

## Nutritional Status of Adolescent and Adult PLWHA on Anti-Retroviral Treatment, Attending Various Comprehensive Care Centres in Nairobi County, Kenya

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### Abstract

**Background:** Maintaining nutritional needs of People Living with HIV and AIDS (PLWHA) who are on Anti-Retroviral Treatment (ART) helps to strengthen their immune system and optimize response to medical treatment. The main objective of this study was to assess the nutritional status PLWHA on ART and the associated factors. **Methodology:** This was a cross-sectional study where 454 adolescent and adult PLWHA on ART were randomly selected and consent obtained to join the study. Structured interviewer-administered questionnaires were used to gather data on their socio-economic characteristics, the types of food consumed in the last 24 hours and their Body Mass Index. The data was organized and analysed using SPSS version 17.0. Variables were categorized and Chi-square statistical test used to assess association where a p-value of less than or equal to 0.05 was considered statistically significant. **Results:** A total of 454 PLWHA were recruited into the study and 180 (39.6%) were males while 274 (60.4%) were females giving a Male: Female ratio of 1: 1.5. Over three quarters (77%) had attained secondary education and above. The main sources of income were employment (48.5%) and business (44.9%). The types of foods consumed were beans and beef for body building (proteins); Ugali (maize meal) and rice for energy (Carbohydrates); kales and cabbages (vegetables), bananas and pineapples (fruits) as protective foods. Over half (51.1%) were overweight/obese. Sources of income and the monthly earnings were significantly associated with the overweight/obesity. **Conclusion:** The PLWHAs' sources of income and monthly earnings had statistical significance on their nutritional status (BMI) of being over-weight/obese. However, other factors such as: ART's ability to decrease resting-energy expenditure and basal metabolic rate resulting in replenishment of muscle bulk and hence weight gain; or intentional over-eating to avoid the stigmatized weight loss which is often "associated" with being HIV positive may have had a part to play.

**Keywords:** PLWHA; ART; Nutritional status (BMI); food groups and consumption; food availability, affordability and use.

### 1. Introduction

Adequate nutrition complements the effects of antiretroviral therapies thereby maintaining body weight and fitness, as well as improving the performance of the immune system already compromised by infection (Amorosa, *et. al.*, 2005). As stated in a report from Zambia, (IRIN, 2008), poor nutrition often experienced by people on treatment in that country nullified the benefits of the medicine. There is now clear evidence that malnourished individuals starting ART are far more likely to die in a given period than well-nourished individuals (Byron & Nangami, 2006).

A study in Singapore found that malnourished people were less likely than others to benefit from ARV therapy (Avert, 2008). In Malawi, severely malnourished people were six times more likely to die in the first three months of treatment compared to those with a normal nutritional status (Avert, 2008). The above cited studies were controlled for viral load and concluded that the findings were a result of malnourishment regardless of the viral load of the participants. Food intake generally improves drug tolerance during medication and reduces side effects as well (CATIE, 2008). Studies have shown that HIV weight loss tends to reduce protein stores more quickly than simple starvation, and a major nutritional goal for HIV infected individuals should be to build or maintain muscle mass (Momentum, 2008). HIV-infected persons taking antiretroviral drugs have been shown to have low serum micronutrient levels before widespread use of antiretroviral drugs and were associated with adverse outcomes (Momentum, 2008). In this connection PEPFAR-funded programmes underscore the importance of integrating food and nutrition support in HIV and AIDS programming as well as incorporating HIV and AIDS components in food assistance projects. Nutrients in food can interact with drugs by either enhancing or diminishing the effects of the medication. Anti-Retroviral Treatment can reduce viral loads and contribute to improved nutritional status, but can also create additional nutritional needs and dietary constraints,

thus making nutritional management a critical component of ARV therapy (Castleman, & Cogill, 2004). This manuscript reports findings of a study whose aim was to assess the nutritional status of the PLWHA on ART and the associated factors in Nairobi City County.

## 2. Materials And Methods

This was a cross-sectional study to investigate food consumption patterns and BMI of PLWHA on ART. The study was purposively undertaken in Comprehensive Care Clinics (CCCs) of Karen, St. Mary's, Mbagathi and Kenyatta National Hospitals in Nairobi, among all the adult PLWHA attending CCCs in the four hospitals. Probability sampling using proportional allocation size was done in the CCCs of the four hospitals. Fisher's formula of 1998 was used to calculate sample size which came to 384 PLWHA. Random sampling was used to select the PLWHA in the four hospitals proportionately. A 20% increase of PLWHA in the study was found necessary due to possible failure of some PLWHA to come for interview due to stigma associated with HIV and AIDS. Therefore, the expected study population was 460. However, 454 PLWHA was realized. Lists of all the PLWHA on ART in the four hospitals were compiled and random numbers used to select the 454 PLWHA. Those selected were contacted to visit their respective CCCs on a set date to be informed about the study and their consent to participate. PLWHA aged between 15 and 49 years who had been on ART for more than one year were included in the study. The age inclusion criterion was guided by the fact that, 15 to 49 year olds is where one finds the majority PLWHA and indeed on ART. In case of those PLWHA below 18 years of age, a legal guardian was requested to sign the consent form for the PLWHA for Participation after the assenting of the PLWHA. Given the level of stigma associated with HIV/AIDS in Kenya and indeed the whole world, confidentiality was paramount. Research assistants were therefore recruited from the institutions where the study was being carried out and trained on the data collection procedure and tools (structured questionnaires). The main issues captured in the interview were; socio-demographic characteristics, types of foods consumed in the last 24 hours and Body Mass Index (BMI). Prior to the data collection, the questionnaire was pre-tested for its suitability for the study.

### 2.1 Data Management And Analysis

The Principal Investigator (PI) counter-checked the questionnaires to ensure that there were no mistakes or omissions. The PI arranged the questionnaires and stored them in a confidential lockable cabinet. The data was cleaned for errors and any inconsistent entries to ensure quality before analysis. Data entry framework using SPSS was prepared for the questionnaire and analysis was done using SPSS version 17. Chi-square and Fisher's exact probability was used as most of the data was categorical. All variables that showed significant differences were subjected to Binary Logistic regression analysis.

## 3. Results

### 3.1 Socio-Demographic Characteristics

A total of 454 PLWHA were recruited into the study and 180 (39.6%) were males while 274 (60.4%) were females giving a Male : Female ratio of 1 : 1.5. Majority 53.3% were aged 40 to 49 years and only 1.3% were below 20 years, Over a half (53.5%) were married, 21.6% were single and the rest were either separated (8.1%), divorced (7.5%) or widowed (9.3%). Over three quarters (77%) had attained secondary education and above with only 1.3% having no formal education. Christians were the majority (95.2%), Muslims 3.7%, Traditional 0.7% and others 0.4%. The main sources of income were employment (48.5%) and business (44.9%) with 5.3% relying on donations and 1.3% on other sources.

### 3.2 Nutritional Status

Table 1: Distribution of Body Mass Index (BMI) in kg / meter squared

BMI Category	Frequency	Percent
Underweight(<18.5)	11	2.4%
Normal (18.5 - <25)	211	46.5%
Overweight (25 - <30)	161	35.5%
Obese (30 plus)	71	15.6%
<b>Total</b>	<b>454</b>	<b>100%</b>

#### Nutritional status

Based on Body Mass Index (BMI), the study participants were classified into four groups:- 1) Underweight (<18.5 kg/metre<sup>2</sup>), 2) Normal (18.5 - <25), 3) Overweight (25 - <30) and 4) Obese (30 plus). Only 11(2.4%) and 211 (46.5%), forming a total of 222 (48.9%) of the PLWHA were in underweight (BMI<18.5kg/m<sup>2</sup>) and normal weight (BMI 18.5 to<25kg/m<sup>2</sup>) respectively. However, 161(35.5%) and 71(15.6%) of the PLWHA, forming a total of 232(51.1%) were in the overweight and obese categories respectively, (table 1).

### 3.3 Food Groups And Consumption

The foods consumed were divided into three groups: body building (proteins), energy giving (carbohydrates) and protective (fruits and vegetables). The foods consumed mostly were beans and beef (proteins), ugali (maize meal) and rice (carbohydrates), kales and cabbages (vegetables) and bananas and pineapples (fruits); (table 2).

Table 2: distribution of types of foods consumed

Type of food	Frequency	Percent
<b>Body building foods</b>		
Beans	334	73.8
Chicken	80	17.6
Fish	171	37.6
Beef	278	61.2
Groundnuts	47	10.4
<b>Energy giving foods</b>		
Cassava	13	2.9
Githeri	220	48.5
Cooked bananas (Matoke)	113	24.9
Rice	289	63.7
Sphagetti	35	7.7
Ugali	387	85.2
Whole bread	93	20.5
<b>Protective foods (Vegetables)</b>		
Broccoli	5	1.1
Cabbage	285	62.8
Carrots	123	27.1
Corriander	13	2.9
Cucumber	29	6.4
Kale	327	72.0
Spinach	237	52.2
Terere	130	28.6
Tomatoes	106	23.3
Onions	42	9.3
Egg plant	2	0.4
<b>Protective foods (Fruits)</b>		
Apples	16	3.5
Avocadoes	162	35.7
Bananas	222	48.9
Guavas	5	1.1
Mangoes	44	9.7
Oranges	197	43.4
Passion fruit	9	2.0
Pawpaw	49	10.8
Pineapples	165	36.3
Watermelon	85	18.7

### 3.4 Factors Associated With Overweight And Obesity

PLWHA in Underweight and normal BMI categories were combined into one group and those in overweight and obese categories into the other group. Marital status, source of income and amount earned were significantly associated with being overweight & obese at bivariate level of analysis. A cut-off of  $p < 0.25$  was used to screen variables associated with overweight/obese at bivariate analysis for inclusion in a multivariate analysis (table 3).

**Table 3: Distribution of socio-economic characteristics of the PLWHA associated with nutritional status.**

Variable	Nutritional status		P-value
	U-weight & normal (N=222) %	Overweight & obese (N=232) %	
Sex	Male	41.4	0.445
	Female	58.6	
Age in years	<30	15.8	0.36
	30-39	32.0	
	40-49	52.3	
Marital status	Single	26.1	0.037
	Married	52.7	
	Div./Sep./widowed	21.2	
Education	None/primary	24.3	0.31
	Secondary	44.6	
	College/University	31.1	
Source of income	Employment	48.6	0.044
	Business	41.9	
	Donation/others	9.5	
Amount earned in Kshs.	<3000	11.3	0.001
	3000 - 6000	15.3	
	7000 - 9000	10.8	
	10000 - 12000	13.5	
	13000 - 15000	14.0	
	>15000	35.1	

Marital status, source of income and amount earned were subjected to binary logistic regression analysis and only amount earned was retained in the model. Further analysis of the retained variable (amount earned), showed that, the odds of being overweight or obese increased with increasing amount of money earned. The odds of being overweight or obese increased with increasing amount of money earned, (table 4).

**Table 4: Logistic regression analysis results of retained variable (amount earned)**

Amount earned in Kshs.	B	Se(β)	P-value	Exp(β)	95.0% C.I. for Exp(β)	
					Lower	Upper
>15,000.00	1.678	.452	.000	5.357	2.209	12.990
13,000-15,000	1.335	.495	.007	3.802	1.440	10.039
10,000-12,000	1.338	.497	.007	3.810	1.437	10.099
7000-9000	1.186	.520	.022	3.274	1.182	9.064
4000-6000	.791	.510	.121	2.206	.812	5.991
<3000 (reference)				1		
Constant	-1.273	.428	.003	.280		

#### 4. Discussion

Adequate nutrition helps to maintain and improve the nutritional status of a person with HIV/AIDS and delay the progression from HIV to AIDS-related diseases, Steinhart (2011). It also complements the effects of antiretroviral therapies and help to maintain body weight and fitness, as well as improve the performance of the immune system already compromised by the infection, Steinhart (2011). The main objective of this study was to determine nutritional status and establish factors associated with nutritional status of PLWHA. The study looked at Socio- economic characteristics (sex, age, marital status, level of education, sources of income and money earned monthly), food types consumed based on 24 hour food recall, and Body Mass Index (BMI).

The prevalence of underweight was 2.4% and of overweight/obesity, 51.1%. The results of prevalence of overweight/obese observed in this study are more than double those of another national survey done in Kenya with 15.7% for early ART (less 6 months on ART) and 20.6% for late ART, NVPS Report (2015). A study done in Rwanda found prevalence levels of 40%, J.M. Frantz & A. Murenzi (2013). The results observed in this study are lower compared to findings of a study in USA with 63%, Nancy Crum-Cianflone (2008).

Sources of income, marital status and amount of money earned per month were found to be significantly associated with overweight/obesity status of the PLWHA at bivariate analysis but only amount earned stood out after multivariate analysis. A study done in Tanzania found age, sex, marital status and CD4 count to be associated with being over-weight/obese, Helen Semu (2014).

The foods mostly consumed by the PLWHA were the usual foods most Kenyans consume, which

included: Beans (73.8%) and Beef (61.2%) for protein; Ugali (maize meal=85.2%) and Rice (63.7%) for carbohydrates and Vegetables and Fruits such as Kale (72.0%), Cabbage (62.8%), Bananas (48.9%) and Oranges (43.4%) as protective foods (table 2). This pattern of food combination and consumption is indicative of food security among the PLWHA. WHO/FAO (2006) defined food security as: “food availability, affordability and proper use”. Food is normally available in the markets and shops, but making it available for use requires affordability. Over three quarters (77%) of PLWHA had attained secondary education and above which may have had a bearing on their sources of income, where most (94.4%) were in employment and business, with majority (72.2%) earning between ≥Ksh. 10,000->15000. It would appear that they were earning slightly higher than the scale set by the government of Kenya(2014); by location, age and skill level, where the urban minimum wage was 11,995 shillings (US=139) per month. This showed some good level of financial stability among the PLWHA which could be translated to mean food affordability. However, Hendricks et al.(2006) noted that, over-weight/obese among PLWHA may be associated with the efficacy of ART in reducing the occurrence of AIDS and wasting, while others term it a phenomenon of weight increase happening among PLWHA on long term ART(USDA/ERS- 2012). This phenomenon may be in part, due to the fact that ART drugs decrease resting-energy expenditure which is reportedly about 10% and 20-30% higher in asymptomatic and symptomatic HIV patients respectively and thus decrease the basal metabolic rate commonly responsible for weight loss. This contributes to replenishment of muscle bulk that translates to normal or even overweight (Tapam, *et al.* 2008). It might also be reasoned that as HIV patients live longer and the infection becomes relegated to a chronic illness, persons with HIV may be now facing similar experiences as the general population, associated with excessive weight gain due to lack of exercise and poor diet (Hendricks, *et al.* 2006). It has been reported too that some PLWHA intentionally over-eat to avoid the stigmatized weight loss which is often “associated” with being HIV positive (Amorosa,*et al.* 2005).

#### 4.1 Study Limitations

The study however, had several limitations which could generate exaggerations and biases, for example: almost all the data from the PLWHA was through self- reporting (not easy to confirm); data on food consumption patterns was based on 24 hour food re-call and the PLWHA may not have been able remember all the foods they had consumed from the previous day; no data was collected on the amount food consumed; and no retrospective data was collected on BMI before ART initiation (to be used as a guide as to when the BMI might have started to rise). Also some variables like CD4 count and physical activity among others were not studied.

#### 4.2 Conclusion

The PLWHAs’ economic wellbeing was significantly associated with their nutritional status (BMI) of being over-weight/obese. However, other factors such as: ART’s ability to decrease resting-energy expenditure and basal metabolic rate resulting in replenishment of muscle bulk and hence weight gain; or intentional over-eating to avoid the stigmatized weight loss which is often “associated” with being HIV positive may have had a part to play.

#### 4.3 Declaration

We (authors) declare that the work in this manuscript is original and has not been submitted to any other journal. We further declare that there is no conflict of interests and agree to grant the first editing/publishing rights to the journal upon acceptance.

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### **Bibliography**

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