40.0)	8 (53.3)
Employed	3 (10.0)	1 (6.7)
On disability	15 (50.0)	6 (40.0)
Monthly income		
< \$1000	26 (86.7)	12 (80.0)
≥ \$1000	4 (13.3)	3 (20.0)

^a Other includes White, Hispanics and other ethnicities

Table 2: Health and behavior related characteristics by group

Variable	Intervention (n=30) n (%)	Control (n=15) n (%)
Smokes Cigarettes	19 (63.3)	10 (66.7)
Uses Drugs	4 (13.3)	4 (26.7)
Drink Alcohol	12 (40.0)	8 (53.3)
On ART	28 (93.3)	15 (100.0)
Takes Vitamins	15 (50.0)	9 (60.0)

ART: Antiretroviral therapy

Table 3: Nutrition knowledge scores across the three assessment periods by group[†]

Study Period	Intervention	Control
	Nutrition knowledge Score	
	Mean ± SD	Mean ± SD
Baseline	67.33 ± 13.69	63.67 ± 18.75
Posttest	68.83 ± 15.57	70.00 ± 17.74
Follow-up	68.50 ± 14.21	67.67 ± 20.67

[†]Scores are based on the percentage of correct answers

Table 4: Diet and shopping self-efficacy scores across the three assessment periods by group[†]

Study Period	Intervention	Control
	Self-Efficacy Score	
	Mean \pm SD	Mean \pm SD
Fruit and Vegetable Intake		
Baseline	2.81 \pm 1.22	2.65 \pm 0.77
Posttest	2.90 \pm 0.88	3.23 \pm 0.92
Follow-up	3.09 \pm 0.93	2.91 \pm 0.88
Dietary Fiber Intake		
Baseline	2.71 \pm 1.12	2.53 \pm 1.01
Posttest	2.94 \pm 1.00	2.95 \pm 1.15
Follow-up	2.79 \pm 0.83	2.46 \pm 1.07
Dietary Fat Intake		
Baseline	2.62 \pm 1.28	2.44 \pm 0.80
Posttest	2.49 \pm 0.90	2.84 \pm 1.08
Follow-up	2.60 \pm 1.10	2.43 \pm 0.80
Shopping		
Baseline	3.05 \pm 0.91	2.91 \pm 0.96
Posttest	3.10 \pm 0.81	3.06 \pm 0.90
Follow-up	2.97 \pm 0.78	2.78 \pm 0.99

[†]Scores ranged from a 1-5 scale for dietary self-efficacy and a 1- 4 scale for shopping self-efficacy (4 or 5 = very/extremely confident)

Table 5: Dietary stages of change across the three assessment periods by group

	Stages of Change				
	Precontemplation n (%)	Contemplation n (%)	Preparation n (%)	Action n (%)	Maintenance n (%)
Fruit and Vegetable					
Intervention(n=30)					
Baseline	13 (43.3)	14 (46.7)	3 (10.0)	---	---
Posttest	10 (33.3)	16 (53.3)	4 (13.3)	---	---
Follow-up	9 (30.0)	15 (50.0)	6 (20.0)	---	---
Control(n=15)					
Baseline	6 (40.0)	7 (46.7)	2 (13.3)	---	---
Posttest	5 (33.3)	6 (40.0)	4 (26.7)	---	---
Follow-up	8 (53.3)	7 (46.7)	0 (0.00)	---	---
Dietary Fiber					
Intervention(n=30)					
Baseline	7 (23.3)	8 (26.7)	0 (0.00)	5 (16.7)	10 (33.3)
Posttest	3 (10.0)	3 (10.0)	4 (13.3)	6 (20.0)	14 (46.7)
Follow-up	5 (16.7)	3 (10.0)	3 (10.0)	9 (30.0)	10 (33.3)
Control (n=15)					
Baseline	2 (13.3)	4 (26.7)	1 (6.7)	4 (26.7)	4 (26.7)
Posttest	5 (33.3)	2 (13.3)	1 (6.7)	2 (13.3)	5 (33.3)
Follow-up	5 (33.3)	4 (26.7)	0 (0.0)	5 (33.3)	1 (6.7)
Dietary Fat					
Intervention(n=30)					
Baseline	4 (13.3)	7 (23.3)	0 (0.00)	10 (33.3)	9 (30.0)
Posttest	3 (10.0)	4 (13.3)	5 (16.7)	12 (40.0)	6 (20.0)
Follow-up	4 (13.3)	2 (6.7)	0 (0.00)	16 (53.3)	8 (26.7)
Control (n=15)					
Baseline	2 (13.3)	0 (0.00)	2 (13.3)	6 (40.0)	5 (33.3)
Posttest	3 (20.0)	1 (6.7)	1 (6.7)	5 (33.3)	5 (33.3)
Follow-up	4 (26.7)	5 (33.3)	3 (0.0)	3 (20.0)	3 (20.0)

Table 6: Dietary intake across the three assessment periods by group

Study Period	Intervention	Control
	Mean \pm SD	Mean \pm SD
Total Calories (kcal)		
Baseline	1855.93 \pm 981.26	1953.76 \pm 748.02
Posttest	2035.88 \pm 979.65	1942.38 \pm 1004.62
Follow-up	2048.80 \pm 926.40	1886.77 \pm 633.80
Carbohydrates Intake (g)		
Baseline	228.64 \pm 123.65	257.13 \pm 105.54
Posttest	255.52 \pm 121.58	269.07 \pm 166.10
Follow-up	254.54 \pm 120.35	245.44 \pm 111.41
Protein Intake (g)		
Baseline	80.99 \pm 48.65	89.14 \pm 47.80
Posttest	82.14 \pm 41.34	75.40 \pm 40.14
Follow-up	83.25 \pm 45.01	86.66 \pm 28.75
Fat Intake (g)		
Baseline	62.98 \pm 43.29	61.71 \pm 32.37
Posttest	73.50 \pm 43.83	62.39 \pm 31.28
Follow-up	74.37 \pm 39.73	63.13 \pm 30.45

Table 7: Nutritional status indicators across the three assessment periods by group

Study Period	Intervention	Control
	Mean \pm SD	Mean \pm SD
BMI (lbs/in ²)		
Baseline	28.84 \pm 6.61	27.91 \pm 4.88
Posttest	29.05 \pm 6.6	28.32 \pm 4.68
Follow-up	28.26 \pm 4.94	28.60 \pm 4.61
Hemoglobin (g/dl)		
Baseline	13.76 \pm 1.39	13.47 \pm 1.49
Posttest	13.63 \pm 1.61	13.45 \pm 1.17
Follow-up	13.76 \pm 1.51	13.53 \pm 1.21
Hematocrit (%)		
Baseline	41.13 \pm 4.03	40.76 \pm 4.67
Posttest	40.93 \pm 4.84	40.58 \pm 3.80
Follow-up	41.23 \pm 4.06	40.53 \pm 3.79
Albumin (g/dl)		
Baseline	4.24 \pm 0.32	4.20 \pm 0.54
Posttest	4.28 \pm 0.26	4.16 \pm 0.45
Follow-up	4.27 \pm 0.27	4.14 \pm 0.32

Table 8: Disease state and quality of life indicators across the three assessment periods by group

	Intervention	Control
Study Period	Mean \pm SD	Mean \pm SD
Log Viral load		
Baseline	2.18 \pm 1.27	3.14 \pm 1.75
Posttest	2.06 \pm 1.10	3.04 \pm 1.63
Follow-up	2.25 \pm 1.17	2.58 \pm 1.55
Square root CD4		
Baseline	22.88 \pm 6.76	18.67 \pm 7.62
Posttest	22.97 \pm 6.55	17.84 \pm 7.92
Follow-up	23.16 \pm 5.55	19.22 \pm 8.43
PCS		
Baseline	47.23 \pm 8.50	43.77 \pm 8.27
Posttest	44.90 \pm 12.09	45.12 \pm 10.37
Follow-up	46.15 \pm 9.39	43.95 \pm 10.12
MCS		
Baseline	47.14 \pm 11.83	43.07 \pm 9.87
Posttest	44.50 \pm 11.71	45.97 \pm 11.81
Follow-up	42.45 \pm 13.81	44.54 \pm 14.01

PCS: Physical Component Summary

MCS: Mental Component Summary

PCS and MCS scores are norm-based T-scores ranging from 0-50

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CHAPTER VII: SUMMARY AND CONCLUSIONS

The present study characterized a convenience sample of HIV infected low income participants in Miami, who participate in the Supplemental Nutrition Assistance Program (SNAP) and compared them to HIV positive low income adults who are eligible for this program but do not participate. Additionally, our study examined the barriers to SNAP participation, and investigated the association of SNAP participation in this cohort with food insecurity, nutritional status, disease stage, and quality of life. The study also examined the effectiveness of a pilot nutrition education intervention in improving nutritional status, disease state and quality of life through improvements in nutrition knowledge, stage-of-change and self-efficacy in people living with HIV.

SNAP is the largest food assistance program in the United States aimed at alleviating problems of food insecurity in low income families.¹ Many studies have reported its effectiveness and success in achieving this aim in the general population, in addition to providing other nutrition and health benefits.²⁻⁶ The results from these previous studies prompted the current study, since food insecurity and inadequacy in nutritional status are common issues for persons living with HIV. SNAP is the program of choice for most low income HIV infected adults, for whom nutritional status and adequate food intake are critical to treatment. As a result, there is the need to investigate SNAP's impact on their nutrition and health.

We found that the SNAP participation rate among this study population is high at 70.3%, similar to State of Florida and national participation rates of 69% and 72% respectively.^{7,8} In our study, SNAP participants were mostly lower income earners and US citizens, characteristics which are consistent with results from other populations

participating in the program.^{9,10} HIV infected adults participating in SNAP had a higher tendency to use antiretroviral therapy (ART), when compared to those who were not receiving SNAP. This is an important finding with implications for HIV disease management since infected individuals are more likely to adhere to treatment when receiving some form of food assistance.¹¹ We did not find employment status, ethnicity, or household status to be associated with SNAP participation; however,¹²⁻¹⁵ having higher education was associated with participation. This could be explained by the greater capacity of such individuals to understand eligibility requirements and complete paperwork for application with ease. We found the following to be barriers to SNAP participation: (1) denial of participation by the program, (2) recent incarceration, (3) not allowed if staying in a shelter, (4) lack of awareness of eligibility status, (5) difficulty with application, and (6) worry about consequences for future citizenship application. These barriers were consistent with those reported in the literature.^{9,10,15-17} It wasn't surprising to find recent incarceration as a barrier to participation. The State of Florida prevents individuals with drug related convictions from receiving SNAP. Our study didn't gather data on reasons for incarceration. It is important to consider allowing such individuals access to these nutritional services as they contribute to establishing stability upon release from jail and prevents relapse to substance abuse.¹⁸ In addition, participation in nutritional programs has been associated with increased ART adherence.^{11,19}

When we assessed the association between SNAP participation, food security and nutritional status, we found no significant difference in these variables between SNAP participants and non-participants. However, we found 56% of the population to experience food insecurity. This rate is similar to those reported among other HIV

populations.²⁰⁻²³ It was, however, higher than the State of Florida and the national food insecurity rate for the general population in 2011 which were 15.4% and 14.9% respectively.²⁴

Additionally, we found that drug use was associated with lower levels of food security and was also strongly associated with poor nutrient intakes. More than 50% of our cohort had inadequate intakes in approximately half of the nutrients assessed. For all participants, vitamin D intake was below the estimated average requirements. Vitamin D deficiency is related to HIV disease progression²⁵ and is common among HIV infected persons, especially those from Black and Hispanic descent.²⁶ The majority of the individuals living with HIV in South Florida are Blacks or Hispanics,²⁷ who have higher rates of vitamin D deficiency.²⁶ More than 50% of the HIV infected participants on ART received a combinations with tenofovir, an antiretroviral associated with low circulating levels of vitamin D, and that further exposes them to vitamin D deficiency.²⁸ In addition further research is needed to investigate serum levels of vitamin D in this South Florida population and how this may be affecting HIV disease progression and management.

Analysis of the relationship between SNAP participation and the parameters determining disease status and health related quality of life (HRQOL) showed no significant associations. Our findings are consistent with reports from previous studies.^{19,29} It has been shown, however, that provision of food assistance improves food security, dietary/nutrient intake, and adherence to medication among persons living with HIV.^{11,29} On the other hand, changes in these variables are known to influence disease status and HRQOL. It is possible that other factors, such as psychosocial events, mediate the relationship of improved food/nutritional status, with disease status, and quality of

life. Further studies are necessary to investigate any possible interactions between nutrition and psychosocial factors as pertaining to clinical and non-clinical outcomes of HIV disease.

We also conducted a pilot intervention study investigating the effect of nutrition education on nutritional status, disease status, and health related quality of life through improvements in nutrition knowledge, self-efficacy to eating healthy and stage of change. The intervention provided did not make a significant impact on the variables measured, although there was a trend towards improvement in readiness to change. The literature is sparse on the successful use of nutrition education to improve dietary behavior and disease status of persons living with HIV as it relates to obesity.^{30,31} Previous studies focused on using nutrition/counseling to achieve weight gain, as a means of improving disease status.³²⁻³⁴ A recent study by Lazzaretti et al.³⁵ reported improvements in dietary intake (fat, carbohydrates, and fiber) among HIV infected individuals in a clinical trial where nutrition education was employed. This reported intervention, however, was aimed at improving dyslipidemia and not at modifying dietary habits, which was the focus of our pilot study. Additionally, their intervention provided individual diet programs as part of their nutrition intervention. The following are possible explanations to the lack of effect observed in our pilot study (1) low participation rate (56.7%) in the education sessions, (2) lack in program intensity needed to effect behavior and health outcome changes, (3) small sample size and (4) relatively short study duration. Despite these limitations, the results from the pilot study were encouraging, as the readiness for change in dietary behavior was increased.

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CHAPTER VIII: STRENGTHS AND LIMITATIONS

This work will provide valuable information to the Supplemental Nutrition Assistance Program (SNAP) and other food and nutrition program administrators by helping them to identify and target individuals at high nutritional risk and creating outreach activities that overcome the most frequent barriers to participation. This is the first study to characterize HIV infected participants receiving SNAP benefits and to identify barriers to SNAP participation in this population.

The results from our study may be used to improve nutritional services and maximize SNAP participation and its potential benefits to people living with HIV. In addition, our study is also the first to evaluate the program's effect on the nutrition and health of HIV infected people. Though in many cases we were not able to disprove our null hypothesis, our findings are a prelude to further studies investigating the benefits derived from participating in SNAP by low income individuals with chronic diseases. Our findings may be the result of the lack of specificity of these programs for people with nutrition-related diseases, and the fact, that SNAP does not have an integrated nutrition education component similar to the one found in the Special Supplemental Nutrition Program for Women, Infants and Children (WIC).

There are several limitations to this study which may have contributed to some of the non-significant findings we observed. First, the cross-sectional design used in the observational study eliminated any causal link that might have existed between SNAP participation, food security, and nutrition and health outcomes. Another limitation is the small sample size used in the pilot intervention study. The sample was also a convenience sample, decreasing the external validity of the study findings. Also, because study

participants were recruited from only one US city, results may not reflect differences that might be observed from varying HIV infected populations, affecting the generalizability of findings. Although the intervention study had a rigorous design to decrease study limitations, its sample size was small and the duration of the intervention was short, compared to other effective nutrition interventions in the literature.

CHAPTER IX: FUTURE RESEARCH

Findings from our study, confirm that food insecurity and other nutrition related issues still plague persons living with HIV, especially when they live within limited resources. More resources and efforts are needed to address food insecurity in this group with special needs, because food insecurity has implications for the treatment, management, and costs of the HIV disease. The Supplemental Nutrition Assistance Program (SNAP) has been beneficial in alleviating some of these problems in the general population. A better understanding is needed on why SNAP is not making a difference in the HIV infected population, and how other factors such as substance abuse, incarceration, stigma and comorbidities affect participation and program effect. Lack of participation in the program might be associated with lack of access to other services. Many of the barriers and conditions affecting the participation of HIV infected individuals in SNAP are local, and need to be addressed at the local level. A possible lesson to be learned from this research is that HIV infected persons, and in general persons living with chronic nutrition-related diseases need food and nutrition programs that are tailored to their specific needs and that nutrition education can foster readiness to eating healthy. Our pilot study was useful in developing educational tools that addressed the stated needs of this group. The preliminary results from our pilot educational intervention will be used to estimate sample size, duration and sustainability of a larger study, and to develop an application for external funding to ascertain the use of a nutrition education intervention to effect changes in the nutritional status, disease state and quality of life of HIV infected individuals.

APPENDICES

Appendix A: Nutrition Education Intervention Manual

NUTRITION EDUCATION MANUAL FOR LOW INCOME HIV INFECTED
ADULTS

Strategies and Lesson Plans

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Overview of Manual

The Nutrition for HIV Healthy Living is a four session nutrition education intervention developed to enhance changes in dietary intake and behavior among low-income HIV infected individuals. It is developed based on results from needs assessment conducted in the target group and is intended to be conducted over a two month period, with sessions being conducted bi-monthly.

The intervention is designed using the social cognitive theory and the transtheoretical model of the stages of change concept. It is conducted by a trained nutritionist; with each session lasting between 45 minutes to an hour. The sessions are client-centered, interactive and utilize methods that enhance adult learning. Topics covered include the importance of nutrition during HIV infection, healthy eating and food safety. The intervention encourages a pre-post measurement of variables that determine the effectiveness of intervention. These variables and the tools for assessment are detailed in this manual.

This manual is organized into four sections. The first section is “introduction”, which details the goals of the intervention, the theoretical framework used, and a description of the target population. Section two is made of four lesson plans, each for the four sessions. Lesson 1 focuses on the bi-directional relationship between HIV and nutrition; lesson 2, teaches how to purchase healthy foods even on a low income budget, lesson 3 focuses on cooking and eating healthy while lesson 4 discusses food safety. Each lesson plan contains:

- Preparation Tips
- Materials Needed (to implement session)

- Measures to take “Before Beginning Session”
- Objectives for session
- Teaching guide (The teaching guide provides information on what is discussed during the session).
- Interactive “Activity”

Section three discusses variables that will be used to determine the effectiveness of this intervention. The final section of this manual includes several handouts and activities, most of which are adapted from existing resources. These handouts and activity packets can be found in the appendix section of the manual.

Introduction

Nutrition Problems in HIV infection

HIV infection is associated with the destruction of the immune system. As a result the nutritional status of HIV infected individuals is critical. The disease and malnutrition create a vicious cycle that aggravates disease progression and affects chances of survival.¹ Poor nutritional status may accelerate disease progression and lead to poor outcome. On the other hand, HIV infection can also impair the intake, digestion, absorption and utilization of nutrients. This can lead to weight loss, nutrient deficiencies compromised immune function and competence as well as susceptibility to infection.¹ Factors that could contribute to poor nutrition include inadequate nutrient intake and absorption, poor appetite, metabolic problems, chronic infection, and limited food availability among others.² HIV disease is linked to conditions (such as sore mouths and throats) that affect food intake. Side effects of treatment may also lead to nausea, diarrhea, vomiting, and loss of appetite, all of which can affect dietary intake.

As with many infections, HIV infection affects the body's ability to absorb nutrients due to damages to the gastrointestinal tract.² Malabsorption could also occur from diarrhea that is caused by infections from pathogens.² HIV infected individuals are more susceptible to these infections because of compromised immunity. The chronic infection also increases the nutritional requirements of HIV infected individuals above those of the uninfected population.³⁻⁵ Antiretroviral therapy (ART) medications can also affect energy expenditure, contributing to higher caloric needs.⁴ HIV infected individuals who are asymptomatic require 10% more energy intake than is recommended for non-infected healthy individuals, for the same age and gender. This requirement increases to

20%-30% during the symptomatic phase. For the above-mentioned reasons among others, optimal nutrition is critical for managing the HIV disease.⁶

Why Nutrition Education Intervention

Lack of optimal nutrition has been linked to the development and severity of most chronic diseases; 5 out of the 10 leading causes of death have been linked to poor diet.⁷ Despite the abundance of information on nutrition in the media and other sources as well as the availability of healthy foods, most Americans are considered to have suboptimal nutrition.⁷ Even with the development of the Dietary Guidelines for Americans, several American do not know what and how much of food to consume from each food group. This could be due to the public's confusion as to which information is correct and also how to filter and apply acquired nutrition information. For example, even though the Healthy People 2010 objective was for 75% of American's over age 2 to consume more than 2 fruits and vegetables per day, the Nation Action Guide 2009 Report indicates only 32.8 % and 32.2% of adults and adolescents respectively consume more than 2 servings of fruits and vegetables per day.⁸

The aim of nutrition and health professionals has therefore been to facilitate dietary behaviors favorable to nutritional and overall health through education intervention. Nutrition Education is defined as “ a combination of educational strategies, accompanied by environmental supports, designed to facilitate voluntary adoption of food choices and other food- and nutrition related behaviors conducive to health and well-being”⁹ Among individuals infected with HIV, nutrition education is especially needed to foster healthy eating habits and optimal nutrition.

Cason et al.,¹⁰ indicated that food stamp participants and non-participants who received nutrition education significantly improved their dietary and nutrient intake, as well as food related behaviors. According to evidence from literature, nutrition education positively influences dietary practices such as food buying, meal planning and preparation, as well as food safety practices and nutrient intakes of low income individuals.¹¹⁻¹³

Goals and Objectives

The goal of this intervention is to optimize nutrition and health status and the overall well-being of low income HIV infected individuals through changes in dietary habits.

The objectives are to significantly:

1. Increase participant's nutrition knowledge.
2. Improve participant's self-efficacy with dietary behavior.
3. Move participant forward in the stage of change continuum as related dietary behavior.
4. Increase participants' nutrient intakes.

Target Population

Participants in this intervention are low-income HIV adults, who either participate or do not participate in the food stamp program and live in Miami-Dade County. Most of the participants either attend Jackson Memorial Hospital and Borinquen Health Care Clinic. These health centers serve majority of the HIV infected population in Miami. The ages of the participants from Jackson Memorial Hospital ranges between 35-72 years, with a mean of 46.3 years. Sixty-six percent of these patients are males, with 69% being African-American and 24% Hispanics. Borinquen clinic participants have similar age

characteristics as those from Jackson Hospital; however, the racial distribution is about 45% African-American and 45% Hispanic. These characteristics are similar to that of the general HIV infected population living in Miami.¹⁴ According to reports from research that has been conducted in this population, participants have a mean monthly income of \$326 and have an average education level of 11th grade.¹⁵ Other characteristics of this population are that 29% are asymptomatic and 38% symptomatic to HIV, 62% are receiving antiretroviral therapy treatment while 38% are not, with the mean number of years since diagnosis being 10 years.¹⁵

Intervention setting

The intervention is conducted at the Borinquen Health Care Clinic (BHCC), which was established in Miami Dade County to provide comprehensive range of health and social services to its' culturally diverse community.¹⁶ Among the primary care services provided by BHCC are internal medicine, pediatrics, HIV care, behavioral health, psychiatry, case management, etc. They also provide specialty care such as podiatry and optometry. The clinic mainly serves the county's low income population and has several locations. This intervention is conducted at the main clinic location in midtown Miami (which is located in the target population's community) and serves the highest number of their patients.¹⁶

Theoretical Framework

The conceptual model used in this intervention is adapted from the StampSmart model, (see figure 1) used by Campbell et al, 1999.¹⁷ This model employs both the Stages-of-Change concept of the Transtheoretical model and the Social Cognitive Theory in its development.¹⁷ Although the same theoretical framework is being used, two features

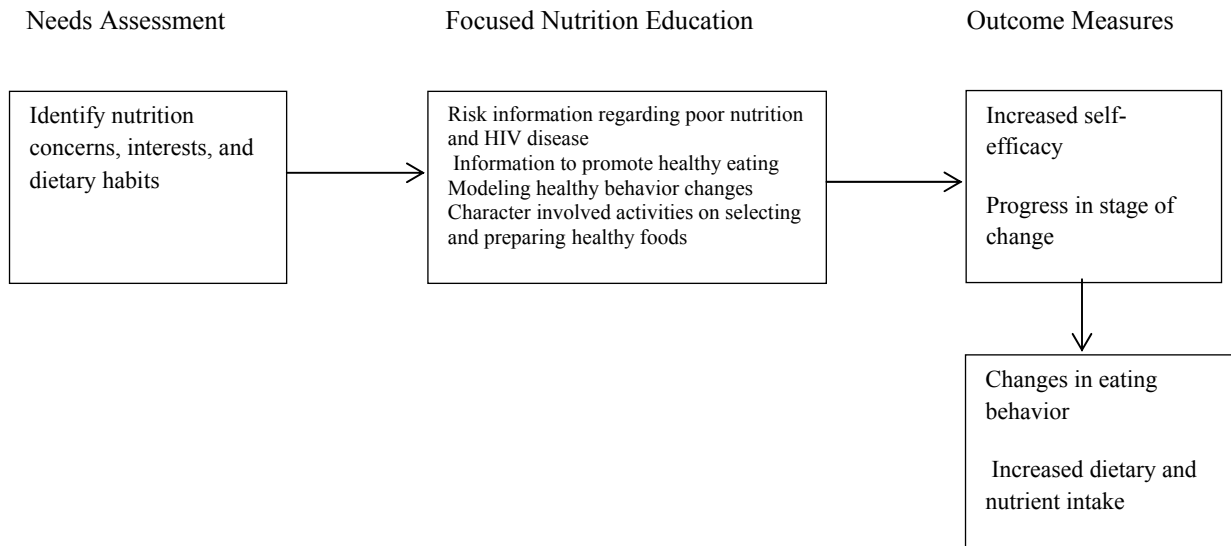
have been changed, namely the content of the education material and the method of data dissemination. The Stage of Change theory is widely used in health promotion and has been applied to intervention in several areas including nutrition.¹⁸ This theory applies the logic that individuals go through different stages of change before developing a new behavior. The stages included in this theory are precontemplation, contemplation, preparation, action, and maintenance.¹⁹ Components of the educational program are developed to target each stage focusing on processes involved in each stage. Some of these processes include consciousness raising through information and knowledge provision, self re-evaluation by discussion with peer role models, self-liberation (belief in the ability to change by drawing attention to individuals who have already made commitment to eat healthy), reinforcement management (giving praise and recognition) and counter conditioning (using activities to learn how to substitute healthy behaviors for unhealthy ones).²⁰

The Social Cognitive Theory integrates an individual with the social environment in which he or she is learning.²¹ It purports that learning is determined by an interrelationship between environmental influences, personal factors, and behavioral attributes.²¹ The focus of this theory is self-efficacy, which is an individual's self-confidence in performing a particular behavior at a certain competence level.²¹ To be able to perform a behavior, an individual must believe in their ability to do so and this makes self-efficacy an important characteristic to consider in behavior change. This intervention seeks to increase self-efficacy through skills development and training to raise individual confidence. The intervention also points out and emphasizes outcomes

(long term benefits to eating healthy) as well as provides incentives that will motivate behavior change.

As a modification to the original model, this model utilizes the operant conditioning method to disseminating information. Operant conditioning is defined as “a type of learning in which behaviors are altered primarily by regulating the consequence that follows then”²². Some tenets of this learning method are goal setting, reinforcement, and provision of feedback. Other learning methods applied in the model are lecture/discussion, practice and role plays. These, however, are drawn from the social cognitive theory discussed earlier. This conceptual model requires conducting a needs assessment prior to implementing nutrition education. It is based on the belief that nutrition education tailored to the needs of the population will increase self-efficacy and help individuals progress in stages of change, leading to change in eating behavior.

Figure1: Conceptual Model



Adapted from “Stamp Smart Model”, Campbell M K et al. Health Educ. Res. 1999; 14:257-26

Key Strategies for Nutrition Education Intervention

Key Strategies And Activities	Target Group	Group Size	Lead Staff	Frequency	Evaluation
Assessment Information dissemination /Education <ul style="list-style-type: none"> • Lecture • Group Discussion • Handouts/Posters • Recipes Skill training <ul style="list-style-type: none"> • Experiential activities 	Low income HIV infected individuals	15 per group	A trained nutritionist	Twice a month delivery of nutrition information for 2 months	Progression in Stage of Change Increase in self-efficacy Improvement in dietary practices Nutritional Status Disease Status Health Status Quality of Life

Delivery Methods

This nutrition intervention is delivered by a trained nutritionist. As individuals learn and process information differently, the education material is delivered in a manner that meets the learning needs and styles of participants. The materials are delivered in person, in a safe learning environment, through mini-lectures, discussions and activities. Messages are tailored towards the attitude and needs of this population. For example, to create and maintain motivation, messages are structured to produce a sense of personal responsibility with nutritional and overall health among participants. Open ended questions are used to allow for discussions. Participant interaction and involvement is encouraged by giving the group the opportunity to ask questions, give them positive feedback and also praise them for accomplishments. Reinforcers in the form of points or tokens are awarded for achievement. Individuals with the highest points get a gift at the end of each session.

Although one-on-one counseling is not used in the delivery of this intervention, participants are encouraged to set personal goals, which they can choose to share with the group in terms of barriers and achievements. To make everyone comfortable, the following ground rules are established:

- Arrive on time and staying in the group meeting
- Respect each other, even when there is disagreement
- Insults or use of derogatory words is not allowed
- Can choose not to participate in an activity if not comfortable
- Listen to others without interrupting them.

Needs Assessment as Basis for Intervention Content

As per conceptual model, the development of this nutrition intervention is based on results from a nutrition needs assessment conducted in the target population. The assessment determined nutrition concerns using tailored questions and information on dietary habits. Other demographic variables such as age, gender, education level, income, and work status of the group were also assessed. Examples of questions asked to determine nutrition concerns are:

- I would like information on how to shop healthy
- I would like education on how to shop on a limited budget
- I would like information on how to cook healthy/ diet modification
- I would like information on strategies to overcome nutritional side effects related to HIV medication intake, and
- I would like education on food safety.

Information on dietary habits was assessed and utilized to determine dietary behaviors that the target group may already engage in and this information was used to determine the need for change to healthier habits that may improve dietary and nutrient intake. A dietary habit questionnaire (Behavioral Check List) from the University of Wisconsin Cooperative Extension was used as part of the needs assessment for this intervention. Conducting a needs assessment is important in order to tailor the intervention towards a specific target population.

LESSON PLAN 1

WHAT IS THE RELATIONSHIP BETWEEN HIV AND YOUR NUTRITION

Preparation

1. Read through the lesson and each activity before beginning session
2. Have copies of each handout; enough for every participant
3. Ensure that supplies/materials needed for the session are on hand.

Materials Needed

1. Flip Chart with markers
2. Handout: "FACTS ABOUT HIV AND NUTRITION"
3. Paper and pencil for each participant
4. Granola bars with different color wrappings
5. Token for reinforcement: Grocery store gift card

Before beginning session:

1. Introduce yourself to the group members
2. Take attendance
3. Give objectives of the session and inform participants that they can ask questions at any time during the session.
4. Inform participants of points for answering questions and the opportunity to get a prize at the end of the session for having the most points.

Participant Objectives

At the end of this session, participants will learn:

1. about HIV's effect of the body
2. the importance of nutrition during HIV infection

3. how to achieve good nutrition.

During Session:

Using attendance sheet, give each participant a point for a correct answer to a posed question. The first participant with the highest points at the end of the session receives a grocery store gift card.

Teaching Guide

Introduction

Bring to the session, granola bars with different color wrapping for example white, green and brown. Ask participants to pick whichever color granola they like as they come in. Inform them that they can eat their snack but should keep the wrappings as it will be used in activities during the session.

Thank you all for coming to our first Nutrition for HIV Healthy Living Session! I hope everyone got a granola bar when they came in. *As our first activity, I would like anyone who has a green granola wrapping to tell us what they know about HIV and what the infection does to the body. Wait for responses.* Those were correct answers and will form the basis of what we will discuss today. Our topic is what happens to the body during HIV infection and how important nutrition is during this time.

Effects of HIV Infection

When the body is infected with HIV, the virus attacks its ability to fight infection (which is what the experts call the immune system). If not brought under control, the virus can destroy the immune system making it impossible to fight any other infection. This is the reason why individuals infected with HIV find it difficult to fight bacteria and viruses that their body could have easily fought without medication. Though these

bacteria and viruses do attack any part of the body, for an individual infected with HIV, these attacks are usually in the gut. The gut starts from the mouth, through your throat, stomach, intestines and ends with the anus. This is one of the reasons why diarrhea, nausea and vomiting are common during HIV infection. An infection of the gut lowers one's ability to eat, by reducing appetite and can also interfere with the body's ability to digest and absorb the nutrients that are in food. Having less energy/calories and nutrients can lead to malnutrition and weight loss.

Another way HIV infection affects the body is the demand for energy/calorie used when fighting an infection. As a result, individuals HIV infected individuals need more energy and therefore need to eat more. If your body doesn't get enough energy and nutrients, your energy levels will be low and can cause fatigue. Eating more doesn't mean eating "junk" food but rather, healthy food that can provide both energy and nutrients. I am sure most people here are taking medication to help fight the HIV virus. While this is extremely important in managing the disease, sometimes the side effects from the medication can affect our food and nutrient intake. Side effects like nausea, vomiting and diarrhea makes some people not want to eat. However, without eating, the body can't function properly and sometimes the medications also don't work as well.

Importance of Nutrition in HIV infection

So far, we have been talking about ways the HIV virus attacks the body and how this can affect our nutritional status. Let's now look at the importance of having good nutrition when you are infected with HIV. *Based on what you know about HIV, why do you think good nutrition is important? Anyone with a brown wrapping can answer this question. Wait for responses.* You all gave right answers. Good nutrition is important to

maintain health and can determine the quality of life you have. When you attain good nutrition before and during an infection, it helps you to overcome many of the negative things we said HIV infection does to the body. With a good nutritional status, you are able to build your immune system to fight off infections, you have enough energy to prevent fatigue and weight loss, and you can also keep yourself from getting other diseases like heart disease and diabetes.

What is Good Nutrition?

I am sure most of you are thinking so how do I achieve good nutrition? For an HIV infected person attaining good nutrition can be a challenge but is not impossibility. This is because the virus is constantly “robbing” you of nutrients and energy. Good nutrition means eating enough complex carbohydrates, and lean protein as well as fats in your diet. Carbohydrates provide us with energy and good sources are vegetables, grains and cereals. Proteins help us build and maintain our muscles, organs and the substances that help the body fight infections. Good sources are beans, fish, meats, and nuts. While fats provide us with the most energy, we have to be careful how much we consume. There are good and bad fats. Good fats come from foods like nuts, seeds, fish, canola and olive oil. Bad fats can contribute to heart disease and come from meats, butter, and lard.

In addition to eating healthy, some people find that taking vitamin supplements help maintain good nutrition. This is a good idea, however, be sure to stay away from supplements designed to make you lose weight. A regular multivitamin or prenatal vitamin should be good enough. You can talk with your doctor about the right vitamin for you. Good nutrition also involves drinking a lot of fluids, preferably water. This helps to keep you hydrated, reduce side effects of medication, and prevent constipation. Fluids

like sodas, coffee, tea, alcohol may make you lose fluids so be careful with how much of these you consume. In the next couple of weeks we are going to have a session where we will be discussing into detail, what and how much to eat in order to achieve and maintain good nutrition. Now let's go ahead and review what we learned today.

Activity

Using the flip-chart, lead a discussion about the “EFFECTS OF HIV INFECTION” and HOW NUTRITION CAN HELP. Cut into strips, statements/facts about both topics (see appendix). Give one strip to each participant and ask them to stick or tape their fact/statement under the correct topic. Allow participant to explain why they chose to place the sticker under the topic they chose. On a different flip-chart lead a discussion about how to attain good nutrition. Allow participant to tell you what they have learned and write them down.

LESSON PLAN 2

THE GREEN EFFECT: EATING HEALTHY ON A SHOESTRING BUDGET

Preparation

1. Read through the lesson and each activity before beginning session
2. Have copies of each handout; enough for every participant
3. Ensure that supplies/ materials needed for the session are on hand.

Materials Needed

1. Flip Chart and markers
2. Handout: Saving Money When Food Shopping
3. Game board and Shopping Tips Cards
4. Paper and pencil for each participant
5. Grocery coupons and ads
6. A can of beans in brand name, store brand , and generic (record prices)
7. A food label reading chart/Nutrition Facts Label Chart and empty coke bottle
8. Tokens for reinforcement: Shopping List Pad

Before beginning session:

1. Introduce yourself to the group members
2. Take attendance and give objectives of the session and let inform participants that they can ask questions at any time during the session.
3. Inform participants of points for answering questions and the opportunity to get a prize at the end of the session for having the most points.

Participant Objectives

At the end of this session, participants will learn:

1. Tips on shopping to save money
2. How to shop healthy
3. How to read food labels

During Session: Using attendance sheet, give each participant a point for a correct answer to a posed question. The first 3 participant with the highest points at the end of the session receives a shopping list pad.

Teaching Guide

Introduction

Thank you for returning to Nutrition for HIV Healthy Living! *Before we begin, can anyone share with us a time that you went shopping and got a good deal? Wait for responses.* Well today, we are going to talk about ways to shop healthy and save money at the same time. I am going to start with how to navigate the store and later provide money saving food shopping tips.

Tip 1: Know your store

One of the most important shopping tips rarely talked about is the need to know your grocery store. Food display and arrangement is done in special ways to attract you, the buyer. Food usually displayed in aisles is processed and as a result can last for a long time. These foods, however, tend to contain a lot of additives that can be both unhealthy and not natural. The best way to ensure you are shopping for healthy foods is to do so around the perimeter of the grocery store. These foods are fresh, rarely or less processed, and have more nutrients.

How many of you have heard that eating healthy is expensive? Wait for responses. Yes it is true that some healthy foods can be expensive but the notion that all healthy foods are expensive is a big misconception. There are several cheap healthy foods; let's talk about tips to buying such foods while saving money. *Can anyone think about any steps you can take to help you save money? Wait for response. Those are very good tips.*

Tip 2: Use Grocery Advertisements

You want to start your trip to the grocery store by first reading the free grocery ads that are mailed weekly to several homes by many grocery stores. They can also be found on the internet. Simply type the stores' name into any search engine such as "google" and when the page comes up, look for a tab that says "weekly ad or weekly specials". If these ads don't get sent to your home or you do not have internet, don't worry. Most grocery stores also have these weekly ads inside their stores; they are usually placed at the entrance. These ads help you to make a plan of what you want to eat and subsequently a grocery list. Grocery stores usually have items on special when there are too many of them available at a time. Other times, they may have items on special to attract you to the store. Prices of other items in the store may be higher than you usually buy them so be sure to check the price of other items you may want to buy. *Has anyone experienced that and will want to share with us? Wait for responses.* Sometimes, stores have specials such as "buy one get one free". While such deals sound good, be sure you can use both items before the date of expiration. You may also end up not saving money if you drive or take the bus around town looking for deals. Find the closest store with the best prices for the foods you want and shop from there.

Tip 3: Use Coupons

Coupons are another way to save money for items you want to buy. *Where are some places we can find coupons? Wait for responses.* You are all right! Some other places to find coupons are Sunday newspapers, magazines, and grocery store ads etc. Be sure to compare brands when shopping with coupons because there might be a brand that is cheaper than the one you have a coupon for. We will talk about comparing brands in a few minutes. *Now, I have here, a grocery store weekly ad and I want you to help me pick out the good deals for this week. Put ad on flipchart so participants can participate in picking out the good deals.*

Tip 4: Use Grocery List

The next tip after looking through the grocery store ad and making a plan of what you want to eat is to make a grocery list. A grocery list can also be made based on what is on hand and ingredients needed for planned meals. It should include breakfast foods and snacks. *How many of you shop with a grocery list. Wait for responses. Allow participants to discuss why they shop with or without a grocery list.* A grocery list allows you to have control over how much you spend and prevents impulse buying. It also keeps you from forgetting needed items and having to make another trip to the store. A grocery list can be developed several days ahead of the day you plan to go to the grocery store. This can be done by keeping a paper and pencil by your pantry or on top of your refrigerator so you can make a list of needed items as and when you run out of them. While having a list when grocery shopping can save you money, it also makes the experience easy and less stressful.

Tip 5: Compare Prices

Let's talk about our fifth tip, which is to compare prices of different brands of an item you want, before making a purchase. Comparing brand prices helps you choose the least expensive item. There are several companies that may make the same food and these companies determine the prices of the food. As a result you may find the same quantity of the same food being sold at different prices. *Let's take a can of black beans for example, how many brands have you seen in the store when you go grocery shopping? Wait for responses.* Based on your answers, we know there are several of them out there. Our aim is to buy the least expensive to save money. Most grocery stores also have their own brands or a generic brand (that bears no company name) of the same food item and these tend to be the cheapest. *Show participants the 3 different brands of beans and tell them the price difference. Let participants discuss how much money is saved depending on which one is bought.*

Tip 6: Read Food Label

Our last tip is reading food labels. Reading food labels help us choose the healthiest foods. Every food has a label which gives us a lot of information about the food. A food label can tell you the ingredients in the food, the serving size, how many calories it contains, how much fat, protein, sugar, etc. there are in a serving. I am going to put up a Food Label chart so we can practice how to read a food label. Almost every packaged food has a label and you know you are reading one, when the title is "Nutrition Facts", usually written at the top of the label. *What is the next thing you notice? Wait for a response.* That is right, the serving size and the number of servings in the package. This tells us what is considered a serving for this particular food item. It is usually in measures

such as cups, ounces, etc., making it easy to visualize. The calorie amount written underneath corresponds to the serving size.

Pass Coca-Cola bottle around. For example this bottle of Coca-Cola has 2.5 servings in this bottle with a serving being 8 oz. *According to the label, how many calories are there in 8oz of coke? Wait for a response.* 110 Calories, that is correct! *So if you drink the whole bottle, how many calories would you have consumed? Wait for a response.* That is correct you would have consumed 275 calories. Let's focus our attention back to the chart and to the nutrients that are bolded. *What do you see? Wait for responses.* That is right! These are some of the nutrients available in the food, and it is important to pay attention to them when you are buying and/or consuming food. The number beside them tells us exactly how much of that nutrient there is in the food. The section to the right is called the "Percent Daily Values". Based on your nutrients needs for the day, this helps you track how much nutrients you are consuming. The goal is to reach 100% of each nutrient. *What are some nutrients you see in the purple color on this chart? Wait for responses.* That is correct. With nutrients like fat, sodium and cholesterol, however, be sure not to eat too much of them; it is not advisable to go over 100%. The percent daily value is based on one serving so the numbers can be adjusted if you eat more or less. It is also based on a 2000 calorie diet and may change depending on your caloric need. A high percent daily value for a nutrient means it is abundant in that food. *Look at the coke bottle again and tell me which nutrient you think is abundant. Wait for responses.* That was a very good answer. Now that you know all about how to shop healthy, let's play our shopping game/activity.

Activity

Cut “Shopping Tips Cards” into strips and put them in activity envelopes.

Request that the class divides into groups of 3 people and give each group an activity envelope and game board. While holding up a copy of the game board, explain the game to participants: Participants within each group takes one “Shopping Tip Card” from the activity envelope and read it aloud. The group then discusses the tip and decides where to place it on the game board. The groups have 10-15 minutes for this activity and when the time is up, the class comes together to discuss the tips they picked. Record these on the flip chart to serve as review of main points.

I hope you enjoyed that activity. There is one last activity I want us to do together before we leave. Let’s look at our handout called “Saving Money When Food Shopping”. I would like each one of us to complete this form with new shopping tips we learned today.

LESSON PLAN 3

TAKE CHARGE OF YOUR DIET!

Preparation

1. Read through the lesson and each activity before beginning session
2. Have copies of each handout; enough for every participant
3. Ensure that supplies/materials needed for the session are on hand.

Materials Needed

1. Flip Chart and markers
2. Handout: Recipes

Make Healthful Changes to your Diet

3. MyPyramid Bingo Instructions
4. MyPyramid Bingo Clue Cards
5. MyPyramid Bingo Answer Sheets
6. Paper and pencil for each participant
7. Prizes for bingo game (healthy snacks)
8. Token for reinforcement: Grocery store gift card

Before beginning session:

1. Introduce yourself to the group members
2. Take attendance
3. Give objectives of the session and let inform participants that they can ask questions at any time during the session.
4. Inform participants of points for answering questions and the opportunity to get a prize at the end of the session for having the most points.

Participant Objectives

At the end of this session, participants will learn:

1. What and how to eat from each food group
2. How to cook healthy

During Session: Using attendance sheet, give each participant a point for a correct answer to a posed question. The first participant with the highest point at the end of the session receives a grocery store gift card.

Teaching Guide

Introduction

Welcome back to the Nutrition for HIV Healthy Living Class! I am happy to see you all. We will be discussing healthy eating today and will be paying more attention to eating whole grains, fruits and vegetables and cheap plant based proteins. *What are some reasons why we eat? Wait for responses.* As we all know, food is good; in fact food is very important. The body becomes weak and doesn't function properly when it does not get enough good and healthy food. As we learned from another session, food provides the body with nutrients, energy, and the ability to maintain and repair itself so that it can fight infections. As a result, good nutritional status is important especially during an infection. Good nutrition however does not come about just by eating anything in any quantity but rather eating a variety of healthy foods in the right amounts. *What did we say were three main nutrients we should try and eat to help us achieve good nutrition? Wait for responses. (Answer: Carbohydrates, Protein and Fat, based on lesson 1) What are some food sources for these nutrients? Wait for response.* You all gave the right answers! Let's go into detail about these food sources.

Carbohydrates

As we have already discussed, carbohydrates are a good source of energy and we get carbohydrates from grains, cereals, fruits, and vegetables. These are the healthy sources. Other sources are sodas, cakes, cookies, ice cream, and most processed foods and sweets. We are going to focus on the healthy ones as it is important to consume more of those. There are several types of grains and grain products but the healthy ones are the whole grains. Examples are oats, brown rice, whole grain pasta, bread, muffin, crackers, breakfast cereals, flour etc. These have fiber, are low in fat and are better sources of carbohydrates than potatoes, regular pasta, white bread or white rice. With the exception of potatoes, the others have been stripped of fiber and other important nutrients. Most people complain about the texture of whole grains and as a result do not like to eat them. You can gradually introduce whole grain products into your meals by mixing them with the regular ones until your taste buds adjust to the taste and texture. A good goal will be to make half of the grains you currently eat whole and gradually make everything whole. It is recommended that we eat 6 ounces of grains in a day. Examples of what counts as 1 ounce are a slice of bread, a cup of ready to eat cereals, and ½ cup of cooked cereals, rice, or pasta.

Vegetables

Vegetables are another good source of carbohydrates and fiber. *What are some vegetables you like to eat? Wait for response. What are some reasons why you choose these kinds of vegetables? Wait for response.* Based on your answers, we can see that there are different types of vegetables, each with different nutrients. *Can we name some vegetables by categories? Let's start with dark green ones* (Answers: spinach, romaine

and broccoli etc.) *How about orange ones? Wait for response.* (Answers: carrots, sweet potatoes, pumpkin, squash etc.) *What are some starchy vegetables? Wait for response* (Answers: corn, green peas, etc.). It is important to add variety when eating vegetables so we can get the various nutrients they provide. All vegetables are good regardless of how they are packaged, that is whether fresh, frozen, or canned. Buy the types of vegetables you can afford. When buying canned vegetables, however, be sure to buy those that have low sodium contents. It is recommended that we eat 2 ½ cups of vegetables in a day with ½ cup being considered a serving.

Fruits

Does anyone know how many servings of fruit we are supposed to eat each day? Wait for response. (Answer: 4 servings or 2 cups) That is right! One small fruit or ½ cup of fresh, frozen or canned fruit counts as a serving. A serving can also be ¼ cup of dried fruits or ½ cup of fresh juice. Just like vegetables all fruits are good for you regardless of how they are processed or packaged.

Proteins

Let's shift our focus to proteins. Proteins do not produce as much energy as fat but are needed to maintain organs, muscles and other substances the body needs to fight infections. Good sources of protein are meats, poultry, seafood, beans and peas as well as eggs. While meats sources of protein are good, they are often high in fat so it is recommended that lean versions be consumed. Eggs and low fat dairy are cheap and good sources of protein, however, beans, peas and lentils are just as good and even cheaper. They are also easy to cook, low in fat and high in fiber. Other nutrients that can be found in beans are vitamins and minerals. Eating a lot of beans and peas helps us meet our

protein needs without a high cost. Beans are easy to store too; they can either be frozen after cooking or can be stored dry. Most people claim that cooking beans takes time. While this can be true, depending on the kind of bean, soaking them overnight reduces the cooking time. The recommendation for protein intake especially during HIV infection is 0.6-0.9 grams per pound body weight. This translates approximately to between 100-150g/day for HIV+ men and about 80-100g/day for HIV+ women. A serving of protein is about 3-4 ounces for meat (which is approximately the palm of a hand or a deck of cards); ½ cup of beans serves as 2 ounces. You can know how much protein you are eating by looking at the nutrition label; the amount of protein in a serving is always listed.

At the end of today's session, you will all receive recipes that are healthy, cheap and easy to make. Making these foods will help you practice at home what we have discussed today. Now let's all take out the handout that says "Make Healthful Changes to your Diet". We need to complete it before we play our bingo game. *Write the foods you ate yesterday and better choices you could make to the future. (Allow 10 minutes for this activity). Before we play our bingo game, I would like you to listen to a success story of someone who is HIV infected and although she lived on a limited income, has been able to achieve her aim of eating healthy.* Participants may discuss the changes they have seen in their health after deciding to eat healthy.

Activity

Get group together to play MyPyramid Bingo. Instruction and game cards can be found in appendix C. Give each participant a copy of Healthy Living Recipes.

LESSON PLAN 4

KEEP THE BUGS OUT!

Preparation

1. Read through the lesson and each activity before beginning session
2. Have copies of each handout; enough for every participant
3. Ensure that supplies/materials needed for the session are on hand.

Materials Needed

1. Flip Chart with markers
2. Handout: Cooking Meat, Poultry and Seafood Safely
Food Safety Tips
3. Paper and Pencils for participants
4. Cooking thermometers for each participant
5. Copies of Food Safety bingo game
6. Dried bean pieces for bingo game
7. Snacks as prizes for bingo game
8. Token for reinforcement: Grocery store gift card

Before beginning session:

1. Introduce yourself to the group members
2. Take attendance
3. Give objectives of the session and inform participants that they can ask questions at any time during the session.
4. Inform participants of points for answering questions and the opportunity to get a prize at the end of session for having the most points.

Participant Objectives

At the end of this session, participants will learn:

1. The basic principles of food safety
 - 1.1. Food safety when shopping
 - 1.2. How to store foods safely
 - 1.3. How to cook foods safely

During Session: Using attendance sheet, give each participant a point for a correct answer to a posed question. The first participant with the highest point at the end of the session receives a grocery store gift card.

Teaching Guide

Introduction

Welcome to the last of our Nutrition for HIV Healthy Living classes! I am glad to have you all here. Today, we are going to discuss food safety. These are basically ways to overcome foodborne illnesses that are caused by bacteria or germs. These bacteria cannot be seen, tasted or smelled yet can get people very sick; sometimes they can even cause death. *Has anyone gotten sick from bacteria in food? What were some of your symptoms? Wait for responses.* Most people get sick from eating food that is infested with bacteria; however, older adults, babies and individuals with weakened immune system are at risk the most. HIV infected individuals are among those with weakened immune systems. This is because the virus attacks and tries to destroy the immune system. There are several ways to fight back to try and maintain your immune system. These include taking your medications as directed and eating healthy. We can also prevent attacks on our immune system by preventing bacteria that causes foodborne illnesses from entering our

bodies. Today's class will discuss tips on how to do this. We will discuss food safety when shopping, storing and cooking food.

Food Safety When Shopping

Food safety should start from the grocery store. This is because bacteria can be transferred from one food to another even at the point of purchase. Here are some steps to take to keep your food safe when grocery shopping:

- Buy food before the sell by or expiration date.
- When buying foods that are packaged, be sure that the packaging is tight. In the case of meats, this will prevent you from spilling the juice from the meat onto other foods.
- When buying eggs, open the carton to make sure that no egg is cracked.
- Be sure to check canned food before buying; do not buy those that are rusted, having dents and/or have bulging lids.
- Frozen and cool foods should be the last foods you buy so they can be kept frozen or cold until you get home.

Once you get home from the grocery shop, foods should immediately be put away especially the perishable, cold and frozen ones.

Food Safety When Handling Food/ Cooking

The next groups of tips we are going to talk about have to do with food safety when handling and cooking food. It is important to wash your hands anytime you handle food and also anytime you expose yourself to germs such as when you use the bathroom, sneeze, blow your nose, or play with pets. Your hand washes should be thorough, should last about 20 seconds and should include under the nails, between fingers and back of

hands. It is also important to wash your utensils before and after using them. Cleaning your kitchen counters and floors often helps to prevent germs from multiplying. A cheap and easy way to do this is to use homemade disinfectant. This can be made by mixing $\frac{1}{4}$ cup chlorine bleach with $2\frac{1}{4}$ cups water and then storing the mixture in a spray bottle.

Cross contamination is the situation when bacteria are spread from one food to another. The best way to keep this from happening is to separate cooked and raw foods like fruits and vegetables from raw meats and eggs. Juices from raw meat contain bacteria and it is dangerous to get these juices on other foods. Be sure to also wash utensils that have come in contact with raw meats with soap and water before using them for other foods like vegetables. Another way to prevent meat juice from getting onto vegetables is to cut them before cutting your meat.

Food Safety and Food Temperature

So far, I am been doing the talking. Let's go around the room and give examples of certain foods that need attention during preparation to ensure that they are cooked at well. Wait for responses. Food needs to be handled in a particular temperature to either keep bacteria from multiplying or to kill them. Bacteria thrive very well in temperatures between 41°F and 140°F . This is known as the danger zone and includes room temperature. As such, food that needs to be kept cold needs to be either refrigerated or frozen. This environment is below 41°F to keep bacteria from multiplying. Foods that need to be cooked should be cooked at temperature above 140°F . Be sure to cook meats such that the center is not pink in color. The best way to make sure your food is cooked at the right temperature is to use a thermometer. Today, you are each going to receive a thermometer so you can always measure the temperature of your meats, poultry and

seafood. Each one of you should also have the handout that says ‘Cooking Meats, Poultry, and Seafood Safely’ This handout has a list of the types of meat and the correct temperatures to cook them at. You can keep this on top of your refrigerator or in a cupboard in your kitchen.

Once food is cooked, it should be refrigerated within 2 hours. Leaving food at room temperature for a long time (more than 2 hours) can help bacteria growth; such a food should be thrown out. Ideally, left overs also need to be thrown out after 3 days. Every food has a distinct color, smell, flavor, texture, and taste. One can tell if food is still good to eat by changes in these characteristics. It is important not to eat any food if you think it is spoiled. For most of us, our initial instinct when we suspect food is bad is to try and recover it. This can be dangerous as food that is gone bad is full of bacteria. The rule of thumb is “If you are in doubt about whether the food is good or bad, then through it out”

Let’s talk about our last food safety tip which has to do with how we thaw food. The best way to thaw or defrost meat is to do it in the microwave. It is fast and easy. Meat can also be thawed by putting it under cold running water for a while or by leaving it in the refrigerator for a couple of days before the day you actually use it. Thawing meat on the counter at room temperature is not considered good. This is because bacteria grows very fast at this temperature.

So far we have been talking about steps to take to prevent foodborne illnesses. Let’s do our activity for the day to remind ourselves of what we have discussed today.

ACTIVITY: FOOD SAFETY BINGO

Give each participant food safety bingo cards and dried beans to use as pieces for the bingo game. The bingo cards and statements can be found in the appendix D of this manual. Cut food safety statements into strips and place in a container. Shuffle, draw and read each stripe at a time. Ask participants to find that food safety fact on their bingo cards. The participant who is first to accurately declare bingo wins. Prizes can be any healthy snacks.

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Appendices: Handouts and Activity

A: Facts about HIV and Nutrition

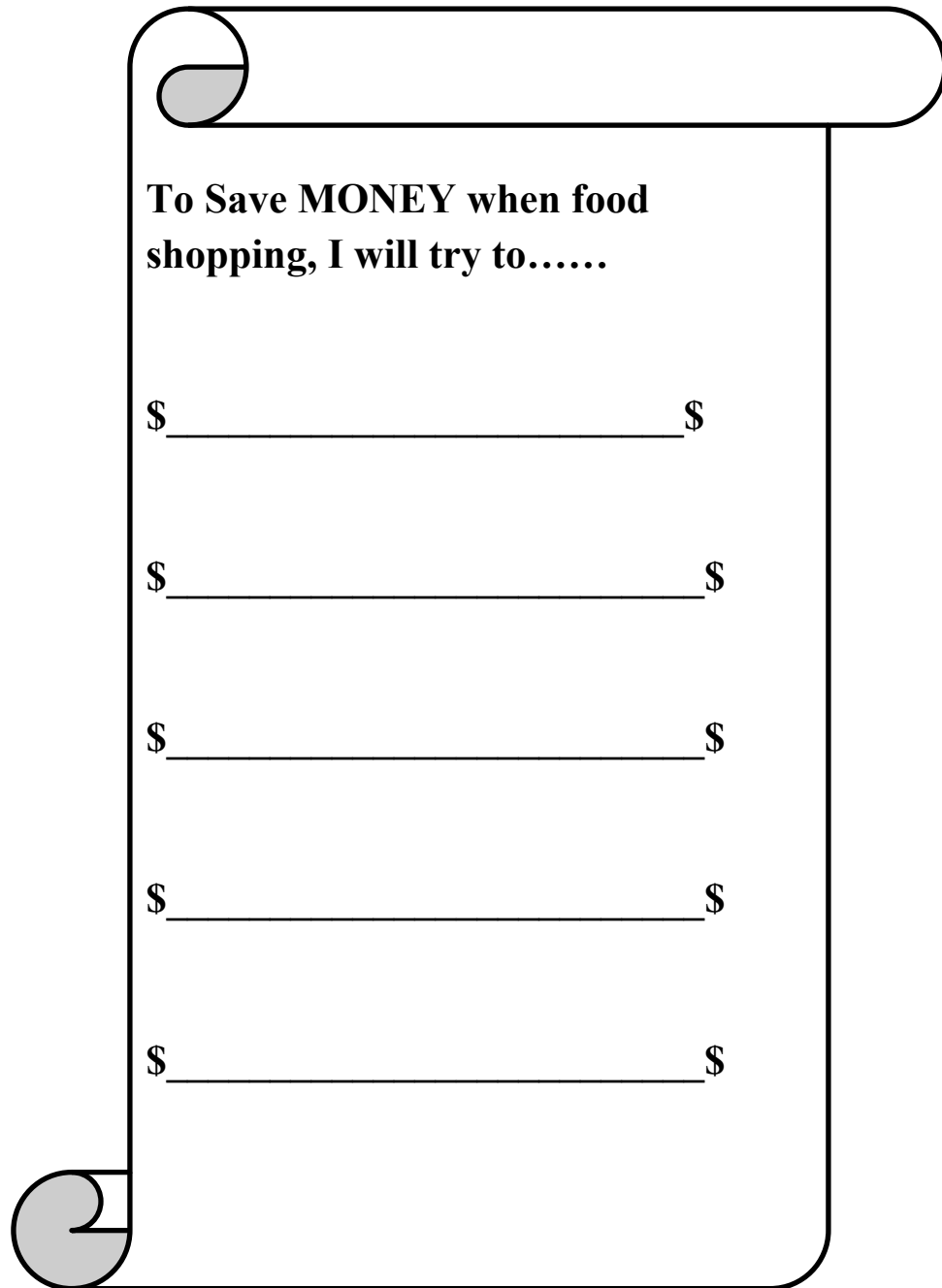
Effects of HIV Infection

- Increased energy needs
- Not being able to absorb nutrients
- Side effects of drugs
- Frequent diarrhea episodes
- Nausea and vomiting
- Frequent infections, e.g. skin, mouth, etc....
- Increased nutrient requirements
- Decreased appetite

How Nutrition Can Help

- Build immune system
- Prevent weight loss
- Slow down HIV disease progression
- Good nutrition status
- Prevent Fatigue
- Better quality of life
- Fight Infections

B1: Saving Money When Food Shopping Handout



To Save MONEY when food shopping, I will try to.....

\$ _____ \$

\$ _____ \$

\$ _____ \$

\$ _____ \$

\$ _____ \$

Source: University of Wisconsin Extension Nutrition Education Program

B2: Shopping Tips Cards

Buy store brands instead of national brands – they often cost less.	Choose store brands of canned fruits and vegetables to get good quality at a lower price.
Learn the layout of the store you usually shop at, so you can find foods quickly.	Use a grocery list every time you shop for food.
Know how much you can spend for food each week.	Use coupons for items you usually buy.
Look for in-store specials and coupons near the entrance of the store and throughout the aisles.	Check to see if multiple item specials are really a good price.
Buy foods that you use a lot in large size packages, only if you can use it all before it spoils.	Use an envelope to hold your coupons and list when shopping.
Check for foods on hand before making grocery list	Compare brand prices of foods before and buy the least expensive

Source: University of Wisconsin Extension Nutrition Education Program

Buy plain frozen vegetables instead of ones with special sauces or seasonings.	Cut whole chicken into pieces yourself, it usually costs less.
Buy plain pasta shapes like macaroni – they are cheaper than fancy shapes	Buy brown rice, regular white rice and converted rice – they cost less than instant rice.
Read food labels to limit buying unhealthy foods	Eat before going food shopping. If you are hungry, you will be more tempted to buy foods that are not on your list
Buy dried beans, peas and lentils to make hearty, low-cost soups and casseroles	Save money by buying a block of cheese and slicing or grating it yourself
Go down only the aisles where you can find foods on you list. “Sight-seeing” in other aisles may tempt you to buy something you don’t need	Avoid foods packaged in individual servings—you pay a lot more for the extra packaging
Buy fruits and vegetables that are in season	Use an envelope to hold your coupons and list when shopping

Source: University of Wisconsin Extension Nutrition Education Program

B3: Game Board

ALREADY DO IT

WILL TRY IT

**NOT PRACTICAL
FOR ME
OR
DON'T WANT TO DO**

Source: University of Wisconsin Extension Nutrition Education Program

C1: Healthy Living Recipes

QUICK SPANISH RICE

Serves 4

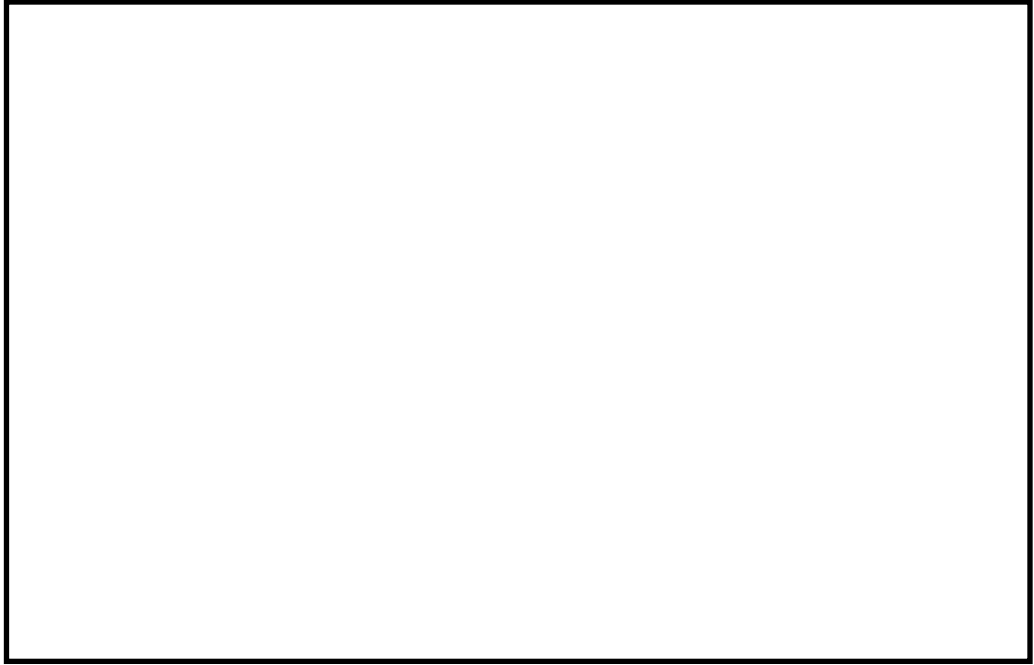
2 cups cooked brown rice
1/3 cup grated cheese
1/2 cup green pepper, chopped
3/4 cup condensed tomato soup

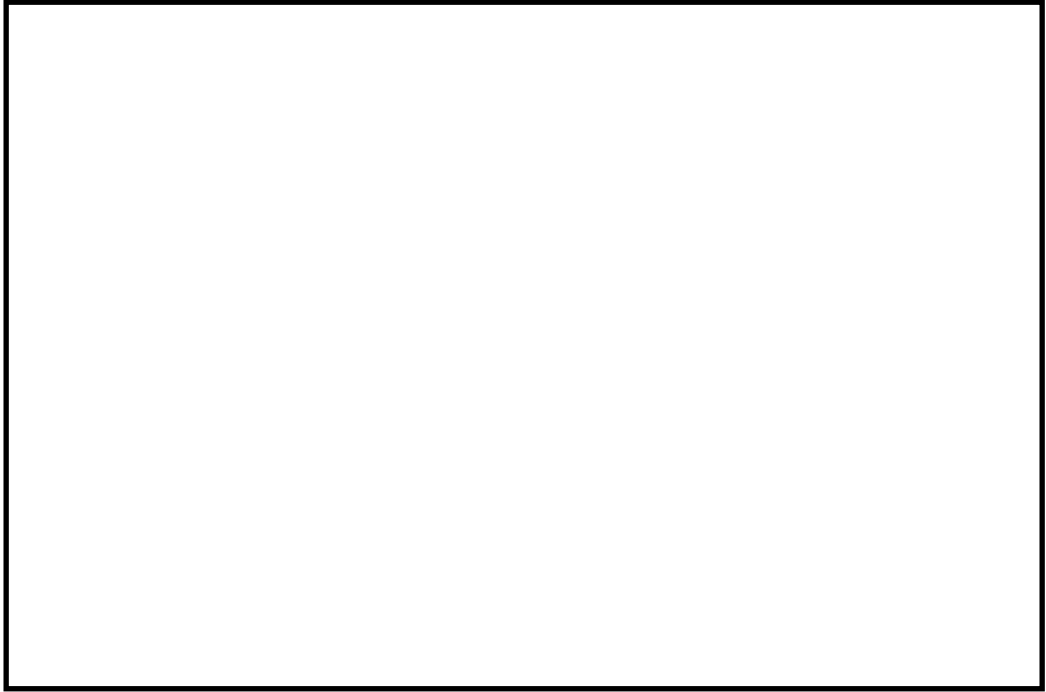
1 teaspoon grated onion
1/4 cup water
1/8 teaspoon pepper
3 strips bacon

1. Preheat oven to 375°.
2. Mix rice and other ingredients except bacon together
3. Greased 1-quart casserole and pour mixture into it.
3. Place bacon on top and bake for 20 minutes.

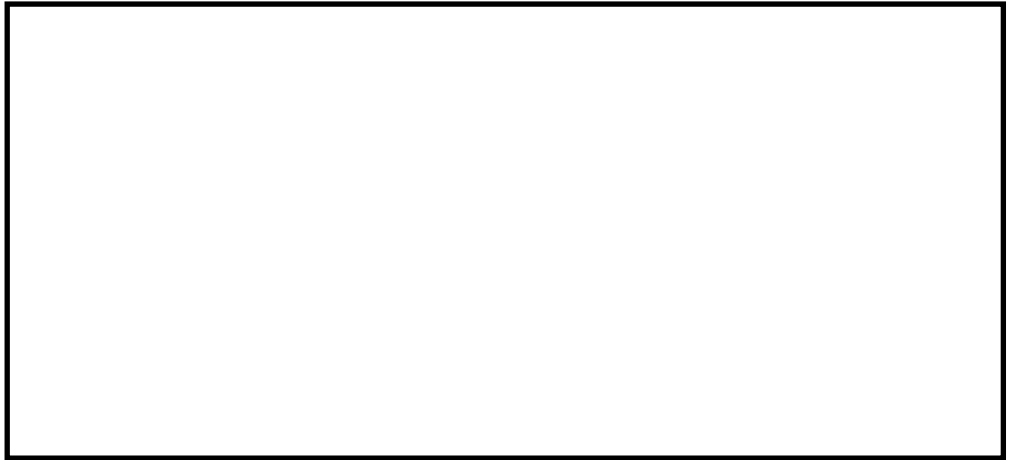
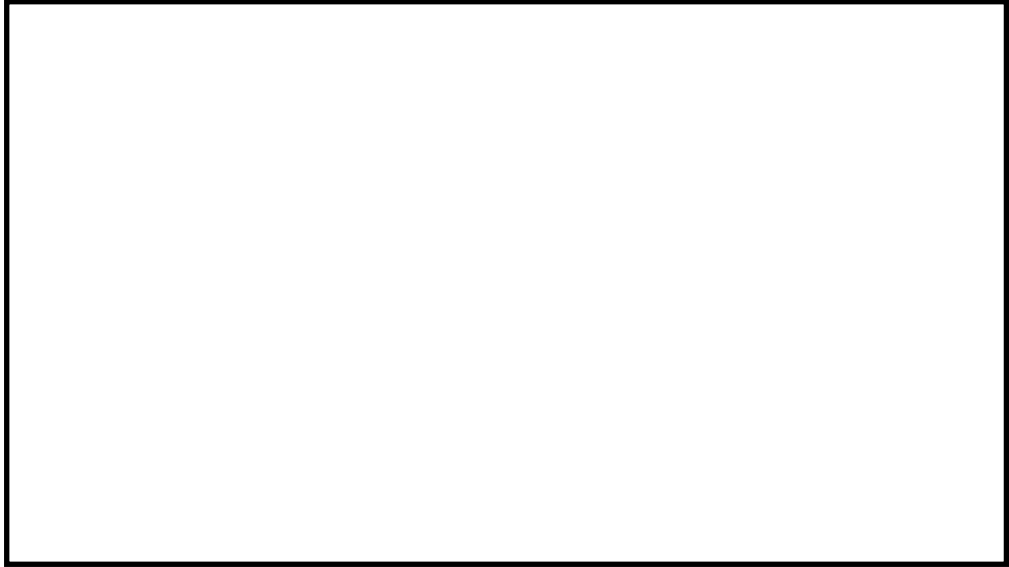
Nutrition Facts (per serving): Calories 220 ~ fat 5 g ~ calories from fat 45 ~ sodium 470 mg ~total carbohydrate 30 g ~ fiber 3 g

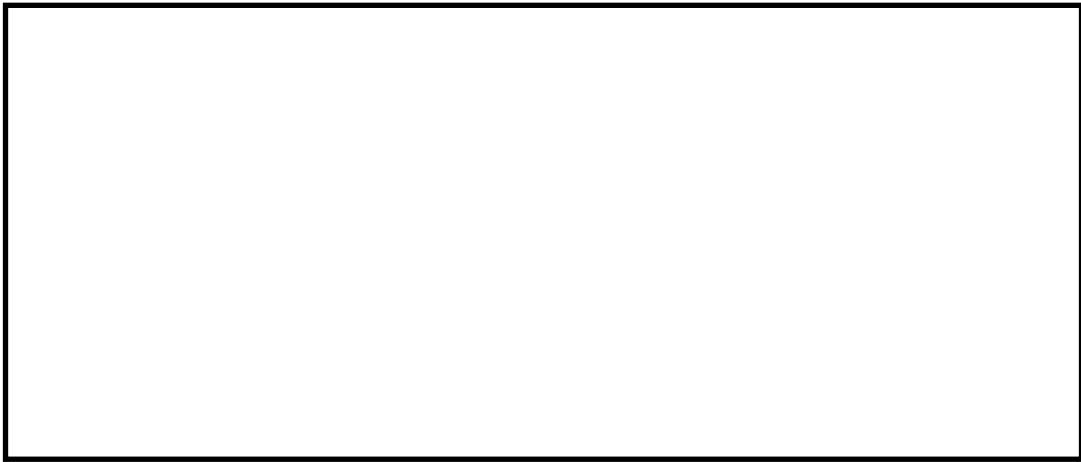






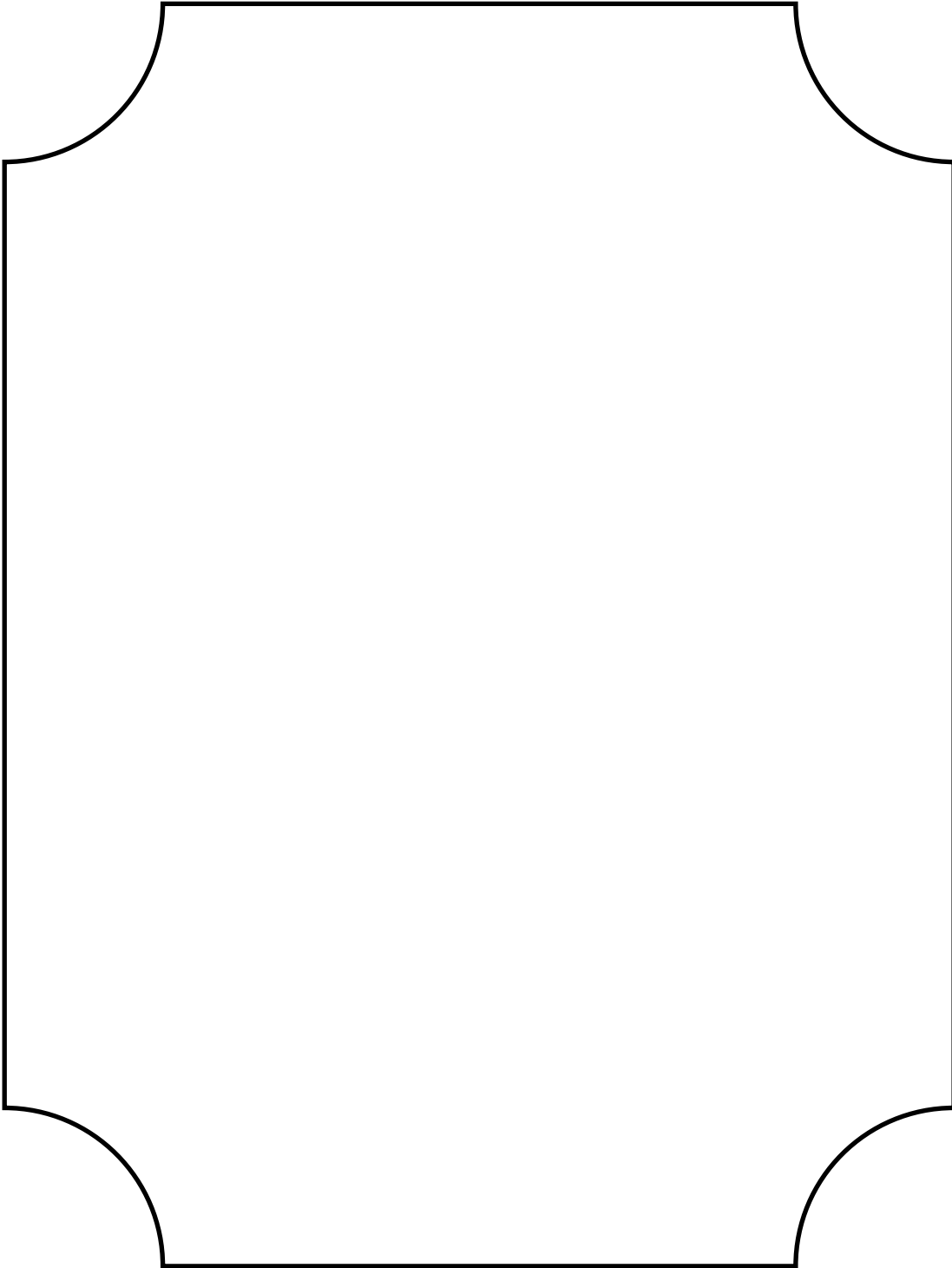






Recipes Source: University of Illinois Extension, Food Stamp Nutrition Education

C2: Make Healthful Changes to your Diet



Source: University of Wisconsin Extension Nutrition Education Program

C3: MyPyramid Bingo Instructions

Supplies

MyPyramid bingo cards (7 different cards available)

Small bathroom dispenser cups

Dried beans

MyPyramid Bingo clue cards

MyPyramid Bingo answer sheet

Prizes (e.g. healthy snacks)

Instructions

“Place dried beans in cups. Dried beans are to be used as bingo game pieces.

Distribute bingo cards and dried beans to players. Instruct them to put a game piece in the free space on their card. Tell them you will be calling out a clue for one of the foods found on their bingo card. The players need to place a game piece (dried bean) on the bingo card picture of the food described on the clue card.

The game caller must first cut out the MyPyramid Bingo clue cards then shuffle them. With the deck of cards face down, pick the top card and read the clue for a food written on the card. After the game caller reads the MyPyramid Bingo clue card, they place that card on the answer sheet on top of the food described by the clue card.

To win the game, the players need to line up game pieces vertically, horizontally or diagonally on their bingo cards. When they completely fill in a line with their game pieces they must yell out loud "MyPyramid Bingo" for everyone to hear. The first person to yell out "MyPyramid Bingo" must have their answers checked before they are declared

the winner. To check the card of a person who yells bingo ask them to tell you the name of each food found in their vertical, horizontal or diagonal line. They are a winner if the answers are in a horizontal, vertical or diagonal line and their food names correspond with the foods found on your answer card. Suggestions for prizes would be healthy snacks, MyPyramid mini-poster, etc”.

Source: University of Illinois Extension, Food Stamp Nutrition Education

C4: MyPyramid Bingo Clue Cards






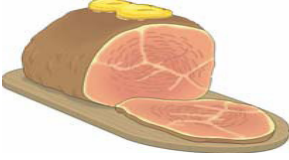




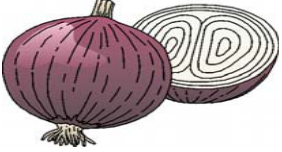
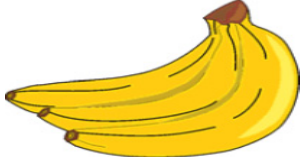












<p>This food belongs to the fruits group. It is divided into segments.</p> <p style="text-align: center;">ORANGE</p>	<p>This food belongs to the milk group. Mice are especially fond of it.</p> <p style="text-align: center;">CHEESE</p>	<p>This food belongs to the grain group. It rhymes with ice.</p> <p style="text-align: center;">RICE</p>	<p>This food belongs to the milk group. It is enjoyed when poured on top of your cereal.</p> <p style="text-align: center;">MILK</p>	<p>This food is needed for good health but in small amounts. It is not in a food group but is part of the MyPyramid.</p> <p style="text-align: center;">OILS</p>
<p>This food belongs to the meat & beans group. It comes from a pig.</p> <p style="text-align: center;">HAM</p>	<p>This food belongs to the meat & bean group. It is often accompanied by jelly.</p> <p style="text-align: center;">PEANUT BUTTER</p>	<p>This food belongs to the grain group. Slice it and make your favorite sandwich.</p> <p style="text-align: center;">BREAD</p>	<p>This food belongs to the vegetable group. It is a favorite food of rabbits.</p> <p style="text-align: center;">CARROT</p>	<p>This food belongs to the grain group. It comes in a variety of shapes, served in salads or topped with sauce.</p> <p style="text-align: center;">PASTA</p>
<p>This food belongs to the vegetable group. It grows underground. It can make you cry.</p> <p style="text-align: center;">ONION</p>	<p>This food belongs to the fruit group. It is grown in clusters and monkeys love to eat it.</p> <p style="text-align: center;">BANANA</p>	<p>FREE</p>	<p>This food belongs to the vegetable group. It is red and juicy and often the main ingredient in sauces.</p> <p style="text-align: center;">TOMATO</p>	<p>This food belongs to the meat & bean group. It will crack if dropped.</p> <p style="text-align: center;">EGG</p>
<p>This food belongs to the meat & bean group. They may need to be soaked before cooking.</p> <p style="text-align: center;">BEANS</p>	<p>This food belongs to the grain group. It is commonly known as a breakfast food.</p> <p style="text-align: center;">CEREAL</p>	<p>This food belongs to the grain group. It is shaped like a donut with a hole in the middle.</p> <p style="text-align: center;">BAGEL</p>	<p>This food belongs to the vegetable group. It grows underground and is very popular french fried.</p> <p style="text-align: center;">POTATO</p>	<p>This food belongs to the milk group. It comes in many flavors and fruit is often added.</p> <p style="text-align: center;">YOGURT</p>
<p>This food belongs to the fruits group. It is red, juicy, and sweet with lots of tiny seeds. It goes well with shortcake.</p> <p style="text-align: center;">STRAWBERRIES</p>	<p>This food belongs to the vegetable group. It looks like a tree.</p> <p style="text-align: center;">BROCCOLLI</p>	<p>This food belongs to the fruit group. It comes in red, yellow and green colors. Hot cider is made from these.</p> <p style="text-align: center;">APPLES</p>	<p>This food belongs to the meat & bean group. It is harvested from the ocean.</p> <p style="text-align: center;">TUNA</p>	<p>This food belongs to the vegetable group. It grows in a pod.</p> <p style="text-align: center;">PEAS</p>

C5: MyPyramid Bingo Answer Sheet











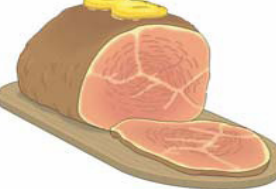






Source: University of Illinois Extension, Food Stamp Nutrition Education

ORANGE	CHEESE	RICE	MILK	OILS
HAM	PEANUT BUTTER	BREAD	CARROT	PASTA
ONION	BANANAS	FREE SPACE	TOMATO	EGG
BEANS	CEREAL	BAGEL	POTATO	YOGURT
STRAWBERRIES	BROCCOLI	APPLE	TUNA	PEAS





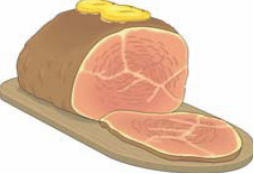



















MyPyramid Bingo

				
				
		FREE SPACE		
				
				

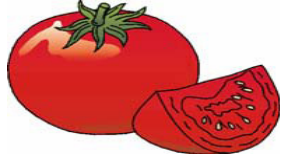



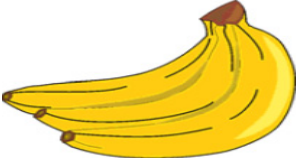

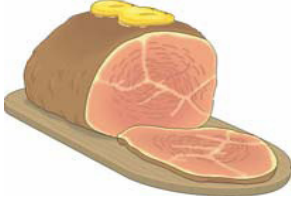

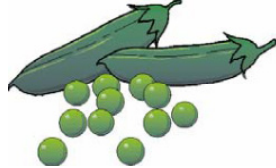






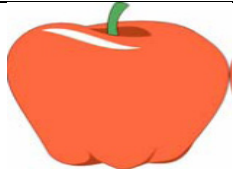
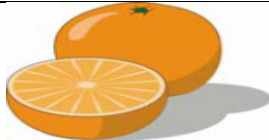
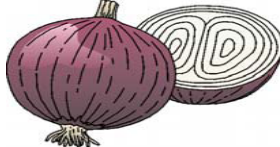
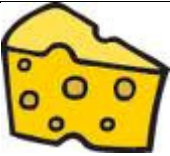




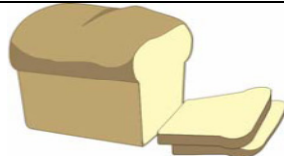
MyPyramid Bingo

				
				
		FREE SPACE		
				
				



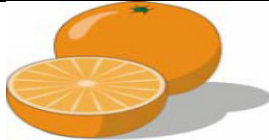



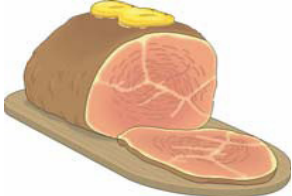

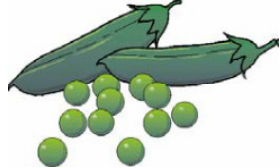





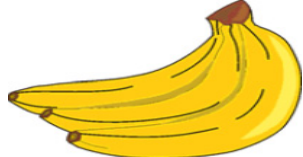


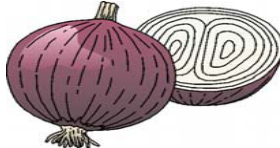






MyPyramid Bingo

				
				
		FREE SPACE		
				
				

MyPyramid Bingo

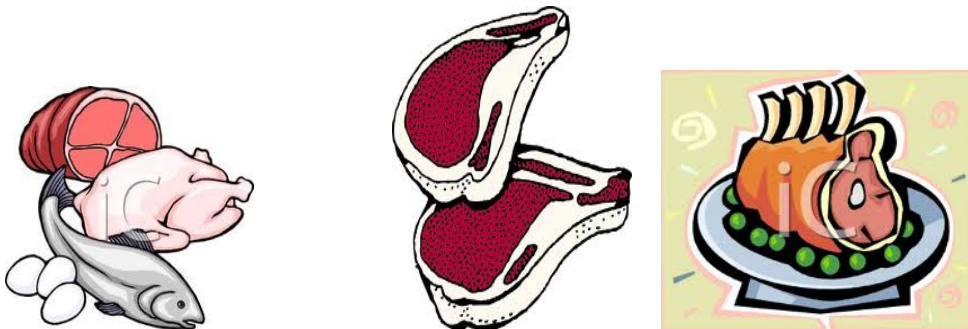
				
				
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MyPyramid Bingo

				
				
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D1: Cooking Meat, Poultry and Seafood Safely Handout

- Insert the thermometer into the thickest part of the meat and keep it there for **15 seconds** to be sure the meat is the right temperature and safe to eat.
- Beef and pork roasts need to have the correct temperature for **3 minutes**.
- Clean thermometer (using paper towel soaked with a little rubbing alcohol or alcohol wipe) before and after use!

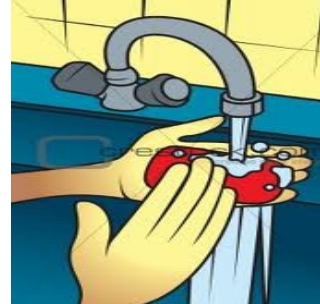


Type of Meat	Temperature
Poultry Stuffing Stuffed Meats	165°F (74°C)
Ground meats Sausage	155°F (68°C)
Beef roasts Pork Lamb Mutton	145°F (63°C)
Fish Seafood	145°F (63°C)

Source: Sacramento Hunger Commission Nutrition Education Manual

D2: Food Safety Tips Handout

- **Always wash hands with soap and water before eating or cooking**
- **Keep your hands, cooking utensils and the kitchen (e.g. countertops) clean**
- **Thaw food in the refrigerator**
- **Keep hot foods hot and cold foods cold.**
- **Use a food thermometer to be sure meat is fully cooked.**
- **Refrigerate leftovers immediately**
- **Foods should not be left at room temperature for more than 2 hours.**



Source: University of Illinois Extension, Food Stamp Nutrition Education

D3: Food Safety Bingo Game Clues

Instructions and Clues

“ Listed below are food safety statements. Cut food safety statements into strips.

Place the strips of paper into a container. Draw these strips from the container one at a time. Read the strip and ask participants to look for that food safety fact on their bingo cards. Dried beans, buttons, etc. can be used for the bingo card game pieces.

1. Bacteria can be everywhere so always wash hands in warm, soapy water for at least 20 seconds before preparing food and after handling raw meat, poultry and fish/seafood products.
2. When unsure if the food is safe to eat, never taste it. Be on the safe side and dispose of it properly.
3. Never leave perishable food out of the refrigerator or cooler over 2 hours or longer than 1 hour in hot weather (90 degrees F or hotter). Bacteria can grow quickly at room temperature.
4. Never place the cooler in the trunk of the car or in the sun on warm or hot summer days. Food within the cooler should be kept cold (40 degree F or less).
5. Never partially cook food and then wait to finish cooking it. This practice encourages the growth of bacteria by keeping the food at the temperature where bacteria multiply fastest. If you do precook meats, immediately finish cooking it.
6. Do not thaw food on the counter top at room temperature. Bacteria can multiply very quickly. The safest way to thaw foods is in the refrigerator.
7. Do not allow time for bacteria to grow. Food should remain no longer than 2 hours at room temperature and no more than 1 hour in hot weather (90 degrees F or above). Put leftovers in the refrigerator or cooler immediately after eating.

8. A good sanitizing solution is 1 tablespoon unscented, liquid chlorine bleach to 1 gallon of water. Allow sanitizing solution to sit for a few minutes on the surface of the item being sanitized before washing it off.
9. To help control the growth of bacteria that may be in food, keep cold foods cold, below 40 degrees F and keep hot foods hot, above 140 degrees F.
10. Any beef can be contaminated with *E. coli* . A temperature of 160 degrees F held for 15 seconds will kill these bacteria. Use a thermometer inserted in the middle of the meat to make sure it has been cooked enough to reach the recommended internal temperature.
11. Use clean utensils to remove cooked food from the stove or grill and place cooked food on a clean plate. Never put the cooked food back on the plate that held the raw product.
12. Do not use cutting boards that have become pitted, chipped or cracked. Bacteria can hide in these areas and be very difficult to clean. When possible have two separate cutting boards...one for use with meat only.
13. Research shows that most of foodborne illness originates in people's homes.
14. Divide large amounts of leftovers into small shallow (2-inch or less deep) containers for quick cooling in the refrigerator.
15. Marinades are a good way to tenderize tougher cuts of meat. Be sure to marinate food in the refrigerator.
16. Although you can't see, taste or often smell harmful bacteria, they can be anywhere---in the air, in the soil, and on/in humans and animals.
17. Bacteria like to grow in warm temperatures. Warm weather is also the time people like to cook outdoors...providing ideal opportunities for foodborne illness to occur.
18. Use a separate cooler for drinks so the one containing perishable food won't be constantly opened and closed.
19. Perishable foods refrigerated at 40 degrees F or below will slow down the growth of most bacteria.

20. Make sure all food preparation areas and utensils that will touch food are clean.
21. Ground beef cooked rare or medium rare is not recommended because *E. coli* bacteria present may not be destroyed. Use a food thermometer to check and make sure ground beef reaches an internal temperature of 160 degrees F for 15 seconds.
22. To limit flare-ups and charred meat, remove visible fat prior to grilling.
23. Fully cooked foods like hot dogs/frankfurters and leftovers should be cooked to 165 degrees F or until steaming hot.
24. Do not re-use marinade that has been used for basting on raw meat, poultry or fish/seafood.
25. The safest way to thaw food is in the refrigerator.
26. Studies show that most cases of foodborne illness could have been avoided with proper food handling.
27. After thoroughly cooking foods, they should be held above 140 degrees F until serving time.
28. Using a food thermometer takes the guesswork out of determining when food is done. It can also help prevent foodborne illness, overcooking of food, and help hold foods at a safe temperature.
29. Foods thawed in the microwave can reach a temperature that encourages bacteria growth therefore it is important to finish cooking those foods immediately after thawing.
30. Leftover foods should be reheated to 165 degrees F or brought to a rolling boil.
31. Poultry products can contain *Salmonella* bacteria. By cooking poultry to 165 degrees F, these bacteria can be destroyed.
32. To minimize the presence of bacteria, be sure the grill is clean and hot (charcoals should be grayish-white) before beginning to grill food”.

Source: University of Illinois Extension, Food Stamp Nutrition Education

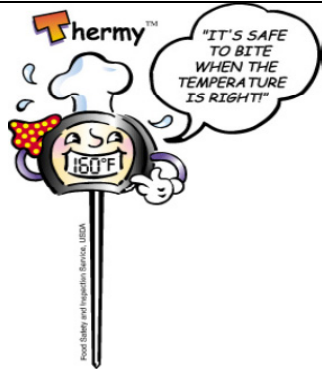
D4: Food Safety Bingo Answers

- (1) Wash hands before handling food
- (2) When in doubt throw it out
- (3) Refrigerate leftovers promptly
- (4) Keep coolers in the shade
- (5) Never partially cook food
- (6) Never thaw food at room temperature
- (7) Serve hot grilled food immediately
- (8) Chlorine bleach is a good sanitizer
- (9) Keep foods out of the "Danger Zone"
- (10) Cook ground beef to 160 degrees F
- (11) Use clean utensils and plates with cooked food
- (12) Throw away worn cutting boards
- (13) Most foodborne illness begins at home
- (14) Put leftovers in small containers
- (15) Marinate food in the refrigerator
- (16) Bacteria can be anywhere
- (17) During warm summer months the risk of foodborne illness rises
- (18) Use separate coolers for beverages and food
- (19) Keep cold foods cold
- (20) Keep everything clean when preparing food
- (21) Do not eat raw or undercooked ground beef

- (22) Before grilling, remove visible fat to limit flare-ups
- (23) Fully cooked foods and leftovers should be reheated to 165 degrees F
- (24) Reserve unused marinades for basting cooked food
- (25) Use the refrigerator to thaw foods safely
- (26) Most foodborne illness can be prevented
- (27) Keep hot foods hot
- (28) Use a meat thermometer
- (29) Immediately cook foods thawed in the microwave
- (30) Reheat foods properly
- (31) Cook poultry to 165 degrees F
- (32) Before grilling food have the grill/coals hot


Source: University of Illinois Extension, Food Stamp Nutrition Education

D5: FOOD SAFETY BINGO CARD

<p>Do not eat raw or undercooked ground meat</p>	<p>Before grilling, remove visible fat to limit flare-ups</p>	<p>Reserve unused marinades for basting cooked food</p>
<p>Use the refrigerator to thaw foods safely</p>	 <p>The image shows a cartoon thermometer character named 'Thermy'. The character has a smiling face, a chef's hat, and a speech bubble that says "IT'S SAFE TO BITE WHEN THE TEMPERATURE IS RIGHT!". The thermometer dial shows 160°F. The character is holding a small blue object. The text 'Thermy™' is written above the character, and 'Food Safety and Inspection Service, USDA' is written vertically on the thermometer stem.</p>	<p>Keep hot foods hot</p>
<p>Use a meat thermometer</p>	<p>Reheat foods properly</p>	<p>Wash hands before handling food</p>

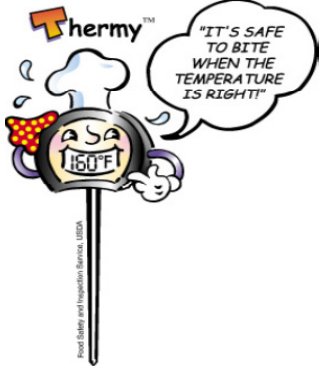
Source: University of Illinois Extension, Food Stamp Nutrition Education

FOOD SAFETY BINGO CARD

<p>Immediately cook foods thawed in the microwave</p>	<p>Reheat foods properly</p>	<p>Cook poultry to 165°F</p>
<p>Before grilling food have the grill/coals hot</p>		<p>Wash hands before handling food</p>
<p>When in doubt throw it out</p>	<p>Refrigerate leftovers promptly</p>	<p>Keep coolers in the shade</p>

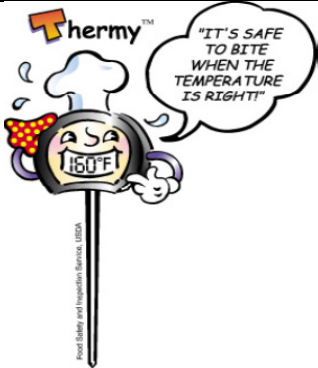
Source: University of Illinois Extension, Food Stamp Nutrition Education

FOOD SAFETY BINGO CARD

<p>Wash hands before handling food</p>	<p>When in doubt throw it out</p>	<p>Cook poultry to 165°F</p>
<p>Keep coolers in the shade</p>		<p>Never partially cook food</p>
<p>Never thaw food at room temperature</p>	<p>Serve hot grilled food immediately</p>	<p>Chlorine bleach is a good sanitizer</p>

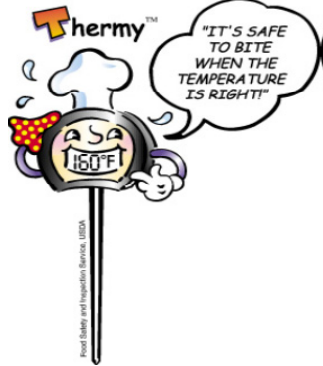
Source: University of Illinois Extension, Food Stamp Nutrition Education

FOOD SAFETY BINGO CARD

<p style="text-align: center;">Refrigerate leftovers promptly</p>	<p style="text-align: center;">Keep coolers in the shade</p>	<p style="text-align: center;">Never partially cook food</p>
<p style="text-align: center;">Never thaw food at room temperature</p>	 <p style="text-align: center;">Food Safety and Inspection Service, USDA</p>	<p style="text-align: center;">Serve hot grilled food immediately</p>
<p style="text-align: center;">Chlorine bleach is a good sanitizer</p>	<p style="text-align: center;">Keep foods out of the “Danger Zone”</p>	<p style="text-align: center;">Cook ground beef to 160°F</p>

Source: University of Illinois Extension, Food Stamp Nutrition Education

FOOD SAFETY BINGO CARD

<p>Keep foods out of the “Danger Zone”</p>	<p>Cook ground beef to 160°F</p>	<p>Never partially cook food</p>
<p>Most foodborne illness begins at home</p>		<p>Marinate food in the refrigerator</p>
<p>Bacteria can be anywhere</p>	<p>During summer months the risk of foodborne illness rises</p>	<p>Keep cold foods cold</p>

Source: University of Illinois Extension, Food Stamp Nutrition Education

Appendix B: Consent Forms



ADULT CONSENT TO PARTICIPATE IN A RESEARCH STUDY
OBSERVATIONAL STUDY

Participation in the Food Stamp Program by low income HIV infected Adults:
Effect on Nutrition and Health Outcomes

PURPOSE OF THE STUDY

You are being asked to participate in a research study. The purpose of this study is to assess the impact of the food-stamp program on nutrition, HIV disease, perceived health and quality of life of people living with HIV who are eligible for food and nutrition programs. Additionally, the study will be used to identify nutrition concerns of people living with HIV as well as barriers to participation in the food stamp program among HIV infected eligible non-participants.

NUMBER OF STUDY PARTICIPANTS

If you decide to be in this study, you will be one of 214 people in this research study.

DURATION OF THE STUDY

Your participation will require about 45 minutes to 1 hour of your time.

PROCEDURES

If you agree to be in the study, we will ask you to do the following things:

1. Complete study questionnaires and complete body composition measurements. The questionnaires will assess information about you, your nutrition and health status, as well as nutritional concerns.
2. Bring a copy of your current labs (not older than 3 months from the day of your initial visit)

RISKS AND/OR DISCOMFORTS

This study does not pose any substantial risk to you, since you will only be completing a questionnaire and undergoing body composition measurements. We do, however, realize that release of confidential data may occur despite all our measures to maintain confidentiality. As such, specific identification numbers will be used to code your information during collection, handling and management, to prevent identification of your data. All data collected will be protected by passwords, and access to the data will be limited to the investigators.

BENEFITS

This study will help determine the impact that the food stamp program has on the nutrition and health status of adults living with HIV. It will also help identify barriers to participation in the food assistance programs of HIV infected adults who are eligible but not participating in this type of program. The information obtained by this study will assist program administrators in identifying and targeting those who need greater outreach efforts in order to maximize Food Stamp Program participation, and improve nutritional services and benefits to people living with HIV.

ALTERNATIVES

You always have the alternative of not participating or withdraw from the study at any time. You will be informed of any significant new finding developed during the course of the research which may affect your willingness to continue participating.

CONFIDENTIALITY

The records of this study will be kept private and will be protected to the fullest extent provided by law. Publication of results will not include any information that will make it possible to identify a participant. Research records will be stored securely and only the researcher team will have access to the records. The U.S. Department of Health and Human Services (DHHS) and/or the Food and Drug Administration (FDA) may request to review and obtain copies of your records. Your records may also be reviewed for audit purposes by authorized University staff or other agents who will be bound by the same provisions of confidentiality.

COMPENSATION & COSTS

You will be reimbursed for your time and any other expenses with \$10.

MEDICAL TREATMENT

Routinely, FIU, its agents, or its employees do not compensate for or provide free care for human subjects in the event that any injury results from participation in a research project. If you become ill or injured as a direct result of participating in this study, contact your regular medical provider. If you have insurance, your insurance company may or may not pay for these costs. If you do not have insurance, or if your insurance company refuses to pay, you will be billed. Funds to compensate for pain, expenses, lost wages and other damages caused by injury are not routinely available.

RIGHT TO DECLINE OR WITHDRAW

Your participation in this study is voluntary. You are free to participate in the study or withdraw your consent at any time during the study. Your withdrawal or lack of participation will not affect any benefits to which you are otherwise entitled. The investigator reserves the right to remove you without your consent at such time that they feel it is in your best interest or that of the research.

RESEARCHER CONTACT INFORMATION

If you have any questions about the purpose, procedures, or any other issues relating to this research study you may contact my advisor, Dr. Adriana Campa at 305-348-2871, or me (Irene Hatsu) at 540-797-6662, or ihats001@fiu.edu.

IRB CONTACT INFORMATION

If you would like to talk with someone about your rights of being a subject in this research study or about ethical issues with this research study you may contact the FIU Office of Research Integrity by phone at 305-348-2494 or by email at ori@fiu.edu.

PARTICIPANT AGREEMENT

I have read the information in this consent form and agree to participate in this study. I have had a chance to ask any questions I have about this study, and they have been answered for me. I understand that I am entitled to a copy of this form after it has been read and signed.

Signature of Participant

Date

Printed Name of Participant

Signature of Person Obtaining Consent

Date



**ADULT CONSENT TO PARTICIPATE IN A RESEARCH STUDY
INTERVENTION STUDY**

**Participation in the Supplemental Nutrition Assistance Program (SNAP) by low
income HIV infected Adults: the Effect of a Nutrition Education Intervention**

PURPOSE OF THE STUDY

You are being asked to be in a research study for 12 months. The purpose of this study is to determine the effectiveness of a nutrition education intervention in improving nutritional status, health status and disease progression through increases in nutrition knowledge, and self-confidence in healthy dietary habits and nutrient intake among low income HIV infected adults.

NUMBER OF STUDY PARTICIPANTS

If you decide to be in this pilot study, you will be one of 60 people in this research study.

DURATION OF THE STUDY

Your participation will require 45-60 minutes of your time twice a month for two consecutive months. There will also be one 30-45 minutes assessment prior to and two such visits after intervention visits.

PROCEDURES

This study will compare 3 groups to determine the effectiveness of nutrition education in improving nutrition and health outcomes. If you agree to be in the study, we will ask you to do the following things:

3. You will be randomly assigned to either of three groups, and asked to complete study questionnaires. The questionnaires will be administered at three time points; prior to the nutrition education, at the end of the 4 education sessions, and 3 months after the education sessions.
4. You will be required to attend nutrition education sessions twice a month for two consecutive months. In the sessions, the investigator will present you with information in 45 minutes to an hour.
5. You will be required to complete physical assessment at three time points; prior to the nutrition education, at the end of the 4 education sessions, and 3 months after the education sessions.
6. You will be required to bring your current labs (not older than 3 months from the day of the assessment) prior to the nutrition education, and 3 months after the education sessions.

RISKS AND/OR DISCOMFORTS

This proposed study does not pose any substantial risk to you since the intervention is to provide nutrition education. We do, however, realize that breach of data confidentiality is possible. As such, specific identification numbers will be used during collection, handling and management. All data collected will be encrypted and protected by passwords, and access to the data will be limited to the investigators.

BENEFITS

The benefits for participation in this study include gaining nutrition knowledge, being able to set dietary goals and increasing self confidence. The study will also support

efforts to empower and engage low income HIV infected individuals to improve dietary practices.

ALTERNATIVES

There are no known alternatives available to you other than not taking part in this study.

However, any significant new findings developed during the course of the research which may relate to your willingness to continue participation will be provided to you.

CONFIDENTIALITY

The records of this study will be kept private and will be protected to the fullest extent provided by law. In any sort of report we might publish, we will not include any information that will make it possible to identify a subject. Research records will be stored securely and only the researcher team will have access to the records. Data will be coded, de-identified, encrypted and passworded. The U.S. Department of Health and Human Services (DHHS) and/or the Food and Drug Administration (FDA) may request to review and obtain copies of your records. Your records may also be reviewed for audit purposes by authorized University or other agents who will be bound by the same provisions of confidentiality.

COMPENSATION & COSTS

You will be reimbursed for your time and any other expenses at \$10 for the initial visit and for two subsequent assessment contacts. You will receive snacks and incentives (e.g. grocery store gift card) during each education session.

MEDICAL TREATMENT

Routinely, FIU, its agents, or its employees do not compensate for or provide free care for human subjects in the event that any injury results from participation in a research

project. If you become ill or injured as a direct result of participating in this study, contact your regular medical provider. If you have insurance, your insurance company may or may not pay for these costs. If you do not have insurance, or if your insurance company refuses to pay, you will be billed. Funds to compensate for pain, expenses, lost wages and other damages caused by injury are not routinely available.

RIGHT TO DECLINE OR WITHDRAW

Your participation in this study is voluntary. You are free to participate in the study or withdraw your consent at any time during the study. Your withdrawal or lack of participation will not affect any benefits to which you are otherwise entitled. The investigator reserves the right to remove you without your consent at such time that they feel it is in the best interest.

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answered for me. I understand that I am entitled to a copy of this form after it has been read and signed.

Signature of Participant

Date

Printed Name of Participant

Signature of Person Obtaining Consent

Date

Appendix C1: Screening Questionnaire

1. Age: _____ years.
2. Are you HIV positive? ₁ Yes ₂ No
3. HIV status was determined on ___/___/___
4. Do you receive food stamps? ₁ Yes ₂ No
- 4a. If yes, how many months have you received food stamps in the past 12 months?

- 4b. If no, I would like to screen you using the Food Stamp Program Pre-screening tool to see if you qualify.
- 4bi. Eligible for Food Stamp; ₁ Yes ₂ No

ELIGIBILITY LIST:

If the answer to any of these conditions is **NO**, the participant is ineligible

Inclusion Criteria	YES	NO
HIV positive		
Age ≥ 18 years		
Participant of Food Stamp Program		
Eligible non-participant of Food Stamp Program		
Signature on consent		

Appendix C2: Observational Cross-Sectional Study Questionnaire

A. Demographic Data

For these questions, please circle your answers or write your answers in the spaces provided.

1. Gender: ₁ Male ₂ Female

2. Age: _____ years.

3. Which of the following best describes your ethnic background?

₁ Black/African American ₂ Asian American ₃ Non-Hispanic White
₄ Hispanic American ₅ Native American ₆ Other (specify): _____

4. In what country were you born?

₁ United States
₂ US Territory (Puerto Rico, Guam, Virgin Islands)
₃ Other country (Specify _____)
₄ Unknown

5. Status: ₁ Married ₂ Single ₃ Divorced/Widowed ₄ Other _____

5. Please check your highest level of education.

₁ < High school ₂ High school or GED
₃ 1-2 years college ₄ Graduated from college

6. Child Status: ₁ Children at home ₂ Children not at home ₃ No Children

7. How many people live in your household? _____

8. Please check your highest level of education.

₁ < High school, ₂ High school or GED
₃ 1-2 years college ₄ ≥College degree

9. Work Status: ₁ Not working ₂ Work Part-time,
₃ Work full time ₄ On disability

10. What is your monthly income? ₁ <\$1000 ₂ \$1001-\$2000
₃ \$2001-\$3000 ₄ >\$3001

11. Do you live: ₁ Alone ₂ With your family (parents, husband, children, etc)
₃ Shelter ₄ Street

12. Do you smoke cigarettes? ₁ Yes ₂ No

12a. If yes how often?

- ₁ Daily
- ₂ 4-6 times a week
- ₃ 2-3 times a week
- ₄ Once a week
- ₅ Less than once a month
- ₆ At least once a month but less than once a week
- ₇ Never

12b. If daily how many cigarettes per day _____

13. Do you use any drugs? ₁ Yes ₂ No

13a. If yes check all that apply: Marijuana ₁ Cocaine ₂ Crack ₃
Heroin ₄ Combination (Speedball) ₅ Methadone ₆ Amphetamine
(Ecstasy) ₇ Other ₈

14. Do you drink alcohol? ₁ Yes ₂ No

14a. If yes how often?

- ₁ Daily
- ₂ 4-6 times a week
- ₃ 2-3 times a week
- ₄ once a week
- ₅ Less than once a month
- ₆ At least once a month but less than once a week
- ₇ Never

14b. If daily how many drinks per day?

- Beer drinks
- Wine drinks
- Liquor drinks
- Total drinks

15. Do you use ART? ₁ Yes ₂ No

15a. List of medications (1) _____ (2) _____

(3) _____ (4) _____ (5) _____

16. Do you take multivitamins? ₁ Yes ₂ No

16a. If yes please list them. 1) _____ 2) _____

3) _____ 4) _____ 5) _____

17. Do you receive food stamps? ₁ Yes ₂ No

17a. If yes, how many months have you received food stamps in the past 12 months? _____

18. In the last 30 days, did you receive any foods to take home from community sources such as a food bank, food pantry, or other sources?

₁ Yes ₂ No

19. In the past 30 days did you eat any meals at a soup kitchen, the Salvation Army, a family shelter, or another similar place? ₁ Yes ₂ No

B. Barriers

There are many different reasons why people who qualify for food stamps do not participate. Here are some reasons that people give, as to why they would not participate in the food stamp program. Please indicate which of these is/are the reason(s) why you do not participate.

14b. If no, what are your reasons for not participating:

- | | |
|--|--|
| <input type="checkbox"/> ₁ Was denied | <input type="checkbox"/> ₉ Don't need them |
| <input type="checkbox"/> ₂ Don't think I'm eligible | <input type="checkbox"/> ₁₀ Don't know how to get them |
| <input type="checkbox"/> ₃ Too hard to apply | <input type="checkbox"/> ₁₁ Don't want government help |
| <input type="checkbox"/> ₄ Worried about my citizenship status | <input type="checkbox"/> ₁₂ Too embarrassed to use them |
| <input type="checkbox"/> ₅ Didn't think about it | <input type="checkbox"/> ₁₃ Disqualified due to misuse |
| <input type="checkbox"/> ₆ Didn't know about them | <input type="checkbox"/> ₁₄ Refuse |
| <input type="checkbox"/> ₇ Can't get to the Food Stamp Office | <input type="checkbox"/> ₁₅ Other (describe) _____ |
| <input type="checkbox"/> ₈ No store accepts Food Stamp in my area | |

C. Sources of Nutrition Information

Which of the following would you most likely trust as a source of nutrition or dietary information?

- | | |
|--|--|
| <input type="checkbox"/> ₁ Case Manager | <input type="checkbox"/> ₆ Television |
| <input type="checkbox"/> ₂ Doctor | <input type="checkbox"/> ₇ Family and Friends |
| <input type="checkbox"/> ₃ Dietitian | <input type="checkbox"/> ₈ Science/Research |
| <input type="checkbox"/> ₄ Internet | <input type="checkbox"/> ₉ Other _____ |
| <input type="checkbox"/> ₅ Radio | |

D. Nutritional Concerns

(I) Most HIV+ individuals have nutrition related needs. If you have any nutritional needs, we would like to what they are so a Dietitian/ Nutritionist can assist you with them.

Please check all that apply:

- ₁ I would like information on how to shop healthy
- ₂ I would like education on how to shop on a limited budget
- ₃ I would like information on how to cook healthy/ diet modification
- ₄ I would like information on strategies to overcome nutritional side effects related to HIV medication intake
- ₅ I would like education on food safety
- ₆ I would like information on how to lose weight
- ₇ I would like information on how to gain weight
- ₈ I would like information on how to maintain my weight
- ₉ I would like information on exercise
- ₁₀ I would like information on how to cope with stress
- ₁₁ I would like information on how to cope with fatigue
- ₁₂ I would like education on how to read food labels
- ₁₃ I would like information on how to eat out healthy

(II) Dietary Habits

1) How often do you plan meals ahead of time?	Does not apply	Never	Seldom	Some-times	Most of the time	Almost always
2) How often do you compare prices before you buy food?	Does not apply	Never	Seldom	Some-times	Most of the time	Almost always
3) How often do you run out of food before the end of the month?	Does not apply	Never	Seldom	Some-times	Most of the time	Almost always
4) How often do you shop with a grocery list?	Does not apply	Never	Seldom	Some-times	Most of the time	Almost always
5) This question is about meat and dairy foods. How often do you let these foods sit out for more than two hours?	Does not apply	Never	Seldom	Some-times	Most of the time	Almost always
6) How often do you thaw frozen meat at room temperature?	Does not apply	Never	Seldom	Some-times	Most of the time	Almost always
7) When deciding what to feed your family, how often do you think about healthy food choices?	Does not apply	Never	Seldom	Some-times	Most of the time	Almost always
8) How often have you prepared foods without adding salt?	Does not apply	Never	Seldom	Some-times	Most of the time	Almost always
9) How often do you use the "Nutrition Facts" on the food label to make food choices?	Does not apply	Never	Seldom	Some-times	Most of the time	Almost always
10) How often do you choose fat free or low fat milk instead of whole or reduced fat milk?	Does not apply	Never	Seldom	Some-times	Most of the time	Almost always
11) How often do you choose whole grain bread instead of white bread?	Does not apply	Never	Seldom	Some-times	Most of the time	Almost always
12) Do your meals consist of a variety of foods?	Does not apply	Never	Seldom	Some-times	Most of the time	Almost always
13) How often do you use a meat thermometer to measure the doneness of meat?	Does not apply	Never	Seldom	Some-times	Most of the time	Almost always

E. Nutrition Knowledge

Please select the best answer to each of the following questions.

1. From the following list of foods, please select the one that is highest in fiber

- ₁ kidney beans
- ₂ low-fat milk
- ₃ eggs
- ₄ yogurt

2. Which of the following may help you to lower your cholesterol level?

- ₁ low fat yogurt
- ₂ oatmeal
- ₃ scrambled eggs
- ₄ croissant sandwich

3. Which of the following have the highest content of trans fats?

- ₁ coke
- ₂ doughnuts
- ₃ collard greens
- ₄ baked potatoes

4. Which of the following have the highest content of saturated fat?

- ₁ low fat cottage cheese
- ₂ cooked potatoes
- ₃ eggs and sausages
- ₄ raw baby carrot sticks

5. Which of the following food groups contributes most to the overall saturated fat intake in the American diet?

- ₁ fruits
- ₂ meats
- ₃ dairy
- ₄ grains

6. Which of the following have the highest content of cholesterol?

- ₁ citrus fruits
- ₂ eggs
- ₃ low fat milk
- ₄ whole wheat flour

7. Which of the following is more likely the highest in sodium?

- ₁ low fat cottage cheese
- ₂ cooked potatoes
- ₃ rolled oats
- ₄ raw baby carrot sticks

8. Which of the following have the highest content of added sugar?

- ₁ fruit salad
- ₂ potato salad
- ₃ coke
- ₄ eggs and sausages

9. Which of the following is the recommended daily number of servings of fruits for a reference 2,000kcal diet?

- ₁ one ₂ two ₃ three ₄ four

10. Which of the following is the recommended daily number of cups of vegetables for a reference 2,000kcal diet?

- ₁ one and one half ₂ two and one half ₃ three and one half ₄ four and one half

11. Adequate intake of whole grains could help me to stay prevent constipation.

- ₁ True ₂ False ₃ I do not know

12. Regular consumption of nuts such as walnuts, pecans or peanuts helps to lower cholesterol.

- ₁ True ₂ False ₃ I do not know

13. Regular intake of flax seeds helps in reducing risk for heart disease.

- ₁ True ₂ False ₃ I do not know

14. Cakes, cookies, crackers, are high in trans fats.

- ₁ True ₂ False ₃ I do not know

15. Trans fats may contribute to the development of a heart attack or a stroke.

- ₁ True ₂ False ₃ I do not know

16. Olive oil is a good source of beneficial fat.

- ₁ True ₂ False ₃ I do not know

17. Heart diseases are the number one cause of death in America.

- ₁ True ₂ False ₃ I do not know

18. Eating adequate amounts of fruits may help prevent from developing cancer.

- ₁ True ₂ False ₃ I do not know

19. Regular intake of whole grains may help to prevent diabetes.

- ₁ True ₂ False ₃ I do not know

20. Eating foods that are high in fiber (e.g. oats, beans, fruits) may help to reduce blood cholesterol level. ₁ True ₂ False ₃ I do not

F. Where do you obtain your meals? Please check what applies the most

₁ Home ₂ Restaurant ₃ Shelter ₄ Fast Food ₅ Other, please specify

Write down everything you had to eat and drink yesterday from the first thing in the morning until the last thing at night. Give as much detail as possible, more detail is better.

Time or Meal	Food or Beverage Item (Describe)	How Much? (Amount/size)	How or Where Prepared?
Such as: morning, mid-morning, lunch, afternoon, evening or late evening	List all foods or a combination food. For example, a taco could be: Corn tortilla Ground beef Lettuce Tomato Cheddar cheese Sour cream 2% Milk	For the taco example it could be: 1 3 oz. 1/2 cup 1/4 cup 2 oz. 1 tablespoon 1 cup	Such as: <i>Baked</i> <i>Fried</i> <i>Fresh</i> <i>Broiled</i> <i>Grilled</i> <i>Boiled</i> <i>McDonald's</i>

G. Food Frequency. I am now going to ask you questions about foods that you usually eat. For each food, I want to know whether you eat it (yes or no), and approximately how many times you eat it, (times per day, week, month).

Do you eat ...		How often do you eat?
Fruits (excluding juices)	Yes / No	___ d w m
Legumes (beans, chick peas, lentils, pigeon peas)	Yes / No	___ d w m
Green leafy vegetables, lettuce	Yes / No	___ d w m
Milk, type of milk 4% 2% 1% skim Other type of milk _____	Yes / No	___ d w m
Cheese or yogurt	Yes / No	___ d w m
Meats (chicken, beef, pork, ham)	Yes / No	___ d w m
Fish and Shellfish	Yes / No	___ d w m
Eggs	Yes / No	___ d w m
Pasta, breads and cereals (e.g. rice, spaghetti)	Yes / No	___ d w m
100% fruit juice	Yes / No	___ d w m
Artificial drinks (e.g. sunny delight, tang, kool aid)	Yes / No	___ d w m
Regular soft drink (e.g. Pepsi, Coke)	Yes / No	___ d w m
Diet soft drinks and drinks with artificial sweeteners	Yes / No	___ d w m
Regular sweets and desserts	Yes / No	___ d w m
Sweets and desserts with artificial sweeteners	Yes / No	___ d w m
Snack foods (e.g., potato chips, Nachos, etc)	Yes / No	___ d w m

H. Short Form of the 12-month Food Security Scale

These next questions are about the food eaten in your household in the last 12 months and whether you were able to afford the food you need.

- 1 I'm going to read you two statements that people have made about their food situation. Please tell me whether the statement was **OFTEN**, **SOMETIMES**, or **NEVER** true for (you/you or the other members of your household) in the last 12 months.

The first statement is, "The food that (I/we) bought just didn't last, and (I/we) didn't have money to get more." Was that often, sometimes, or never true for (you/your household) in the last 12 months?
(1) Often true
(2) Sometimes true
(3) Never true
(D, R)
- 2 "(I/we) couldn't afford to eat balanced meals." Was that often, sometimes, or never true for (you/your household) in the last 12 months?
(1) Often true
(2) Sometimes true
(3) Never true
(D, R)
- 3 In the last 12 months, since (date 12 months ago) did (you/you or other adults in your household) ever cut the size of your meals or skip meals because there wasn't enough money for food?
(1) Yes
(2) No (GO TO 5)
(D, R) (GO TO 5)
- 4 **[Ask only if # 3 = YES]** How often did this happen---almost every month, some months but not every month, or in only 1 or 2 months?

(1) Almost every month
(2) Some months but not every month
(3) Only 1 or 2 months
(D, R)
(X) Question not asked because of negative or missing response to question 3
- 5 In the last 12 months, did you ever eat less than you felt you should because there wasn't enough money to buy food?
(1) Yes
(2) No
(D, R)
- 6 In the last 12 months, were you ever hungry but didn't eat because you couldn't afford enough food?

(1) Yes
(2) No

I. MORBIDITY

Have you experienced any of these signs and symptoms in the last month?

Sign and Symptom	Yes	No
Fever		
Chills		
Fatigue		
Malaise		
Lethargy		
Headache		
Skin Lesion or Rash		
Visual changes		
Oral Lesion		
Abdominal Discomfort		
Anorexia		
Dysphagia		
Nausea		
Vomiting		
Diarrhea		
Constipation		
Rectal or Anal Lesions		
Changes in weight		
Cough		
Wheezing		
Chest pain		
Difficulty breathing		
Shortness of breath		
Anemia		
Numbness		
Sharp pain		
Loss of coordination		
Impaired concentration		
Apathy or mood changes		
Seizures		
Dysuria		
Genital discharge		
Genital lesion		
Myalgia		
Arthralgia		

J. MEDICATION ADHERENCE QUESTIONNAIRE

This answers you give on this form will be used to plan ways to help other people who must take pills on a difficult schedule. Please do the best you can to answer all the questions. If you do not wish to answer a question, please draw a line through it. If you do not know how to answer a question, ask your study nurse to help. Thank you for helping in this important study.

PATIENT ONLY continue here.

The next section of the questionnaire asks about your HIV study medications that you took over the last four days.

Most people with HIV have many pills to take at different times during the day. Many people find it hard to always remember their pills:

- Some people get busy and forget to carry their pills with them.
- Some people find it hard to take their pills according to all the instructions, such as “with on every 8 hours,” “with plenty of fluids” meals,” or “ an empty stomach,”
- Some people decide to skip doses to avoid side effects or to just not be taking pills that day.

We need to understand how people with HIV are really doing with their pills. Please tell us what you are actually doing. Don't worry about telling us that you don't take all your pills. We need to know what is really happening, not what you think we “want to hear”

The next section of the questionnaire asks about the study medications that you may have missed taking over the last four days. Please complete the following table by filling in the boxes below.

A. IF YOU TOOK ONLY A PORTION OF A DOSE ON ONE OR MORE OF THESE DAYS, PLEASE REPORT THE DOSE(S) AS BEING MISSED.

Names of your anti-HIV medications	How many doses did you miss			
	Yesterday	2 days ago	3 days ago	4 days ago

B. During the past 4 days, on how many days have you missed taking all your doses?

₁ None ₂ One day ₃ Two days ₄ Three days ₅ Four days

C. Most anti-HIV medications need to be taken on a schedule, such as “2 times a day” or “3 times a day” or “every 8 hours.” How closely did you follow your specific schedule over the last four days?

₁ Never ₂ Some Of The Time ₃ About Half Of The Time
₄ Most Of The Time ₅ All Of The Time

D. Do any of your anti-HIV medications have special instructions, such as “take with food” or “on an empty stomach” or “with plenty of fluids?”

₁ Yes ₂ No

If Yes, how often did you follow those special instructions over the last four days?

₁ Never ₂ Some Of The Time ₃ About Half Of The Time
₄ Most Of The Time
₅ All Of The Time

E. Some people find that they forget to take their pills on the weekend days. Did you miss any of your anti-HIV medications last weekend— last Saturday or Sunday?

₁ Yes ₂ No

F. When was the last time you missed any of your medications? Check one.

₁ Within the past week
₂ 1-2 weeks ago
₃ 2-4 weeks ago
₄ 1-3 months ago
₅ More than 3 months ago
₆ Never skip medications or not applicable

K. QUALITY OF LIFE INDEX






ACTIVITY	SCORE
<p>Since the last visit, the patient:</p> <ul style="list-style-type: none"> -has been working or studying full-time, or nearly so, in usual occupation; or managing own household, or participating in unpaid or voluntary activities, whether retired or not. 	2
<ul style="list-style-type: none"> -has been working or studying full-time, or nearly so, in usual occupation; or managing own household, or participating in unpaid or voluntary activities; but requiring major assistance or a significant reduction in hours worked or sheltered situation or was on sick leave 	1
<ul style="list-style-type: none"> -has not been working or studying in any capacity and not managing own household 	0
DAILY LIVING	SCORE
<p>Since the last visit, the patient</p> <ul style="list-style-type: none"> -has been self-reliant in eating, washing, toileting, and dressing; using public transport, or driving own car. 	2
<ul style="list-style-type: none"> -has been requiring assistance (another person or special equipment) for daily activities and transport, but performing light tasks. 	1
<ul style="list-style-type: none"> -has not been managing personal care or light tasks, or not leaving own home or institution at all. 	0
HEALTH	SCORE
<p>Since the last visit, the patient</p> <ul style="list-style-type: none"> -has been appearing to feel well or reporting feeling "great" most of the time. 	2
<ul style="list-style-type: none"> -has been lacking energy or not feeling entirely "up to par" more than just occasionally. 	1
<ul style="list-style-type: none"> -has been feeling very ill or "lousy", seeming weak and washed out most of the time or was unconscious 	0
SUPPORT	SCORE
<p>Since the last visit, the patient</p> <ul style="list-style-type: none"> -has been having good relationships with others and receiving strong support from at least one family member or friend. 	2
<ul style="list-style-type: none"> -support received or perceived has been limited from family or friends or by patient's condition. 	1
<ul style="list-style-type: none"> -support from family and friends occurred infrequently or only when absolutely necessary, or patient was unconscious. 	0
OUTLOOK	SCORE
<p>During the last week, the patient</p> <ul style="list-style-type: none"> -has usually been appearing calm and positive in outlook, accepting and in control of personal circumstances, including surroundings. 	2
<ul style="list-style-type: none"> -has sometimes been troubled because not fully in control of personal circumstances, or has been having periods of obvious anxiety or depression 	1
<ul style="list-style-type: none"> -has been seriously confused or very frightened , or consistently anxious and depressed or confused 	0

L. SF-36 HEALTH SURVEY
Your Health and Well-Being






This survey asks for your views about your health. This information will help keep track of how you feel and how well you are able to do your usual activities. *Thank you for completing this survey!*

For each of the following questions, please mark an in the one box that best describes your answer.

1. In general, would you say your health is:

Excellent	Very good	Good	Fair	Poor
				
<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5

2. Compared to one year ago, how would you rate your health in general now?

Much better now than one year ago	Somewhat better now than one year ago	About the same as one year ago	Somewhat worse now than one year ago	Much worse now than one year ago
				
<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5

3. The following questions are about activities you might do during a typical day. Does your health now limit you in these activities? If so, how much?

Yes, limited a lot	Yes, limited a little	No, not limited at all
▼	▼	▼

- | | | | | |
|---|---|----------------------------------|----------------------------------|----------------------------|
| a | <u>Vigorous activities</u> , such as running, lifting heavy objects, participating in strenuous sports | <input type="checkbox"/> 1 | <input type="checkbox"/> 2 | <input type="checkbox"/> 3 |
| b | <u>Moderate activities</u> , such as moving a table, pushing a vacuum cleaner, bowling, or playing golf | <input type="checkbox"/> 1 | <input type="checkbox"/> 2 | <input type="checkbox"/> 3 |
| c | Lifting or carrying groceries | <input type="checkbox"/> 1 | <input type="checkbox"/> 2 | <input type="checkbox"/> 3 |
| d | Climbing <u>several</u> flights of stairs | <input type="checkbox"/> 1 | <input type="checkbox"/> 2 | <input type="checkbox"/> 3 |
| e | Climbing <u>one</u> flight of stairs | <input type="checkbox"/> 1 | <input type="checkbox"/> 2 | <input type="checkbox"/> 3 |
| f | Bending, kneeling, or stooping | <input type="checkbox"/> 1 | <input type="checkbox"/> 2 | <input type="checkbox"/> 3 |
| g | Walking more than a mile | <input type="checkbox"/> 1 | <input type="checkbox"/> 2 | <input type="checkbox"/> 3 |
| h | Walking several hundred yards | <input type="checkbox"/> 1 | <input type="checkbox"/> 2 | <input type="checkbox"/> 3 |
| i | Walking one hundred yards | <input type="checkbox"/> 1 | <input type="checkbox"/> 2 | <input type="checkbox"/> 3 |
| j | Bathing or dressing yourself | <input type="checkbox"/> 1 | <input type="checkbox"/> 2 | <input type="checkbox"/> 3 |

4. During the past 4 weeks, how much of the time have you had any of the following problems with your work or other regular daily activities as a result of your physical health?

All of the time	Most of the time	Some of the time	A little of the time	None of the time
▼	▼	▼	▼	▼

- a Cut down on the amount of time you spent on work or other activities..... 1..... 2..... 3..... 4..... 5
- b Accomplished less than you would like..... 1..... 2..... 3..... 4..... 5
- c Were limited in the kind of work or other activities..... 1..... 2..... 3..... 4..... 5
- d Had difficulty performing the work or other activities (for example, it took extra effort)..... 1..... 2..... 3..... 4..... 5

5. During the past 4 weeks, how much of the time have you had any of the following problems with your work or other regular daily activities as a result of any emotional problems (such as feeling depressed or anxious)?

All of the time	Most of the time	Some of the time	A little of the time	None of the time
▼	▼	▼	▼	▼

- a Cut down on the amount of time you spent on work or other activities..... 1..... 2..... 3..... 4..... 5
- b Accomplished less than you would like..... 1..... 2..... 3..... 4..... 5
- c Did work or other activities less carefully than usual..... 1..... 2..... 3..... 4..... 5

6. During the past 4 weeks, to what extent has your physical health or emotional problems interfered with your normal social activities with family, friends, neighbors, or groups?

Not at all	Slightly	Moderately	Quite a bit	Extremely
▼	▼	▼	▼	▼
<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5

7. How much bodily pain have you had during the past 4 weeks?

None	Very mild	Mild	Moderate	Severe	Very severe
▼	▼	▼	▼	▼	▼
<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> 6

8. During the past 4 weeks, how much did pain interfere with your normal work (including both work outside the home and housework)?

Not at all	A little bit	Moderately	Quite a bit	Extremely
▼	▼	▼	▼	▼
<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5

9. These questions are about how you feel and how things have been with you during the past 4 weeks. For each question, please give the one answer that comes closest to the way you have been feeling. How much of the time during the past 4 weeks...

All of the time	Most of the time	Some of the time	A little of the time	None of the time
▼	▼	▼	▼	▼

- a Did you feel full of life?..... 1 2 3 4 5
- b Have you been very nervous?.... 1 2 3 4 5
- c Have you felt so down in the dumps that nothing could cheer you up?..... 1 2 3 4 5
- d Have you felt calm and peaceful?..... 1 2 3 4 5
- e Did you have a lot of energy?..... 1 2 3 4 5
- f Have you felt downhearted and depressed?..... 1 2 3 4 5
- g Did you feel worn out?..... 1 2 3 4 5
- h Have you been happy?..... 1 2 3 4 5
- i Did you feel tired?..... 1 2 3 4 5

10. During the past 4 weeks, how much of the time has your physical health or emotional problems interfered with your social activities (like visiting with friends, relatives, etc.)?

All of the time	Most of the time	Some of the time	A little of the time	None of the time
▼	▼	▼	▼	▼
<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5

11. How TRUE or FALSE is each of the following statements for you?

Definitely true	Mostly true	Don't know	Mostly false	Definitely false
▼	▼	▼	▼	▼

- a I seem to get sick a little
easier than other people..... 1 2 3 4 5
- b I am as healthy as
anybody I know..... 1 2 3 4 5
- c I expect my health to
get worse..... 1 2 3 4 5
- d My health is excellent..... 1 2 3 4 5

K. ANTHROPOMETRICS AND LABORATORY RESULTS

MEASUREMENTS	RESULTS	DATE OBTAINED
Height(ft/cm)		
Weight(lbs)		
BMI		
Waist		
Hip		
Waist/Hip Ratio		
TEST	RESULTS	DATE OBTAINED
CD4 Cell Count		
Viral Load		
Hemoglobin		
Hematocrit		
Albumin		

BODY COMPOSITION BIA RESULTS

Phase Angle	_____	°
Body Capacitance	_____	pF
Resistance	_____	ohm
Reactance	_____	ohm

Mass Distribution	lbs	Percent
Body Cell Mass	_____	_____
Extracellular Mass	_____	_____
Lean Body Mass	_____	_____
Fat Mass	_____	_____
Total Weight	_____	_____

ECM/BCM	_____
Body Mass Index	_____
Basal Metabolic Rate	_____

Water Compartment	Liters	Percent
Intracellular Water	_____	_____
Extracellular Water	_____	_____
Total Body Water	_____	100
TBW/Lean Body Mass	_____	_____
TBW/Lean Body Weight	_____	_____

Appendix C3: Intervention Study Baseline Questionnaire

A. Demographic Data

For these questions, please circle your answers or write your answers in the spaces provided.

1. Gender: ₁ Male ₂ Female

2. Age: _____ years.

3. Which of the following best describes your ethnic background?

₁ Black/African American ₂ Asian American ₃ Non-Hispanic White
₄ Hispanic American ₅ Native American ₆ Other (specify): _____

4. Status: ₁ Married ₂ Single ₃ Divorced/Widowed ₄ Other _____

5. Please check your highest level of education.

₁ < High school ₂ High school or GED
₃ 1-2 years college ₄ Graduated from college

6. Work Status: ₁ Not working ₂ Work Part-time,
₃ Work full time ₄ On disability

7. What is your monthly income? ₁ <\$1000 ₂ \$1001-\$2000
₃ \$2001-\$3000 ₄ >\$3001

8. Do you live: ₁ Alone ₂ With your family (parents, husband, children, etc)
₃ Shelter ₄ Street

9. Do you smoke cigarettes? ₁ Yes ₂ No

9a. If yes how often?

₁ Daily
₂ 4-6 times a week
₃ 2-3 times a week
₄ Once a week
₅ Less than once a month
₆ At least once a month but less than once a week
₇ Never

9b. If daily how many cigarettes per day _____

10. Do you use any drugs? ₁ Yes ₂ No

10a. If yes please check all that apply: Marijuana ₁ Cocaine ₂ Crack

₃ Heroin ₄ Combination (Speedball) ₅ Methadone
₆ Amphetamine (Ecstasy) ₇ Other ₈

11. Do you drink alcohol? ₁ Yes ₂ No

11a. If yes how often?

- ₁ Daily
₂ 4-6 times a week
₃ 2-3 times a week
₄ once a week
₅ Less than once a month
₆ At least once a month but less than once a week
₇ Never

11b. If daily how many drinks per day?

- Beer drinks
----- Wine drinks
----- Liquor drinks
----- Total drinks

12. Do you use ART? ₁ Yes ₂ No

12a. List of medications (1) _____ (2) _____
(3) _____ (4) _____ (5) _____

13. Do you take multivitamins? ₁ Yes ₂ No

13a. If yes please list them. 1) _____ 2) _____
3) _____ 4) _____ 5) _____

14. Do you receive food stamps? ₁ Yes ₂ No

14a. If yes, how many months have you received food stamps in the past 12 months? _____

15. In the last 30 days, did you receive any foods to take home from community sources such as a food bank, food pantry, or other sources?

₁ Yes ₂ No

16. In the past 30 days did you eat any meals at a soup kitchen, the Salvation Army, a family shelter, or another similar place? ₁ Yes ₂ No

B. Nutrition Knowledge

Please select the best answer to each of the following questions.

1. From the following list of foods, please select the one that is highest in fiber

- ₁ kidney beans
- ₂ low-fat milk
- ₃ eggs
- ₄ yogurt

2. Which of the following may help you to lower your cholesterol level?

- ₁ low fat yogurt
- ₂ oatmeal
- ₃ scrambled eggs
- ₄ croissant sandwich

3. Which of the following have the highest content of trans fats?

- ₁ coke
- ₂ doughnuts
- ₃ collard greens
- ₄ baked potatoes

4. Which of the following have the highest content of saturated fat?

- ₁ low fat cottage cheese
- ₂ cooked potatoes
- ₃ eggs and sausages
- ₄ raw baby carrot sticks

5. Which of the following food groups contributes most to the overall saturated fat intake in the American diet?

- ₁ fruits
- ₂ meats
- ₃ dairy
- ₄ grains

6. Which of the following have the highest content of cholesterol?

- ₁ citrus fruits
- ₂ eggs
- ₃ low fat milk
- ₄ whole wheat flour

7. Which of the following is more likely the highest in sodium?

- ₁ low fat cottage cheese
- ₂ cooked potatoes
- ₃ rolled oats
- ₄ raw baby carrot sticks

8. Which of the following have the highest content of added sugar?

- ₁ fruit salad
- ₂ potato salad
- ₃ coke
- ₄ eggs and sausages

9. Which of the following is the recommended daily number of servings of fruits for a reference 2,000kcal diet?

- ₁ one ₂ two ₃ three ₄ four

10. Which of the following is the recommended daily number of cups of vegetables for a reference 2,000kcal diet?

- ₁ one and one half ₂ two and one half ₃ three and one half ₄ four and one half

11. Adequate intake of whole grains could help me to stay prevent constipation.

- ₁ True ₂ False ₃ I do not know

12. Regular consumption of nuts such as walnuts, pecans or peanuts helps to lower cholesterol.

- ₁ True ₂ False ₃ I do not know

13. Regular intake of flax seeds helps in reducing risk for heart disease.

- ₁ True ₂ False ₃ I do not know

14. Cakes, cookies, crackers, are high in trans fats.

- ₁ True ₂ False ₃ I do not know

15. Trans fats may contribute to the development of a heart attack or a stroke.

- ₁ True ₂ False ₃ I do not know

16. Olive oil is a good source of beneficial fat.

- ₁ True ₂ False ₃ I do not know

17. Heart diseases are the number one cause of death in America.

- ₁ True ₂ False ₃ I do not know

18. Eating adequate amounts of fruits may help prevent from developing cancer.

- ₁ True ₂ False ₃ I do not know

19. Regular intake of whole grains may help to prevent diabetes.

- ₁ True ₂ False ₃ I do not know

20. Eating foods that are high in fiber (e.g. oats, beans, fruits) may help to reduce blood cholesterol level. ₁ True ₂ False ₃ I do not

C. Food Frequency. I am now going to ask you questions about foods that you usually eat. For each food, I want to know whether you eat it (yes or no), and approximately how many times you eat it, (times per day, week, month).

Do you eat ...		How often do you eat?
Fruits (excluding juices)	Yes / No	___ d w m
Legumes (beans, chick peas, lentils, pigeon peas)	Yes / No	___ d w m
Green leafy vegetables, lettuce	Yes / No	___ d w m
Milk, type of milk 4% 2% 1% skim Other type of milk _____	Yes / No	___ d w m
Cheese or yogurt	Yes / No	___ d w m
Meats (chicken, beef, pork, ham)	Yes / No	___ d w m
Fish and Shellfish	Yes / No	___ d w m
Eggs	Yes / No	___ d w m
Pasta, breads and cereals (e.g. rice, spaghetti)	Yes / No	___ d w m
100% fruit juice	Yes / No	___ d w m
Artificial drinks (e.g. sunny delight, tang, kool aid)	Yes / No	___ d w m
Regular soft drink (e.g. Pepsi, Coke)	Yes / No	___ d w m
Diet soft drinks and drinks with artificial sweeteners	Yes / No	___ d w m
Regular sweets and desserts	Yes / No	___ d w m
Sweets and desserts with artificial sweeteners	Yes / No	___ d w m
Snack foods (e.g., potato chips, Nachos, etc)	Yes / No	___ d w m

D. Where do you obtain your meals? Please check what applies the most

₁ Home ₂ Restaurant ₃ Shelter ₄ Fast Food ₅ Other, please specify

Write down everything you had to eat and drink yesterday from the first thing in the morning until the last thing at night. Give as much detail as possible, more detail is better.

Time or Meal	Food or Beverage Item (Describe)	How Much? (Amount/size)	How or Where Prepared?
Such as: morning, mid- morning, lunch, afternoon, evening or late evening	List all foods or a combination food. For example, a taco could be: Corn tortilla Ground beef Lettuce Tomato Cheddar cheese Sour cream 2% Milk	For the taco example it could be: 1 3 oz. 1/2 cup 1/4 cup 2 oz. 1 tablespoon 1 cup	Such as: <i>Baked</i> <i>Fried</i> <i>Fresh</i> <i>Broiled</i> <i>Grilled</i> <i>Boiled</i> <i>McDonald's</i>

E. FRUITS & VEGETABLES: Staging

Fruits and vegetables come in many forms: fresh, frozen, canned, dried, and 100% fruit and vegetable juices. Fruits and vegetables can be cooked or eaten raw. They can also be eaten by themselves or as part of a mixed dish such as soups or casseroles.

Use this table to help you count your fruit and vegetable servings...

COUNT AS ONE SERVING: Vegetables:

- 1/2 cup of cooked or raw vegetables
- 1 cup of raw leafy greens

Fruit:

- 1/2 cup or a medium sized piece of fruit
- 3/4 cup of 100% fruit juice
- 1/4 cup of dried fruit

A. How many servings of fruits and vegetables do you usually eat each day? Please select one and fill in the circle.

- None (Go to Question B1)
- 1 Serving (Go to Question B1)
- 2 Servings Days (Go to Question B1)
- 3 Servings (Go to Question B1)
- 4 Servings (Go to Question B1)
- 5 Servings (Go to Question B2)
- 6 Servings or more (Go to Question B2)

B1. Do you intend to change what you eat so you will eat at least 5 servings of fruits and vegetables every day? Please select one and fill in the circle.

- No, and I don't intend to in the next 6 months (Go to Next Page)
- Yes, and I intend to in the next 6 months (Go to Next Page)
- Yes, and I intend to in the next 30 days (Go to Next Page)

B2. You report that you have been eating 5 or more regular servings of fruits and vegetables.

For how many months have you been doing this? Please select one and fill in the circle.

- Less than 6 months
- 6 months or more

DIETARY FAT: Staging

A. Do you regularly eat 5 or fewer servings of high fat foods every day? Please select one and fill in the circle.

- No, I eat more than 5 servings of high fat foods per day (Go to Question B1)
- Yes, I eat 5 or fewer servings of high fat foods per day (Go to Question B2)

B1. Do you intend to change what you eat so you will eat 5 or fewer servings of high fat foods every day in the next 6 months? Please select one and fill in the circle.

- No, and I don't intend to in the next 6 months (Go to Next Page)
- Yes, and I intend to in the next 6 months (Go to Next Page)
- Yes, and I intend to in the next 30 days (Go to Next Page)

B2. For how many months have you been eating 5 or fewer servings of high fat foods every day? Please select one and fill in the circle.

- Less than 6 months
- 6 months or more

FIBER: Staging

A. Do you eat regular servings of high fiber foods? Please select one and fill in the circle.

- No (Go to Question B1)
- Yes (Go to Question B2)

B1. Do you intend to change what you eat so you will eat more high fiber foods in the next 6 months? You can get this by eating high fiber cereals (5 grams/serving), breads (2 grams per serving), beans and legumes, fruits, and vegetables. Please select one and fill in the circle.

- No, and I don't intend to in the next 6 months (*Go to Next Page*)
- Yes, and I intend to in the next 6 months (*Go to Next Page*)
- Yes, and I intend to in the next 30 days (*Go to Next Page*)

B2. You report that you've been eating regular servings of high fiber foods. For how many months have you been consuming this amount of fiber? Please select one and fill in the circle.

- Less than 6 months
- 6 months or more

F. FRUIT AND VEGETABLE SELF EFFICACY

There are many things that can get in the way of choosing to eat 5 fruits and vegetables each day Rate HOW CONFIDENT you are that you can do the following using the scale below.

	Not at All Confident	Somewhat Confident	Moderately Confident	Very Confident	Extremely Confident
Eat 5 servings of fruits and vegetables everyday?					
Drink 100% fruit juice instead of soda or fruit punch?					
Eat fruits and vegetables for a snack instead of chips or candy?					
Eat fruits and vegetables when eating out at a restaurant?					
Eat fruits and vegetables when I am upset or having a bad day?					
Eat fruits and vegetables when I am at a social event?					

DIETARY FIBER SELF-EFFICACY

There are many things that can get in the way of choosing to eat foods high in fiber. Rate HOW CONFIDENT you are that you can do the following using the scale below

	Not at All Confident	Somewhat Confident	Moderately Confident	Very Confident	Extremely Confident
Choose high fiber cereals over low fiber and sugary cereals?					
Avoid foods that are low in fiber?					
Choose high fiber foods even when you are upset and having a bad day					
Choose high fiber snacks instead of doughnuts or cookies?					
Eat 5 servings of whole grains and beans every day?					
Choose selections with whole grains or beans when out at a restaurant?					
Regularly eat whole grain bread?					

DIETARY FAT SELF-EFFICACY

There are many things that can get in the way of choosing to eat a diet low in fat. HOW CONFIDENT are you that you can choose low fat foods in each situation?

	Not at All Confident	Somewhat Confident	Moderately Confident	Very Confident	Extremely Confident
When others around you are eating high fat foods.					
When you are craving high fat foods.					
When you are out at a restaurant.					
When you are upset or having a bad day.					
When you are at a social event.					

**When you are grocery shopping how confident are you in your ability to?
(check one answer for each food type)**

How confident are you in your ability to	Not at all confident	Not confident	Somewhat confident	Very confident
Select whole grain bread or cereal in a grocery store? ...	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Select low fat dairy products (e.g. yogurt)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Select foods that are low in sodium	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Select foods that are low in saturated fat?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Select foods that are low in cholesterol?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Select foods high in dietary fiber?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Select foods that are low in or free of trans fats?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

G. MORBIDITY

Have you experienced any of these signs and symptoms in the last month?

Sign and Symptom	Yes	No
Fever		
Chills		
Fatigue		
Malaise		
Lethargy		
Headache		
Skin Lesion or Rash		
Visual changes		
Oral Lesion		
Abdominal Discomfort		
Anorexia		
Dysphagia		
Nausea		
Vomiting		
Diarrhea		
Constipation		
Rectal or Anal Lesions		
Changes in weight		
Cough		
Wheezing		
Chest pain		
Difficulty breathing		
Shortness of breath		
Anemia		
Numbness		
Sharp pain		
Loss of coordination		
Impaired concentration		
Apathy or mood changes		
Seizures		
Dysuria		
Genital discharge		
Genital lesion		
Myalgia		
Arthralgia		

H. MEDICATION ADHERENCE QUESTIONNAIRE

This answers you give on this form will be used to plan ways to help other people who must take pills on a difficult schedule. Please do the best you can to answer all the questions. If you do not wish to answer a question, please draw a line through it. If you do not know how to answer a question, ask your study nurse to help. Thank you for helping in this important study.

PATIENT ONLY continue here.

The next section of the questionnaire asks about your HIV study medications that you took over the last four days.

Most people with HIV have many pills to take at different times during the day. Many people find it hard to always remember their pills:

- Some people get busy and forget to carry their pills with them.
- Some people find it hard to take their pills according to all the instructions, such as “with on every 8 hours,” “with plenty of fluids” meals,” or “ an empty stomach,”
- Some people decide to skip doses to avoid side effects or to just not be taking pills that day.

We need to understand how people with HIV are really doing with their pills. Please tell us what you are actually doing. Don't worry about telling us that you don't take all your pills. We need to know what is really happening, not what you think we “want to hear”

The next section of the questionnaire asks about the study medications that you may have missed taking over the last four days. Please complete the following table by filling in the boxes below.

A. IF YOU TOOK ONLY A PORTION OF A DOSE ON ONE OR MORE OF THESE DAYS, PLEASE REPORT THE DOSE(S) AS BEING MISSED.

Names of your anti-HIV medications	How many doses did you miss			
	Yesterday	2 days ago	3 days ago	4 days ago

B. During the past 4 days, on how many days have you missed taking all your doses?

₁ None ₂ One day ₃ Two days ₄ Three days ₅ Four days

C. Most anti-HIV medications need to be taken on a schedule, such as “2 times a day” or “3 times a day” or “every 8 hours.” How closely did you follow your specific schedule over the last four days?

₁ Never ₂ Some Of The Time ₃ About Half Of The Time
₄ Most Of The Time ₅ All Of The Time

D. Do any of your anti-HIV medications have special instructions, such as “take with food” or “on an empty stomach” or “with plenty of fluids?”

₁ Yes ₂ No

If Yes, how often did you follow those special instructions over the last four days?

₁ Never ₂ Some Of The Time ₃ About Half Of The Time
₄ Most Of The Time
₅ All Of The Time

E. Some people find that they forget to take their pills on the weekend days. Did you miss any of your anti-HIV medications last weekend— last Saturday or Sunday?

₁ Yes ₂ No

F. When was the last time you missed any of your medications? Check one.

- ₁ Within the past week
₂ 1-2 weeks ago
₃ 2-4 weeks ago
₄ 1-3 months ago
₅ More than 3 months ago
₆ Never skip medications or not applicable

I. QUALITY OF LIFE INDEX






ACTIVITY	SCORE
<p>Since the last visit, the patient:</p> <ul style="list-style-type: none"> -has been working or studying full-time, or nearly so, in usual occupation; or managing own household, or participating in unpaid or voluntary activities, whether retired or not. 	2
<ul style="list-style-type: none"> -has been working or studying full-time, or nearly so, in usual occupation; or managing own household, or participating in unpaid or voluntary activities; but requiring major assistance or a significant reduction in hours worked or sheltered situation or was on sick leave 	1
<ul style="list-style-type: none"> -has not been working or studying in any capacity and not managing own household 	0
DAILY LIVING	SCORE
<p>Since the last visit, the patient</p> <ul style="list-style-type: none"> -has been self-reliant in eating, washing, toileting, and dressing; using public transport, or driving own car. 	2
<ul style="list-style-type: none"> -has been requiring assistance (another person or special equipment) for daily activities and transport, but performing light tasks. 	1
<ul style="list-style-type: none"> -has not been managing personal care or light tasks, or not leaving own home or institution at all. 	0
HEALTH	SCORE
<p>Since the last visit, the patient</p> <ul style="list-style-type: none"> -has been appearing to feel well or reporting feeling "great" most of the time. 	2
<ul style="list-style-type: none"> -has been lacking energy or not feeling entirely "up to par" more than just occasionally. 	1
<ul style="list-style-type: none"> -has been feeling very ill or "lousy", seeming weak and washed out most of the time or was unconscious 	0
SUPPORT	SCORE
<p>Since the last visit, the patient</p> <ul style="list-style-type: none"> -has been having good relationships with others and receiving strong support from at least one family member or friend. 	2
<ul style="list-style-type: none"> -support received or perceived has been limited from family or friends or by patient's condition. 	1
<ul style="list-style-type: none"> -support from family and friends occurred infrequently or only when absolutely necessary, or patient was unconscious. 	0
OUTLOOK	SCORE
<p>During the last week, the patient</p> <ul style="list-style-type: none"> -has usually been appearing calm and positive in outlook, accepting and in control of personal circumstances, including surroundings. 	2
<ul style="list-style-type: none"> -has sometimes been troubled because not fully in control of personal circumstances, or has been having periods of obvious anxiety or depression 	1
<ul style="list-style-type: none"> -has been seriously confused or very frightened , or consistently anxious and depressed or confused 	0

J. SF-36 HEALTH SURVEY
Your Health and Well-Being






This survey asks for your views about your health. This information will help keep track of how you feel and how well you are able to do your usual activities. *Thank you for completing this survey!*

For each of the following questions, please mark an in the one box that best describes your answer.

1. In general, would you say your health is:

Excellent	Very good	Good	Fair	Poor
				
<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5

2. Compared to one year ago, how would you rate your health in general now?

Much better now than one year ago	Somewhat better now than one year ago	About the same as one year ago	Somewhat worse now than one year ago	Much worse now than one year ago
				
<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5

3. The following questions are about activities you might do during a typical day. Does your health now limit you in these activities? If so, how much?

Yes, limited a lot	Yes, limited a little	No, not limited at all
▼	▼	▼

- | | | | | |
|---|---|----------------------------------|----------------------------------|----------------------------|
| a | <u>Vigorous activities</u> , such as running, lifting heavy objects, participating in strenuous sports | <input type="checkbox"/> 1 | <input type="checkbox"/> 2 | <input type="checkbox"/> 3 |
| b | <u>Moderate activities</u> , such as moving a table, pushing a vacuum cleaner, bowling, or playing golf | <input type="checkbox"/> 1 | <input type="checkbox"/> 2 | <input type="checkbox"/> 3 |
| c | Lifting or carrying groceries | <input type="checkbox"/> 1 | <input type="checkbox"/> 2 | <input type="checkbox"/> 3 |
| d | Climbing <u>several</u> flights of stairs | <input type="checkbox"/> 1 | <input type="checkbox"/> 2 | <input type="checkbox"/> 3 |
| e | Climbing <u>one</u> flight of stairs | <input type="checkbox"/> 1 | <input type="checkbox"/> 2 | <input type="checkbox"/> 3 |
| f | Bending, kneeling, or stooping | <input type="checkbox"/> 1 | <input type="checkbox"/> 2 | <input type="checkbox"/> 3 |
| g | Walking more than a mile | <input type="checkbox"/> 1 | <input type="checkbox"/> 2 | <input type="checkbox"/> 3 |
| h | Walking several hundred yards | <input type="checkbox"/> 1 | <input type="checkbox"/> 2 | <input type="checkbox"/> 3 |
| i | Walking one hundred yards | <input type="checkbox"/> 1 | <input type="checkbox"/> 2 | <input type="checkbox"/> 3 |
| j | Bathing or dressing yourself | <input type="checkbox"/> 1 | <input type="checkbox"/> 2 | <input type="checkbox"/> 3 |

4. During the past 4 weeks, how much of the time have you had any of the following problems with your work or other regular daily activities as a result of your physical health?

All of the time	Most of the time	Some of the time	A little of the time	None of the time
▼	▼	▼	▼	▼

- a Cut down on the amount of time you spent on work or other activities..... 1..... 2..... 3..... 4..... 5
- b Accomplished less than you would like..... 1..... 2..... 3..... 4..... 5
- c Were limited in the kind of work or other activities..... 1..... 2..... 3..... 4..... 5
- d Had difficulty performing the work or other activities (for example, it took extra effort)..... 1..... 2..... 3..... 4..... 5

5. During the past 4 weeks, how much of the time have you had any of the following problems with your work or other regular daily activities as a result of any emotional problems (such as feeling depressed or anxious)?

All of the time	Most of the time	Some of the time	A little of the time	None of the time
▼	▼	▼	▼	▼

- a Cut down on the amount of time you spent on work or other activities..... 1..... 2..... 3..... 4..... 5
- b Accomplished less than you would like..... 1..... 2..... 3..... 4..... 5
- c Did work or other activities less carefully than usual..... 1..... 2..... 3..... 4..... 5

6. During the past 4 weeks, to what extent has your physical health or emotional problems interfered with your normal social activities with family, friends, neighbors, or groups?

Not at all	Slightly	Moderately	Quite a bit	Extremely
▼	▼	▼	▼	▼
<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5

7. How much bodily pain have you had during the past 4 weeks?

None	Very mild	Mild	Moderate	Severe	Very severe
▼	▼	▼	▼	▼	▼
<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> 6

8. During the past 4 weeks, how much did pain interfere with your normal work (including both work outside the home and housework)?

Not at all	A little bit	Moderately	Quite a bit	Extremely
▼	▼	▼	▼	▼
<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5

9. These questions are about how you feel and how things have been with you during the past 4 weeks. For each question, please give the one answer that comes closest to the way you have been feeling. How much of the time during the past 4 weeks...

All of the time	Most of the time	Some of the time	A little of the time	None of the time
▼	▼	▼	▼	▼

- a Did you feel full of life?..... 1 2 3 4 5
- b Have you been very nervous?.... 1 2 3 4 5
- c Have you felt so down in the dumps that nothing could cheer you up?..... 1 2 3 4 5
- d Have you felt calm and peaceful?..... 1 2 3 4 5
- e Did you have a lot of energy?..... 1 2 3 4 5
- f Have you felt downhearted and depressed?..... 1 2 3 4 5
- g Did you feel worn out?..... 1 2 3 4 5
- h Have you been happy?..... 1 2 3 4 5
- i Did you feel tired?..... 1 2 3 4 5

10. During the past 4 weeks, how much of the time has your physical health or emotional problems interfered with your social activities (like visiting with friends, relatives, etc.)?

All of the time	Most of the time	Some of the time	A little of the time	None of the time
▼	▼	▼	▼	▼
<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5

11. How TRUE or FALSE is each of the following statements for you?

Definitely true	Mostly true	Don't know	Mostly false	Definitely false
▼	▼	▼	▼	▼

- a I seem to get sick a little easier than other people..... 1 2 3 4 5
- b I am as healthy as anybody I know..... 1 2 3 4 5
- c I expect my health to get worse..... 1 2 3 4 5
- d My health is excellent..... 1 2 3 4 5

K. ANTHROPOMETRICS AND LABORATORY RESULTS

MEASUREMENTS	RESULTS	DATE OBTAINED
Height(ft/cm)		
Weight(lbs)		
BMI		
Waist		
Hip		
Waist/Hip Ratio		
TEST	RESULTS	DATE OBTAINED
CD4 Cell Count		
Viral Load		
Hemoglobin		
Hematocrit		
Albumin		

BODY COMPOSITION BIA RESULTS

Phase Angle	_____	°
Body Capacitance	_____	pF
Resistance	_____	ohm
Reactance	_____	ohm

Mass Distribution	Ibs	Percent
Body Cell Mass	_____	_____
Extracellular Mass	_____	_____
Lean Body Mass	_____	_____
Fat Mass	_____	_____
Total Weight	_____	_____

ECM/BCM	_____
Body Mass Index	_____
Basal Metabolic Rate	_____

Water Compartment	Liters	Percent
Intracellular Water	_____	_____
Extracellular Water	_____	_____
Total Body Water	_____	100
TBW/Lean Body Mass	_____	_____
TBW/Lean Body Weight	_____	_____

Appendix C4: Intervention Study Posttest Questionnaire

A. Demographic Data

For these questions, please circle your answers or write your answers in the spaces provided.

1. Gender: ₁ Male ₂ Female

2. Age: _____ years.

3. Which of the following best describes your ethnic background?

₁ Black/African American ₂ Asian American ₃ Non-Hispanic White
₄ Hispanic American ₅ Native American ₆ Other (specify): _____

4. Status: ₁ Married ₂ Single ₃ Divorced/Widowed ₄ Other _____

5. Please check your highest level of education.

₁ < High school ₂ High school or GED
₃ 1-2 years college ₄ Graduated from college

6. Work Status: ₁ Not working ₂ Work Part-time,
₃ Work full time ₄ On disability

7. What is your monthly income? ₁ <\$1000 ₂ \$1001-\$2000
₃ \$2001-\$3000 ₄ >\$3001

8. Do you live: ₁ Alone ₂ With your family (parents, husband, children, etc)
₃ Shelter ₄ Street

9. Do you smoke cigarettes? ₁ Yes ₂ No

9a. If yes how often?

₁ Daily
₂ 4-6 times a week
₃ 2-3 times a week
₄ Once a week
₅ Less than once a month
₆ At least once a month but less than once a week
₇ Never

9b. If daily how many cigarettes per day _____

10. Do you use any drugs? ₁ Yes ₂ No

10a. If yes please check all that apply: Marijuana ₁ Cocaine ₂ Crack

₃ Heroin ₄ Combination (Speedball) ₅ Methadone
₆ Amphetamine (Ecstasy) ₇ Other ₈

11. Do you drink alcohol? ₁ Yes ₂ No

11a. If yes how often?

- ₁ Daily
₂ 4-6 times a week
₃ 2-3 times a week
₄ once a week
₅ Less than once a month
₆ At least once a month but less than once a week
₇ Never

11b. If daily how many drinks per day?

- Beer drinks
----- Wine drinks
----- Liquor drinks
----- Total drinks

12. Do you use ART? ₁ Yes ₂ No

12a. List of medications (1) _____ (2) _____
(3) _____ (4) _____ (5) _____

13. Do you take multivitamins? ₁ Yes ₂ No

13a. If yes please list them. 1) _____ 2) _____
3) _____ 4) _____ 5) _____

14. Do you receive food stamps? ₁ Yes ₂ No

14a. If yes, how many months have you received food stamps in the past 12 months? _____

15. In the last 30 days, did you receive any foods to take home from community sources such as a food bank, food pantry, or other sources?

₁ Yes ₂ No

16. In the past 30 days did you eat any meals at a soup kitchen, the Salvation Army, a family shelter, or another similar place? ₁ Yes ₂ No

B. Nutrition Knowledge

Please select the best answer to each of the following questions.

1. From the following list of foods, please select the one that is highest in fiber

- ₁ kidney beans
- ₂ low-fat milk
- ₃ eggs
- ₄ yogurt

2. Which of the following may help you to lower your cholesterol level?

- ₁ low fat yogurt
- ₂ oatmeal
- ₃ scrambled eggs
- ₄ croissant sandwich

3. Which of the following have the highest content of trans fats?

- ₁ coke
- ₂ doughnuts
- ₃ collard greens
- ₄ baked potatoes

4. Which of the following have the highest content of saturated fat?

- ₁ low fat cottage cheese
- ₂ cooked potatoes
- ₃ eggs and sausages
- ₄ raw baby carrot sticks

5. Which of the following food groups contributes most to the overall saturated fat intake in the American diet?

- ₁ fruits
- ₂ meats
- ₃ dairy
- ₄ grains

6. Which of the following have the highest content of cholesterol?

- ₁ citrus fruits
- ₂ eggs
- ₃ low fat milk
- ₄ whole wheat flour

7. Which of the following is more likely the highest in sodium?

- ₁ low fat cottage cheese
- ₂ cooked potatoes
- ₃ rolled oats
- ₄ raw baby carrot sticks

8. Which of the following have the highest content of added sugar?

- ₁ fruit salad
- ₂ potato salad
- ₃ coke
- ₄ eggs and sausages

9. Which of the following is the recommended daily number of servings of fruits for a reference 2,000kcal diet?

- ₁ one ₂ two ₃ three ₄ four

10. Which of the following is the recommended daily number of cups of vegetables for a reference 2,000kcal diet?

- ₁ one and one half ₂ two and one half ₃ three and one half ₄ four and one half

11. Adequate intake of whole grains could help me to stay prevent constipation.

- ₁ True ₂ False ₃ I do not know

12. Regular consumption of nuts such as walnuts, pecans or peanuts helps to lower cholesterol.

- ₁ True ₂ False ₃ I do not know

13. Regular intake of flax seeds helps in reducing risk for heart disease.

- ₁ True ₂ False ₃ I do not know

14. Cakes, cookies, crackers, are high in trans fats.

- ₁ True ₂ False ₃ I do not know

15. Trans fats may contribute to the development of a heart attack or a stroke.

- ₁ True ₂ False ₃ I do not know

16. Olive oil is a good source of beneficial fat.

- ₁ True ₂ False ₃ I do not know

17. Heart diseases are the number one cause of death in America.

- ₁ True ₂ False ₃ I do not know

18. Eating adequate amounts of fruits may help prevent from developing cancer.

- ₁ True ₂ False ₃ I do not know

19. Regular intake of whole grains may help to prevent diabetes.

- ₁ True ₂ False ₃ I do not know

20. Eating foods that are high in fiber (e.g. oats, beans, fruits) may help to reduce blood cholesterol level. ₁ True ₂ False ₃ I do not

C. Food Frequency. I am now going to ask you questions about foods that you usually eat. For each food, I want to know whether you eat it (yes or no), and approximately how many times you eat it, (times per day, week, month).

Do you eat ...		How often do you eat?
Fruits (excluding juices)	Yes / No	___ d w m
Legumes (beans, chick peas, lentils, pigeon peas)	Yes / No	___ d w m
Green leafy vegetables, lettuce	Yes / No	___ d w m
Milk, type of milk 4% 2% 1% skim Other type of milk _____	Yes / No	___ d w m
Cheese or yogurt	Yes / No	___ d w m
Meats (chicken, beef, pork, ham)	Yes / No	___ d w m
Fish and Shellfish	Yes / No	___ d w m
Eggs	Yes / No	___ d w m
Pasta, breads and cereals (e.g. rice, spaghetti)	Yes / No	___ d w m
100% fruit juice	Yes / No	___ d w m
Artificial drinks (e.g. sunny delight, tang, kool aid)	Yes / No	___ d w m
Regular soft drink (e.g. Pepsi, Coke)	Yes / No	___ d w m
Diet soft drinks and drinks with artificial sweeteners	Yes / No	___ d w m
Regular sweets and desserts	Yes / No	___ d w m
Sweets and desserts with artificial sweeteners	Yes / No	___ d w m
Snack foods (e.g., potato chips, Nachos, etc)	Yes / No	___ d w m

D. Where do you obtain your meals? Please check what applies the most
₁ Home ₂ Restaurant ₃ Shelter ₄ Fast Food ₅ Other, please specify

Write down everything you had to eat and drink yesterday from the first thing in the morning until the last thing at night. Give as much detail as possible, more detail is better.

Time or Meal	Food or Beverage Item (Describe)	How Much? (Amount/size)	How or Where Prepared?
<p>Such as: morning, mid-morning, lunch, afternoon, evening or late evening</p>	<p>List all foods or a combination food. For example, a taco could be: Corn tortilla Ground beef Lettuce Tomato Cheddar cheese Sour cream 2% Milk</p>	<p>For the taco example it could be: 1 3 oz. 1/2 cup 1/4 cup 2 oz. 1 tablespoon 1 cup</p>	<p>Such as: <i>Baked Fried Fresh Broiled Grilled Boiled McDonald's</i></p>

E. FRUITS & VEGETABLES: Staging

Fruits and vegetables come in many forms: fresh, frozen, canned, dried, and 100% fruit and vegetable juices. Fruits and vegetables can be cooked or eaten raw. They can also be eaten by themselves or as part of a mixed dish such as soups or casseroles.

Use this table to help you count your fruit and vegetable servings...

COUNT AS ONE SERVING: Vegetables:

- 1/2 cup of cooked or raw vegetables
- 1 cup of raw leafy greens

Fruit:

- 1/2 cup or a medium sized piece of fruit
- 3/4 cup of 100% fruit juice
- 1/4 cup of dried fruit

A. How many servings of fruits and vegetables do you usually eat each day? *Please select one and fill in the circle.*

- None (*Go to Question B1*)
- 1 Serving (*Go to Question B1*)
- 2 Servings Days (*Go to Question B1*)
- 3 Servings (*Go to Question B1*)
- 4 Servings (*Go to Question B1*)
- 5 Servings (*Go to Question B2*)
- 6 Servings or more (*Go to Question B2*)

B1. Do you intend to change what you eat so you will eat at least 5 servings of fruits and vegetables every day? *Please select one and fill in the circle.*

- No, and I don't intend to in the next 6 months (*Go to Next Page*)
- Yes, and I intend to in the next 6 months (*Go to Next Page*)
- Yes, and I intend to in the next 30 days (*Go to Next Page*)

B2. You report that you have been eating 5 or more regular servings of fruits and vegetables. For how many months have you been doing this? *Please select one and fill in the circle.*

- Less than 6 months
- 6 months or more

DIETARY FAT: Staging

A. Do you regularly eat 5 or fewer servings of high fat foods every day? Please select one and fill in the circle.

- No, I eat more than 5 servings of high fat foods per day (Go to Question B1)
- Yes, I eat 5 or fewer servings of high fat foods per day (Go to Question B2)

B1. Do you intend to change what you eat so you will eat 5 or fewer servings of high fat foods every day in the next 6 months? Please select one and fill in the circle.

- No, and I don't intend to in the next 6 months (Go to Next Page)
- Yes, and I intend to in the next 6 months (Go to Next Page)
- Yes, and I intend to in the next 30 days (Go to Next Page)

B2. For how many months have you been eating 5 or fewer servings of high fat foods every day? Please select one and fill in the circle.

- Less than 6 months
- 6 months or more

FIBER: Staging

A. Do you eat regular servings of high fiber foods? Please select one and fill in the circle.

- No (Go to Question B1)
- Yes (Go to Question B2)

B1. Do you intend to change what you eat so you will eat more high fiber foods in the next 6 months? You can get this by eating high fiber cereals (5 grams/serving), breads (2 grams per serving), beans and legumes, fruits, and vegetables. Please select one and fill in the circle.

- No, and I don't intend to in the next 6 months (Go to Next Page)
- Yes, and I intend to in the next 6 months (Go to Next Page)
- Yes, and I intend to in the next 30 days (Go to Next Page)

B2. You report that you've been eating regular servings of high fiber foods. For how many months have you been consuming this amount of fiber? Please select one and fill in the circle.

- Less than 6 months
- 6 months or more

F. FRUIT AND VEGETABLE SELF EFFICACY

There are many things that can get in the way of choosing to eat 5 fruits and vegetables each day Rate HOW CONFIDENT you are that you can do the following using the scale below.

	Not at All Confident	Somewhat Confident	Moderately Confident	Very Confident	Extremely Confident
Eat 5 servings of fruits and vegetables everyday?					
Drink 100% fruit juice instead of soda or fruit punch?					
Eat fruits and vegetables for a snack instead of chips or candy?					
Eat fruits and vegetables when eating out at a restaurant?					
Eat fruits and vegetables when I am upset or having a bad day?					
Eat fruits and vegetables when I am at a social event?					

DIETARY FIBER SELF-EFFICACY

There are many things that can get in the way of choosing to eat foods high in fiber. Rate HOW CONFIDENT you are that you can do the following using the scale below

	Not at All Confident	Somewhat Confident	Moderately Confident	Very Confident	Extremely Confident
Choose high fiber cereals over low fiber and sugary cereals?					
Avoid foods that are low in fiber?					
Choose high fiber foods even when you are upset and having a bad day					
Choose high fiber snacks instead of doughnuts or cookies?					
Eat 5 servings of whole grains and beans every day?					
Choose selections with whole grains or beans when out at a restaurant?					
Regularly eat whole grain bread?					
Choose foods that are high in fiber when at a social event?					

DIETARY FAT SELF EFFICACY

There are many things that can get in the way of choosing to eat a diet low in fat. HOW CONFIDENT are you that you can choose low fat foods in each situation?

	Not at All Confident	Somewhat Confident	Moderately Confident	Very Confident	Extremely Confident
When others around you are eating high fat foods.					
When you are craving high fat foods.					
When you are out at a restaurant.					
When you are upset or having a bad day.					
When you are at a social event.					

**When you are grocery shopping how confident are you in your ability to?
(check one answer for each food type)**

How confident are you in your ability to	Not at all confident	Not confident	Somewhat confident	Very confident
Select whole grain bread or cereal in a grocery store? ...	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Select low fat dairy products (e.g. yogurt)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Select foods that are low in sodium	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Select foods that are low in saturated fat?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Select foods that are low in cholesterol?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Select foods high in dietary fiber?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Select foods that are low in or free of trans fats?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

G. MORBIDITY

Have you experienced any of these signs and symptoms in the last month?

Sign and Symptom	Yes	No
Fever		
Chills		
Fatigue		
Malaise		
Lethargy		
Headache		
Skin Lesion or Rash		
Visual changes		
Oral Lesion		
Abdominal Discomfort		
Anorexia		
Dysphagia		
Nausea		
Vomiting		
Diarrhea		
Constipation		
Rectal or Anal Lesions		
Changes in weight		
Cough		
Wheezing		
Chest pain		
Difficulty breathing		
Shortness of breath		
Anemia		
Numbness		
Sharp pain		
Loss of coordination		
Impaired concentration		
Apathy or mood changes		
Seizures		
Dysuria		
Genital discharge		
Genital lesion		
Myalgia		
Arthralgia		

H. MEDICATION ADHERENCE QUESTIONNAIRE

This answers you give on this form will be used to plan ways to help other people who must take pills on a difficult schedule. Please do the best you can to answer all the questions. If you do not wish to answer a question, please draw a line through it. If you do not know how to answer a question, ask your study nurse to help. Thank you for helping in this important study.

PATIENT ONLY continue here.

The next section of the questionnaire asks about your HIV study medications that you took over the last four days.

Most people with HIV have many pills to take at different times during the day.

Many people find it hard to always remember their pills:

- Some people get busy and forget to carry their pills with them.
- Some people find it hard to take their pills according to all the instructions, such as “with on every 8 hours,” “with plenty of fluids” meals,” or “ an empty stomach,”
- Some people decide to skip doses to avoid side effects or to just not be taking pills that day.

We need to understand how people with HIV are really doing with their pills. Please tell us what you are actually doing. Don't worry about telling us that you don't take all your pills. We need to know what is really happening, not what you think we “want to hear”

The next section of the questionnaire asks about the study medications that you may have missed taking over the last four days. Please complete the following table by filling in the boxes below.

A. IF YOU TOOK ONLY A PORTION OF A DOSE ON ONE OR MORE OF THESE DAYS, PLEASE REPORT THE DOSE(S) AS BEING MISSED.

Names of your anti-HIV medications	How many doses did you miss			
	Yesterday	2 days ago	3 days ago	4 days ago

B. During the past 4 days, on how many days have you missed taking all your doses?

₁ None ₂ One day ₃ Two days ₄ Three days ₅ Four days

C. Most anti-HIV medications need to be taken on a schedule, such as “2 times a day” or “3 times a day” or “every 8 hours.” How closely did you follow your specific schedule over the last four days?

₁ Never ₂ Some Of The Time ₃ About Half Of The Time
₄ Most Of The Time ₅ All Of The Time

D. Do any of your anti-HIV medications have special instructions, such as “take with food” or “on an empty stomach” or “with plenty of fluids?”

₁ Yes ₂ No

If Yes, how often did you follow those special instructions over the last four days?

₁ Never ₂ Some Of The Time ₃ About Half Of The Time
₄ Most Of The Time
₅ All Of The Time

E. Some people find that they forget to take their pills on the weekend days. Did you miss any of your anti-HIV medications last weekend— last Saturday or Sunday?

₁ Yes ₂ No

F. When was the last time you missed any of your medications? Check one.

₁ Within the past week
₂ 1-2 weeks ago
₃ 2-4 weeks ago
₄ 1-3 months ago
₅ More than 3 months ago
₆ Never skip medications or not applicable

I. QUALITY OF LIFE INDEX

ACTIVITY	SCORE
<p>Since the last visit, the patient:</p> <p>-has been working or studying full-time, or nearly so, in usual occupation; or managing own household, or participating in unpaid or voluntary activities, whether retired or not.</p> <p style="text-align: right;">2</p> <p>-has been working or studying full-time, or nearly so, in usual occupation; or managing own household, or participating in unpaid or voluntary activities; but requiring major assistance or a significant reduction in hours worked or sheltered situation or was on sick leave</p> <p style="text-align: right;">1</p> <p>-has not been working or studying in any capacity and not managing own household</p> <p style="text-align: right;">0</p>	
DAILY LIVING	SCORE
<p>Since the last visit, the patient</p> <p>-has been self-reliant in eating, washing, toileting, and dressing; using public transport, or driving own car.</p> <p style="text-align: right;">2</p> <p>-has been requiring assistance (another person or special equipment) for daily activities and transport, but performing light tasks.</p> <p style="text-align: right;">1</p> <p>-has not been managing personal care or light tasks, or not leaving own home or institution at all.</p> <p style="text-align: right;">0</p>	
HEALTH	SCORE
<p>Since the last visit, the patient</p> <p>-has been appearing to feel well or reporting feeling "great" most of the time.</p> <p style="text-align: right;">2</p> <p>-has been lacking energy or not feeling entirely "up to par" more than just occasionally.</p> <p style="text-align: right;">1</p> <p>-has been feeling very ill or "lousy", seeming weak and washed out most of the time or was unconscious</p> <p style="text-align: right;">0</p>	
SUPPORT	SCORE
<p>Since the last visit, the patient</p> <p>-has been having good relationships with others and receiving strong support from at least one family member or friend.</p> <p style="text-align: right;">2</p> <p>-support received or perceived has been limited from family or friends or by patient's condition.</p> <p style="text-align: right;">1</p> <p>-support from family and friends occurred infrequently or only when absolutely necessary, or patient was unconscious.</p> <p style="text-align: right;">0</p>	
OUTLOOK	SCORE
<p>During the last week, the patient</p> <p>-has usually been appearing calm and positive in outlook, accepting and in control of personal circumstances, including surroundings.</p> <p style="text-align: right;">2</p> <p>-has sometimes been troubled because not fully in control of personal circumstances, or has been having periods of obvious anxiety or depression</p> <p style="text-align: right;">1</p> <p>-has been seriously confused or very frightened, or consistently anxious and depressed or confused</p> <p style="text-align: right;">0</p>	

J. SF-36 HEALTH SURVEY
Your Health and Well-Being

This survey asks for your views about your health. This information will help keep track of how you feel and how well you are able to do your usual activities. *Thank you for completing this survey!*

For each of the following questions, please mark an in the one box that best describes your answer.

1. In general, would you say your health is:

Excellent	Very good	Good	Fair	Poor
▼	▼	▼	▼	▼
<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5

2. Compared to one year ago, how would you rate your health in general now?

Much better now than one year ago	Somewhat better now than one year ago	About the same as one year ago	Somewhat worse now than one year ago	Much worse now than one year ago
▼	▼	▼	▼	▼
<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5

3. The following questions are about activities you might do during a typical day. Does your health now limit you in these activities? If so, how much?

Yes, limited a lot	Yes, limited a little	No, not limited at all
▼	▼	▼

- | | | | | |
|---|---|----------------------------------|----------------------------------|----------------------------|
| a | <u>Vigorous activities</u> , such as running, lifting heavy objects, participating in strenuous sports | <input type="checkbox"/> 1 | <input type="checkbox"/> 2 | <input type="checkbox"/> 3 |
| b | <u>Moderate activities</u> , such as moving a table, pushing a vacuum cleaner, bowling, or playing golf | <input type="checkbox"/> 1 | <input type="checkbox"/> 2 | <input type="checkbox"/> 3 |
| c | Lifting or carrying groceries | <input type="checkbox"/> 1 | <input type="checkbox"/> 2 | <input type="checkbox"/> 3 |
| d | Climbing <u>several</u> flights of stairs | <input type="checkbox"/> 1 | <input type="checkbox"/> 2 | <input type="checkbox"/> 3 |
| e | Climbing <u>one</u> flight of stairs | <input type="checkbox"/> 1 | <input type="checkbox"/> 2 | <input type="checkbox"/> 3 |
| f | Bending, kneeling, or stooping | <input type="checkbox"/> 1 | <input type="checkbox"/> 2 | <input type="checkbox"/> 3 |
| g | Walking more than a mile | <input type="checkbox"/> 1 | <input type="checkbox"/> 2 | <input type="checkbox"/> 3 |
| h | Walking several hundred yards | <input type="checkbox"/> 1 | <input type="checkbox"/> 2 | <input type="checkbox"/> 3 |
| i | Walking one hundred yards | <input type="checkbox"/> 1 | <input type="checkbox"/> 2 | <input type="checkbox"/> 3 |
| j | Bathing or dressing yourself | <input type="checkbox"/> 1 | <input type="checkbox"/> 2 | <input type="checkbox"/> 3 |

4. During the past 4 weeks, how much of the time have you had any of the following problems with your work or other regular daily activities as a result of your physical health?

All of the time	Most of the time	Some of the time	A little of the time	None of the time
▼	▼	▼	▼	▼

- a Cut down on the amount of time you spent on work or other activities..... 1..... 2..... 3..... 4..... 5
- b Accomplished less than you would like..... 1..... 2..... 3..... 4..... 5
- c Were limited in the kind of work or other activities..... 1..... 2..... 3..... 4..... 5
- d Had difficulty performing the work or other activities (for example, it took extra effort)..... 1..... 2..... 3..... 4..... 5

5. During the past 4 weeks, how much of the time have you had any of the following problems with your work or other regular daily activities as a result of any emotional problems (such as feeling depressed or anxious)?

All of the time	Most of the time	Some of the time	A little of the time	None of the time
▼	▼	▼	▼	▼

- a Cut down on the amount of time you spent on work or other activities..... 1..... 2..... 3..... 4..... 5
- b Accomplished less than you would like..... 1..... 2..... 3..... 4..... 5
- c Did work or other activities less carefully than usual..... 1..... 2..... 3..... 4..... 5

6. During the past 4 weeks, to what extent has your physical health or emotional problems interfered with your normal social activities with family, friends, neighbors, or groups?

Not at all	Slightly	Moderately	Quite a bit	Extremely
▼	▼	▼	▼	▼
<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5

7. How much bodily pain have you had during the past 4 weeks?

None	Very mild	Mild	Moderate	Severe	Very severe
▼	▼	▼	▼	▼	▼
<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> 6

8. During the past 4 weeks, how much did pain interfere with your normal work (including both work outside the home and housework)?

Not at all	A little bit	Moderately	Quite a bit	Extremely
▼	▼	▼	▼	▼
<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5

9. These questions are about how you feel and how things have been with you during the past 4 weeks. For each question, please give the one answer that comes closest to the way you have been feeling. How much of the time during the past 4 weeks...

All of the time	Most of the time	Some of the time	A little of the time	None of the time
▼	▼	▼	▼	▼

- a Did you feel full of life?..... 1 2 3 4 5
- b Have you been very nervous?.... 1 2 3 4 5
- c Have you felt so down in the dumps that nothing could cheer you up?..... 1 2 3 4 5
- d Have you felt calm and peaceful?..... 1 2 3 4 5
- e Did you have a lot of energy?..... 1 2 3 4 5
- f Have you felt downhearted and depressed?..... 1 2 3 4 5
- g Did you feel worn out?..... 1 2 3 4 5
- h Have you been happy?..... 1 2 3 4 5
- i Did you feel tired?..... 1 2 3 4 5

10. During the past 4 weeks, how much of the time has your physical health or emotional problems interfered with your social activities (like visiting with friends, relatives, etc.)?

All of the time	Most of the time	Some of the time	A little of the time	None of the time
▼	▼	▼	▼	▼
<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5

11. How TRUE or FALSE is each of the following statements for you?

Definitely true	Mostly true	Don't know	Mostly false	Definitely false
▼	▼	▼	▼	▼

- a I seem to get sick a little
easier than other people..... 1 2 3 4 5
- b I am as healthy as
anybody I know..... 1 2 3 4 5
- c I expect my health to
get worse..... 1 2 3 4 5
- d My health is excellent..... 1 2 3 4 5

K. ANTHROPOMETRICS AND LABORATORY RESULTS

MEASUREMENTS	RESULTS	DATE OBTAINED
Height(ft/cm)		
Weight(lbs)		
BMI		
Waist		
Hip		
Waist/Hip Ratio		
TEST	RESULTS	DATE OBTAINED
CD4 Cell Count		
Viral Load		
Hemoglobin		
Hematocrit		
Albumin		

BODY COMPOSITION BIA RESULTS

Phase Angle	_____	°
Body Capacitance	_____	pF
Resistance	_____	ohm
Reactance	_____	ohm

Mass Distribution	Ibs	Percent
Body Cell Mass	_____	_____
Extracellular Mass	_____	_____
Lean Body Mass	_____	_____
Fat Mass	_____	_____
Total Weight	_____	_____

ECM/BCM	_____
Body Mass Index	_____
Basal Metabolic Rate	_____

Water Compartment	Liters	Percent
Intracellular Water	_____	_____
Extracellular Water	_____	_____
Total Body Water	_____	100
TBW/Lean Body Mass	_____	_____
TBW/Lean Body Weight	_____	_____

Appendix C5: Intervention Study 3-Months Follow-up Questionnaire

A. Demographic Data

For these questions, please circle your answers or write your answers in the spaces provided.

1. Gender: ₁ Male ₂ Female

2. Age: _____ years.

3. Which of the following best describes your ethnic background?

₁ Black/African American ₂ Asian American ₃ Non-Hispanic White
₄ Hispanic American ₅ Native American ₆ Other (specify): _____

4. Status: ₁ Married ₂ Single ₃ Divorced/Widowed ₄ Other _____

5. Please check your highest level of education.

₁ < High school ₂ High school or GED
₃ 1-2 years college ₄ Graduated from college

6. Work Status: ₁ Not working ₂ Work Part-time,
₃ Work full time ₄ On disability

7. What is your monthly income? ₁ <\$1000 ₂ \$1001-\$2000
₃ \$2001-\$3000 ₄ >\$3001

8. Do you live: ₁ Alone ₂ With your family (parents, husband, children, etc)
₃ Shelter ₄ Street

9. Do you smoke cigarettes? ₁ Yes ₂ No

9a. If yes how often?

₁ Daily
₂ 4-6 times a week
₃ 2-3 times a week
₄ Once a week
₅ Less than once a month
₆ At least once a month but less than once a week
₇ Never

9b. If daily how many cigarettes per day _____

10. Do you use any drugs? ₁ Yes ₂ No

10a. If yes please check all that apply: Marijuana ₁ Cocaine ₂ Crack

₃ Heroin ₄ Combination (Speedball) ₅ Methadone
₆ Amphetamine (Ecstasy) ₇ Other ₈

11. Do you drink alcohol? ₁ Yes ₂ No

11a. If yes how often?

- ₁ Daily
₂ 4-6 times a week
₃ 2-3 times a week
₄ once a week
₅ Less than once a month
₆ At least once a month but less than once a week
₇ Never

11b. If daily how many drinks per day?

- Beer drinks
----- Wine drinks
----- Liquor drinks
----- Total drinks

12. Do you use ART? ₁ Yes ₂ No

12a. List of medications (1) _____ (2) _____
(3) _____ (4) _____ (5) _____

13. Do you take multivitamins? ₁ Yes ₂ No

13a. If yes please list them. 1) _____ 2) _____
3) _____ 4) _____ 5) _____

14. Do you receive food stamps? ₁ Yes ₂ No

14a. If yes, how many months have you received food stamps in the past 12 months? _____

15. In the last 30 days, did you receive any foods to take home from community sources such as a food bank, food pantry, or other sources?

₁ Yes ₂ No

16. In the past 30 days did you eat any meals at a soup kitchen, the Salvation Army, a family shelter, or another similar place? ₁ Yes ₂ No

B. Nutrition Knowledge

Please select the best answer to each of the following questions.

1. From the following list of foods, please select the one that is highest in fiber

- ₁ kidney beans
- ₂ low-fat milk
- ₃ eggs
- ₄ yogurt

2. Which of the following may help you to lower your cholesterol level?

- ₁ low fat yogurt
- ₂ oatmeal
- ₃ scrambled eggs
- ₄ croissant sandwich

3. Which of the following have the highest content of trans fats?

- ₁ coke
- ₂ doughnuts
- ₃ collard greens
- ₄ baked potatoes

4. Which of the following have the highest content of saturated fat?

- ₁ low fat cottage cheese
- ₂ cooked potatoes
- ₃ eggs and sausages
- ₄ raw baby carrot sticks

5. Which of the following food groups contributes most to the overall saturated fat intake in the American diet?

- ₁ fruits
- ₂ meats
- ₃ dairy
- ₄ grains

6. Which of the following have the highest content of cholesterol?

- ₁ citrus fruits
- ₂ eggs
- ₃ low fat milk
- ₄ whole wheat flour

7. Which of the following is more likely the highest in sodium?

- ₁ low fat cottage cheese
- ₂ cooked potatoes
- ₃ rolled oats
- ₄ raw baby carrot sticks

8. Which of the following have the highest content of added sugar?

- ₁ fruit salad
- ₂ potato salad
- ₃ coke
- ₄ eggs and sausages

9. Which of the following is the recommended daily number of servings of fruits for a reference 2,000kcal diet?

- ₁ one ₂ two ₃ three ₄ four

10. Which of the following is the recommended daily number of cups of vegetables for a reference 2,000kcal diet?

- ₁ one and one half ₂ two and one half ₃ three and one half ₄ four and one half

11. Adequate intake of whole grains could help me to stay prevent constipation.

- ₁ True ₂ False ₃ I do not know

12. Regular consumption of nuts such as walnuts, pecans or peanuts helps to lower cholesterol.

- ₁ True ₂ False ₃ I do not know

13. Regular intake of flax seeds helps in reducing risk for heart disease.

- ₁ True ₂ False ₃ I do not know

14. Cakes, cookies, crackers, are high in trans fats.

- ₁ True ₂ False ₃ I do not know

15. Trans fats may contribute to the development of a heart attack or a stroke.

- ₁ True ₂ False ₃ I do not know

16. Olive oil is a good source of beneficial fat.

- ₁ True ₂ False ₃ I do not know

17. Heart diseases are the number one cause of death in America.

- ₁ True ₂ False ₃ I do not know

18. Eating adequate amounts of fruits may help prevent from developing cancer.

- ₁ True ₂ False ₃ I do not know

19. Regular intake of whole grains may help to prevent diabetes.

- ₁ True ₂ False ₃ I do not know

20. Eating foods that are high in fiber (e.g. oats, beans, fruits) may help to reduce blood cholesterol level. ₁ True ₂ False ₃ I do not

C. Food Frequency. I am now going to ask you questions about foods that you usually eat. For each food, I want to know whether you eat it (yes or no), and approximately how many times you eat it, (times per day, week, month).

Do you eat ...		How often do you eat?
Fruits (excluding juices)	Yes / No	___ d w m
Legumes (beans, chick peas, lentils, pigeon peas)	Yes / No	___ d w m
Green leafy vegetables, lettuce	Yes / No	___ d w m
Milk, type of milk 4% 2% 1% skim Other type of milk _____	Yes / No	___ d w m
Cheese or yogurt	Yes / No	___ d w m
Meats (chicken, beef, pork, ham)	Yes / No	___ d w m
Fish and Shellfish	Yes / No	___ d w m
Eggs	Yes / No	___ d w m
Pasta, breads and cereals (e.g. rice, spaghetti)	Yes / No	___ d w m
100% fruit juice	Yes / No	___ d w m
Artificial drinks (e.g. sunny delight, tang, kool aid)	Yes / No	___ d w m
Regular soft drink (e.g. Pepsi, Coke)	Yes / No	___ d w m
Diet soft drinks and drinks with artificial sweeteners	Yes / No	___ d w m
Regular sweets and desserts	Yes / No	___ d w m
Sweets and desserts with artificial sweeteners	Yes / No	___ d w m
Snack foods (e.g., potato chips, Nachos, etc)	Yes / No	___ d w m

E. FRUITS & VEGETABLES: Staging

Fruits and vegetables come in many forms: fresh, frozen, canned, dried, and 100% fruit and vegetable juices. Fruits and vegetables can be cooked or eaten raw. They can also be eaten by themselves or as part of a mixed dish such as soups or casseroles.

Use this table to help you count your fruit and vegetable servings...

COUNT AS ONE SERVING: Vegetables:

- 1/2 cup of cooked or raw vegetables
- 1 cup of raw leafy greens

Fruit:

- 1/2 cup or a medium sized piece of fruit
- 3/4 cup of 100% fruit juice
- 1/4 cup of dried fruit

A. How many servings of fruits and vegetables do you usually eat each day? Please select one and fill in the circle.

- None (Go to Question B1)
- 1 Serving (Go to Question B1)
- 2 Servings Days (Go to Question B1)
- 3 Servings (Go to Question B1)
- 4 Servings (Go to Question B1)
- 5 Servings (Go to Question B2)
- 6 Servings or more (Go to Question B2)

B1. Do you intend to change what you eat so you will eat at least 5 servings of fruits and vegetables every day? Please select one and fill in the circle.

- No, and I don't intend to in the next 6 months (Go to Next Page)
- Yes, and I intend to in the next 6 months (Go to Next Page)
- Yes, and I intend to in the next 30 days (Go to Next Page)

B2. You report that you have been eating 5 or more regular servings of fruits and vegetables.

For how many months have you been doing this? Please select one and fill in the circle.

- Less than 6 months
- 6 months or more

DIETARY FAT: Staging

A. Do you regularly eat 5 or fewer servings of high fat foods every day? Please select one and fill in the circle.

- No, I eat more than 5 servings of high fat foods per day (Go to Question B1)
- Yes, I eat 5 or fewer servings of high fat foods per day (Go to Question B2)

B1. Do you intend to change what you eat so you will eat 5 or fewer servings of high fat foods every day in the next 6 months? Please select one and fill in the circle.

- No, and I don't intend to in the next 6 months (Go to Next Page)
- Yes, and I intend to in the next 6 months (Go to Next Page)
- Yes, and I intend to in the next 30 days (Go to Next Page)

B2. For how many months have you been eating 5 or fewer servings of high fat foods every day? Please select one and fill in the circle.

- Less than 6 months
- 6 months or more

FIBER: Staging

A. Do you eat regular servings of high fiber foods? Please select one and fill in the circle.

- No (Go to Question B1)
- Yes (Go to Question B2)

B1. Do you intend to change what you eat so you will eat more high fiber foods in the next 6 months? You can get this by eating high fiber cereals (5 grams/serving), breads (2 grams per serving), beans and legumes, fruits, and vegetables. Please select one and fill in the circle.

- No, and I don't intend to in the next 6 months (Go to Next Page)
- Yes, and I intend to in the next 6 months (Go to Next Page)
- Yes, and I intend to in the next 30 days (Go to Next Page)

B2. You report that you've been eating regular servings of high fiber foods. For how many months have you been consuming this amount of fiber? Please select one and fill in the circle.

- Less than 6 months
- 6 months or more

F. FRIUT AND VEGETABLE SELF EFFICACY

There are many things that can get in the way of choosing to eat 5 fruits and vegetables each day Rate HOW CONFIDENT you are that you can do the following using the scale below.

	Not at All Confident	Somewhat Confident	Moderately Confident	Very Confident	Extremely Confident
Eat 5 servings of fruits and vegetables everyday?					
Drink 100% fruit juice instead of soda or fruit punch?					
Eat fruits and vegetables for a snack instead of chips or candy?					
Eat fruits and vegetables when eating out at a restaurant?					
Eat fruits and vegetables when I am upset or having a bad day?					
Eat fruits and vegetables when I am at a social event?					

DIETARY FIBER SELF-EFFICACY

There are many things that can get in the way of choosing to eat foods high in fiber. Rate HOW CONFIDENT you are that you can do the following using the scale below

	Not at All Confident	Somewhat Confident	Moderately Confident	Very Confident	Extremely Confident
Choose high fiber cereals over low fiber and sugary cereals?					
Avoid foods that are low in fiber?					
Choose high fiber foods even when you are upset and having a bad day					
Choose high fiber snacks instead of doughnuts or cookies?					
Eat 5 servings of whole grains and beans every day?					
Choose selections with whole grains or beans when out at a restaurant?					
Regularly eat whole grain bread?					
Choose foods that are high in fiber when at a social event?					

DIETARY FAT SELF EFFICACY

There are many things that can get in the way of choosing to eat a diet low in fat. HOW CONFIDENT are you that you can choose low fat foods in each situation?

	Not at All Confident	Somewhat Confident	Moderately Confident	Very Confident	Extremely Confident
When others around you are eating high fat foods.					
When you are craving high fat foods.					
When you are out at a restaurant.					
When you are upset or having a bad day.					
When you are at a social event.					

**When you are grocery shopping how confident are you in your ability to?
(check one answer for each food type)**

How confident are you in your ability to	Not at all confident	Not confident	Somewhat confident	Very confident
Select whole grain bread or cereal in a grocery store? ...	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Select low fat dairy products (e.g. yogurt)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Select foods that are low in sodium	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Select foods that are low in saturated fat?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Select foods that are low in cholesterol?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Select foods high in dietary fiber?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Select foods that are low in or free of trans fats?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

G. MORBIDITY

Have you experienced any of these signs and symptoms in the last month?

Sign and Symptom	Yes	No
Fever		
Chills		
Fatigue		
Malaise		
Lethargy		
Headache		
Skin Lesion or Rash		
Visual changes		
Oral Lesion		
Abdominal Discomfort		
Anorexia		
Dysphagia		
Nausea		
Vomiting		
Diarrhea		
Constipation		
Rectal or Anal Lesions		
Changes in weight		
Cough		
Wheezing		
Chest pain		
Difficulty breathing		
Shortness of breath		
Anemia		
Numbness		
Sharp pain		
Loss of coordination		
Impaired concentration		
Apathy or mood changes		
Seizures		
Dysuria		
Genital discharge		
Genital lesion		
Myalgia		
Arthralgia		

H.

MEDICATION ADHERENCE QUESTIONNAIRE

This answers you give on this form will be used to plan ways to help other people who must take pills on a difficult schedule. Please do the best you can to answer all the questions. If you do not wish to answer a question, please draw a line through it. If you do not know how to answer a question, ask your study nurse to help. Thank you for helping in this important study.

PATIENT ONLY continue here.

The next section of the questionnaire asks about your HIV study medications that you took over the last four days.

Most people with HIV have many pills to take at different times during the day.

Many people find it hard to always remember their pills:

- Some people get busy and forget to carry their pills with them.
- Some people find it hard to take their pills according to all the instructions, such as “with on every 8 hours,” “with plenty of fluids” meals,” or “ an empty stomach,”
- Some people decide to skip doses to avoid side effects or to just not be taking pills that day.

We need to understand how people with HIV are really doing with their pills. Please tell us what you are actually doing. Don't worry about telling us that you don't take all your pills. We need to know what is really happening, not what you think we “want to hear”

The next section of the questionnaire asks about the study medications that you may have missed taking over the last four days. Please complete the following table by filling in the boxes below.

A. IF YOU TOOK ONLY A PORTION OF A DOSE ON ONE OR MORE OF THESE DAYS, PLEASE REPORT THE DOSE(S) AS BEING MISSED.

Names of your anti-HIV medications	How many doses did you miss			
	Yesterday	2 days ago	3 days ago	4 days ago

B. During the past 4 days, on how many days have you missed taking all your doses?

₁ None ₂ One day ₃ Two days ₄ Three days ₅ Four days

C. Most anti-HIV medications need to be taken on a schedule, such as “2 times a day” or “3 times a day” or “every 8 hours.” How closely did you follow your specific schedule over the last four days?

₁ Never ₂ Some Of The Time ₃ About Half Of The Time
₄ Most Of The Time ₅ All Of The Time

D. Do any of your anti-HIV medications have special instructions, such as “take with food” or “on an empty stomach” or “with plenty of fluids?”

₁ Yes ₂ No

If Yes, how often did you follow those special instructions over the last four days?

₁ Never ₂ Some Of The Time ₃ About Half Of The Time
₄ Most Of The Time
₅ All Of The Time

E. Some people find that they forget to take their pills on the weekend days. Did you miss any of your anti-HIV medications last weekend— last Saturday or Sunday?

₁ Yes ₂ No

F. When was the last time you missed any of your medications? Check one.

₁ Within the past week
₂ 1-2 weeks ago
₃ 2-4 weeks ago
₄ 1-3 months ago
₅ More than 3 months ago
₆ Never skip medications or not applicable

I. QUALITY OF LIFE INDEX

ACTIVITY	SCORE
<p>Since the last visit, the patient:</p> <p>-has been working or studying full-time, or nearly so, in usual occupation; or managing own household, or participating in unpaid or voluntary activities, whether retired or not.</p> <p style="text-align: right;">2</p> <p>-has been working or studying full-time, or nearly so, in usual occupation; or managing own household, or participating in unpaid or voluntary activities; but requiring major assistance or a significant reduction in hours worked or sheltered situation or was on sick leave</p> <p style="text-align: right;">1</p> <p>-has not been working or studying in any capacity and not managing own household</p> <p style="text-align: right;">0</p>	
DAILY LIVING	SCORE
<p>Since the last visit, the patient</p> <p>-has been self-reliant in eating, washing, toileting, and dressing; using public transport, or driving own car.</p> <p style="text-align: right;">2</p> <p>-has been requiring assistance (another person or special equipment) for daily activities and transport, but performing light tasks.</p> <p style="text-align: right;">1</p> <p>-has not been managing personal care or light tasks, or not leaving own home or institution at all.</p> <p style="text-align: right;">0</p>	
HEALTH	SCORE
<p>Since the last visit, the patient</p> <p>-has been appearing to feel well or reporting feeling "great" most of the time.</p> <p style="text-align: right;">2</p> <p>-has been lacking energy or not feeling entirely "up to par" more than just occasionally.</p> <p style="text-align: right;">1</p> <p>-has been feeling very ill or "lousy", seeming weak and washed out most of the time or was unconscious</p> <p style="text-align: right;">0</p>	
SUPPORT	SCORE
<p>Since the last visit, the patient</p> <p>-has been having good relationships with others and receiving strong support from at least one family member or friend.</p> <p style="text-align: right;">2</p> <p>-support received or perceived has been limited from family or friends or by patient's condition.</p> <p style="text-align: right;">1</p> <p>-support from family and friends occurred infrequently or only when absolutely necessary, or patient was unconscious.</p> <p style="text-align: right;">0</p>	
OUTLOOK	SCORE
<p>During the last week, the patient</p> <p>-has usually been appearing calm and positive in outlook, accepting and in control of personal circumstances, including surroundings.</p> <p style="text-align: right;">2</p> <p>-has sometimes been troubled because not fully in control of personal circumstances, or has been having periods of obvious anxiety or depression</p> <p style="text-align: right;">1</p> <p>-has been seriously confused or very frightened, or consistently anxious and depressed or confused</p> <p style="text-align: right;">0</p>	

J. SF-36 HEALTH SURVEY
Your Health and Well-Being

This survey asks for your views about your health. This information will help keep track of how you feel and how well you are able to do your usual activities. *Thank you for completing this survey!*

For each of the following questions, please mark an in the one box that best describes your answer.

1. In general, would you say your health is:

Excellent	Very good	Good	Fair	Poor
▼	▼	▼	▼	▼
<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5

2. Compared to one year ago, how would you rate your health in general now?

Much better now than one year ago	Somewhat better now than one year ago	About the same as one year ago	Somewhat worse now than one year ago	Much worse now than one year ago
▼	▼	▼	▼	▼
<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5

3. The following questions are about activities you might do during a typical day. Does your health now limit you in these activities? If so, how much?

Yes, limited a lot	Yes, limited a little	No, not limited at all
▼	▼	▼

- | | | | | |
|---|---|----------------------------------|----------------------------------|----------------------------|
| a | <u>Vigorous activities</u> , such as running, lifting heavy objects, participating in strenuous sports | <input type="checkbox"/> 1 | <input type="checkbox"/> 2 | <input type="checkbox"/> 3 |
| b | <u>Moderate activities</u> , such as moving a table, pushing a vacuum cleaner, bowling, or playing golf | <input type="checkbox"/> 1 | <input type="checkbox"/> 2 | <input type="checkbox"/> 3 |
| c | Lifting or carrying groceries | <input type="checkbox"/> 1 | <input type="checkbox"/> 2 | <input type="checkbox"/> 3 |
| d | Climbing <u>several</u> flights of stairs | <input type="checkbox"/> 1 | <input type="checkbox"/> 2 | <input type="checkbox"/> 3 |
| e | Climbing <u>one</u> flight of stairs | <input type="checkbox"/> 1 | <input type="checkbox"/> 2 | <input type="checkbox"/> 3 |
| f | Bending, kneeling, or stooping | <input type="checkbox"/> 1 | <input type="checkbox"/> 2 | <input type="checkbox"/> 3 |
| g | Walking more than a mile | <input type="checkbox"/> 1 | <input type="checkbox"/> 2 | <input type="checkbox"/> 3 |
| h | Walking several hundred yards | <input type="checkbox"/> 1 | <input type="checkbox"/> 2 | <input type="checkbox"/> 3 |
| i | Walking one hundred yards | <input type="checkbox"/> 1 | <input type="checkbox"/> 2 | <input type="checkbox"/> 3 |
| j | Bathing or dressing yourself | <input type="checkbox"/> 1 | <input type="checkbox"/> 2 | <input type="checkbox"/> 3 |

4. During the past 4 weeks, how much of the time have you had any of the following problems with your work or other regular daily activities as a result of your physical health?

All of the time	Most of the time	Some of the time	A little of the time	None of the time
▼	▼	▼	▼	▼

- a Cut down on the amount of time you spent on work or other activities..... 1..... 2..... 3..... 4..... 5
- b Accomplished less than you would like..... 1..... 2..... 3..... 4..... 5
- c Were limited in the kind of work or other activities..... 1..... 2..... 3..... 4..... 5
- d Had difficulty performing the work or other activities (for example, it took extra effort)..... 1..... 2..... 3..... 4..... 5

5. During the past 4 weeks, how much of the time have you had any of the following problems with your work or other regular daily activities as a result of any emotional problems (such as feeling depressed or anxious)?

All of the time	Most of the time	Some of the time	A little of the time	None of the time
▼	▼	▼	▼	▼

- a Cut down on the amount of time you spent on work or other activities..... 1..... 2..... 3..... 4..... 5
- b Accomplished less than you would like..... 1..... 2..... 3..... 4..... 5
- c Did work or other activities less carefully than usual..... 1..... 2..... 3..... 4..... 5

6. During the past 4 weeks, to what extent has your physical health or emotional problems interfered with your normal social activities with family, friends, neighbors, or groups?

Not at all	Slightly	Moderately	Quite a bit	Extremely
▼	▼	▼	▼	▼
<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5

7. How much bodily pain have you had during the past 4 weeks?

None	Very mild	Mild	Moderate	Severe	Very severe
▼	▼	▼	▼	▼	▼
<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> 6

8. During the past 4 weeks, how much did pain interfere with your normal work (including both work outside the home and housework)?

Not at all	A little bit	Moderately	Quite a bit	Extremely
▼	▼	▼	▼	▼
<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5

9. These questions are about how you feel and how things have been with you during the past 4 weeks. For each question, please give the one answer that comes closest to the way you have been feeling. How much of the time during the past 4 weeks...

All of the time	Most of the time	Some of the time	A little of the time	None of the time
▼	▼	▼	▼	▼

- a Did you feel full of life?..... 1 2 3 4 5
- b Have you been very nervous?.... 1 2 3 4 5
- c Have you felt so down in the dumps that nothing could cheer you up?..... 1 2 3 4 5
- d Have you felt calm and peaceful?..... 1 2 3 4 5
- e Did you have a lot of energy?..... 1 2 3 4 5
- f Have you felt downhearted and depressed?..... 1 2 3 4 5
- g Did you feel worn out?..... 1 2 3 4 5
- h Have you been happy?..... 1 2 3 4 5
- i Did you feel tired?..... 1 2 3 4 5

10. During the past 4 weeks, how much of the time has your physical health or emotional problems interfered with your social activities (like visiting with friends, relatives, etc.)?

All of the time	Most of the time	Some of the time	A little of the time	None of the time
▼	▼	▼	▼	▼
<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5

11. How TRUE or FALSE is each of the following statements for you?

Definitely true	Mostly true	Don't know	Mostly false	Definitely false
▼	▼	▼	▼	▼

- a I seem to get sick a little
easier than other people..... 1 2 3 4 5
- b I am as healthy as
anybody I know..... 1 2 3 4 5
- c I expect my health to
get worse..... 1 2 3 4 5
- d My health is excellent..... 1 2 3 4 5

K. ANTHROPOMETRICS AND LABORATORY RESULTS

MEASUREMENTS	RESULTS	DATE OBTAINED
Height(ft/cm)		
Weight(lbs)		
BMI		
Waist		
Hip		
Waist/Hip Ratio		
TEST	RESULTS	DATE OBTAINED
CD4 Cell Count		
Viral Load		
Hemoglobin		
Hematocrit		
Albumin		

BODY COMPOSITION BIA RESULTS

Phase Angle	_____	°
Body Capacitance	_____	pF
Resistance	_____	ohm
Reactance	_____	ohm

Mass Distribution	lbs	Percent
Body Cell Mass	_____	_____
Extracellular Mass	_____	_____
Lean Body Mass	_____	_____
Fat Mass	_____	_____
Total Weight	_____	_____

ECM/BCM	_____
Body Mass Index	_____
Basal Metabolic Rate	_____

Water Compartment	Liters	Percent
Intracellular Water	_____	_____
Extracellular Water	_____	_____
Total Body Water	_____	100
TBW/Lean Body Mass	_____	_____
TBW/Lean Body Weight	_____	_____

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