

Anthropometric Indices, Dietary Practices, Nutritional Knowledge, Attitude, and Health Status of People Living With HIV/AIDS in Owerri Metropolis Imo State, Nigeria

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ABSTRACT

Background: HIV/AIDS and inadequate nutrient consumption predisposes patients to malnutrition and poor health status with significant increase in morbidity and mortality rate **Objective:** To assess the anthropometric indices, NKAD and health status of people living with HIV/AIDS in Owerri Metropolis, Nigeria

Methods: A cross-sectional descriptive study technique was used to assess anthropometric indices, NKAD and health status of people living with HIV/AIDS in Owerri Metropolis, Nigeria. A total of 325 subjects were recruited using systematic random sampling method. Interviewed administered structured questionnaire was used to assess socio-economic data, nutritional knowledge and attitude, dietary practices and health status of the subjects. Anthropometric measurements were taken to assess body mass index (BMI) and waist hip ratio (WHR). Data was analyzed using SPSS Version 21.0.

Results: Majority had good nutritional knowledge (65.5%), good nutritional attitude (78.2%) and good dietary practice (71.1%). Malnutrition among the subjects revealed that underweight was (11.08%), overweight (21.23%) and obesity (13.23%). Subjects with high risk for cardiovascular diseases using WHR were 49.3% (female) and 18.1% (male). Diet-related chronic diseases include hypertension (21.8%), hypercholesterolemia (13.2%) and diabetes (9.2%). There was a positive association between body mass index and frequency of meal consumption ($p = 0.037$) and eating well ($p = 0.054$). Significant positive correlations between nutritional knowledge and dietary practice ($r = 0.320$), dietary practice and BMI ($r = 0.264$), BMI and health status ($r = 0.180$) were established.

Conclusion: Good nutritional knowledge, attitude and dietary practice improved nutritional and health status of HIV/AIDS subjects.

Keywords: HIV/AIDS, nutritional knowledge and attitude, health status, anthropometric indices

INTRODUCTION

HIV/AIDS is a serious global public health issue. According to UNAIDS (1) 37.9 million people are living with HIV/AIDS worldwide. Among these people 36.2 million were adults while 1.7 million were children (<15 years old). In Nigeria, the prevalence of HIV/AIDS has continued to increase from 1.9% in 1991 to 3.4% in 2013, though the country experienced HIV/AIDS prevalence peak in 2001 with 5.8% (2). In 2019,

the prevalence of HIV/AIDS reduced to 1.4% with 1.9 million living with HIV/AIDS (3). HIV increases energy, nutrient and non-nutrient (phytochemical) needs as well reduces nutrient metabolism. This directly affects nutritional status of individuals living with HIV/AIDS (4). Poor nutritional status predisposes individuals to poor immunity, increases risk of opportunistic infections, morbidity, co-morbidity and mortality

rate (5). In Ethiopia, undernutrition ranged from 12.3% to (6) to 46.7% (7), Thapa *et al.* (8) recorded a prevalence rate of 19.9% (underweight) and 9.7% (overweight) among HIV/AIDS subjects. The statistics above showed that undernutrition is a major problem for people living with HIV/AIDS (PLWHA) expects Mgbekem *et al.* (9) who reported a normal BMI of 22.2 to 31.1kg/m² among HIV infected persons in Calabar, Nigeria. Greater than 66% weight loss of ideal body weight has been linked to timing of mortality in AIDS subjects even after controlling CD⁴⁺ cells (10). Adequate nutrition which includes protein, energy, mineral and essential micronutrients helps to improve the immune system (11). According to Akwiwu and Akinbile (12), PLWHA in Mbaise, Imo State had low dietary intake using dietary diversity scores. Successful response to medical treatment and use of antiretroviral drugs (ART) depends largely on the inter-relationship between nutrition and drugs. Adequate nutrition cannot cure HIV/AIDS infection but could act as a panacea to stabilize an already compromised immune system (10). Inadequate nutritional knowledge, attitude and practices among PLWHA could affect their nutritional and health status. Good and adequate nutrition may help to enhance medical therapy, control opportunist infection and support the overall health of PLWHA. Nutritional assessment is recommended to be conducted for all HIV subjects despite their stage of HIV which helps to assess their status and know those at risk for nutritional intervention (8). Therefore, this study was designed to assess anthropometric indices, nutritional knowledge, attitude, dietary practices and health status of people living with HIV/AIDS in Owerri metropolis Imo State, Nigeria.

Materials and Methods

Study Area

This study was conducted in Owerri, Imo State. Owerri is the capital of Imo State, Nigeria, set in the heart of Igbo land. Owerri consists of three Local Government Areas including Owerri Municipal, Owerri North and Owerri West. It has an estimated population of about 1,401,873 as at 2016 census. It is approximately 100 square kilometres (40 sq mi) in area. Owerri is bordered by the Otamiri River to the east and the Nworie River to the south.

Population of study

Population of study was adults living with HIV/AIDS in Owerri Metropolis.

Study Design

A cross sectional descriptive study to assess the prevalence, anthropometric indices, nutritional knowledge, attitude, dietary practices and health status of people living with HIV/AIDS in Owerri metropolis was adopted for the study.

Sample Selection

Two hospitals that attend to people living with HIV/AIDS in Owerri Metropolis were used. They are Imo State Specialist Hospital Owerri West and Federal Medical Centre Owerri with HIV/AIDS prevention, treatment and health services, paediatric HIV care and treatment, tuberculosis / HIV care and treatment, and prevention of mother-to-child treatment of HIV (PMTCT) facilities.

Inclusion and Exclusion criteria

Adults 18 years and less than 65 years, subjects attending hospital for the past three months before the study and subjects on anti-retroviral therapy (ART) were included in the study while subjects less than 18 years and greater than 65 years, who are not on ART and have not attended hospital for the past three months before the commencement of the study were excluded.

Sample size

Sample size of the subjects was determined using the formula:

$$N = \frac{Z^2 pq}{d^2}$$

Where

N = Minimum sample size,

Z = Standard deviation at 95% confidence interval = 1.96

p = Anticipated proportion/population of PLWHA with appropriate knowledge and practice of adequate nutrition = 20.9% (0.209) from a knowledge and practice of adequate nutrition = 20.9% (0.209) from a similar survey (13).

$$\begin{aligned}
 q: \text{ Complementary probability} &= 1 - p \\
 &= 1 - 0.209 \\
 &= 0.791
 \end{aligned}$$

$$\begin{aligned}
 d &= \text{ Error margin/tolerance} \\
 &= 5\% = 0.05
 \end{aligned}$$

Therefore,

$$N = \frac{(1.96)^2 * 0.209 * 0.791}{(0.05)^2}$$

$$N = \frac{0.6351}{0.0025}$$

$$= 244.04$$

$$N = 250$$

However, the sample size was increased to 30% in anticipation for dropout and non-response. The sample size used for the study was 325 subjects.

Sampling Technique

Systematic random sampling was adopted. Hospital register was used to compute the sampling frame. The subjects that came to clinic on daily basis were assigned 1 to 5 using the sampling frame. Every 5th subject was selected. A total of 40 subjects were interviewed each day for a period of 8 weeks and 1 day.

Ethical Approval

The study was approved by the ethical review committee of Department of Nutrition and Dietetics, Faculty of Health Sciences, Imo State University (IMSU/ETS/NTD/20181007).

Preliminary visit

A preliminary visit was made to the Chief Medical Directors of Imo State Specialist Hospital Owerri West and Federal Medical Centre Owerri with an introductory letter from the Dean, Faculty of Health Sciences and approval to conduct the research was granted. The aim and objectives of the research were explained. Anonymity and confidentiality of the subjects were ensured.

Informed Consent

The objectives of the study were explained to the subjects and written consent was obtained before commencing the study.

Validation of Study

The questionnaire and anthropometric equipment were validated before commencing the study.

Data Collection

Data was collected by interviewed-administered structured questionnaire. The questionnaire was pre-tested at Holy Rosary Hospital Emekuku, Owerri North Imo State to ascertain its reliability according to Ifeagwu (14). Fifty PLWHA at the health facility were used and the questionnaire had a reliability of 0.92. The questionnaire was divided into five sections namely: section A: assessment of socio-economic data of the subjects, section B: assessment of anthropometric indices, section C: assessment of nutritional knowledge and attitude, section D: assessment of dietary practices and section E: assessment of health status.

Anthropometric Measurements

Skol digital bathroom weighing scale model 7227 and improvised meter rules were used to obtain weights (in kilograms) and heights (in meters) of subjects respectively using standard methods. Subjects were weighed twice with minimal clothing and average of the reading to the nearest 0.1 kg was recorded. They were asked to stand against a wall with their heel, buttocks and vortex their heights were measured and recorded. Their BMI was calculated (weight in kilograms / height in meter²) and recorded. WHO (15) classification was used: underweight = <18.5; normal = 18.5 – 24.99; overweight = 25 -30 and obese = >30. The subjects were asked to stand erect, abdominal muscles relaxed, arms at the sides and feet together. Waist circumference was measured halfway between the lowest rib and iliac crest to the nearest 0.1cm using tailors' tape. Hip circumference was measured at the point of greatest circumference around the hip region with the subject standing erect, arms at the sides and feet together. Tailors' tape (inelastic) was placed close to the body without indenting the soft tissue (leaving a mark on the body) the reading was taken to the nearest 0.1cm and recorded. All measurements were made twice

and average taken. Waist-hip ratio was calculated and classified according to WHO (16). For Female: normal (<0.80), overweight (0.8 – 0.84) and obesity (>0.85). Male: normal (> 0.85), overweight (0.90 – 0.99) and obesity (>1.0).

Nutritional knowledge and attitude questionnaire

The method according to Ezechi *et al.* (17) was adopted for scoring nutritional knowledge and attitude questions with little modification. In nutritional knowledge, questions ranging from 1 to 20. Each question had four options with one correct answer. Each correct answer was assigned a score of 1 and zero for incorrect answer. Scores were classified as 0 -8 (Poor nutritional knowledge), 9 – 14 (Average nutritional knowledge) and 15 – 20 (Good nutritional knowledge). Attitude questions ranged from 1 to 20: disagree = 1, undecided = 0 and agree = 2. The nutrition attitude scores were classified as 0- 8 (Poor nutritional attitude), 9 – 14 (Average nutritional attitude) and 15 to 20 (Good nutritional attitude). In dietary practices questions 20 close ended questions with answer as yes and no was used. Each yes answer had a score of 1 while no answer had a score of 0. Dietary practice was categorized into 0 to 8 (Poor dietary practice), 9 to 14 = (Average dietary practice) and 15 to 20 (Good dietary practice).

Dietary Assessment Questionnaire

Dietary assessment of the subjects was determined using the food consumption frequency and dietary habit questionnaire. Food consumption frequency was scaled into 4 such as occasionally, daily / 2-3 times per week, 4 to 5 days per week, once weekly. Dietary habit questions include: meal frequency, meal usually skipped, reasons for skipping meal, eating well and reason for not eating well.

Health Status Assessment

Medical doctors in the hospital assessed the subjects on clinical status on survey days. These include current conditions in relation to clinical staging of HIV/AIDS according to WHO criteria and other clinical observations experienced by PLWHA. Biochemical assessment was carried out on survey days by hospital medical laboratory scientists and result were extracted from hospital record.

Research Assistants

Five final year undergraduate and two post-graduate students of nutrition and dietetics department were trained for data collection and supervision respectively while the Researcher monitored them.

Statistical Analysis

Data obtained was coded and analyzed using IBM SPSS statistics version 21.0. Descriptive statistics was presented as frequency, percent, mean and standard deviation. Inferential statistics was performed on correlation between nutritional knowledge and attitude, dietary practices, and anthropometric indices and health status using Pearson correlation while relationship between BMI and food habits was analyzed using Chi-square. Significant level was set at $p < 0.05$.

Results

Socio-Economic Characteristic of PLWHA

Socio-economic characteristics of the subjects showed that majority (66.5 %) of the subjects aged 40-<65 years and more (64.3%) were female. More than half (55.7%) of the subjects were married while 51.7% had secondary education. Majority (71.69%) resided in the urban, 41.54% were traders and 44.9% received <N36,000 (USD 100) per month (Table 1).

Table 1: Socio-Economic Characteristic of PLWHA

Socio-economic characteristics	Frequency	Percentage
Age of the subject		
18- 39 years	109	33.5
40- <65 years	216	66.5
Total	325	100
Sex		
Male	116	35.7
Female	209	64.3
Total	325	100
Marital status		
Single	102	31.4
Married	181	55.7
Widowed	27	8.3
Divorced	15	4.6
Total	325	100
Education		
Primary	53	16.3
Secondary	168	51.7
Tertiary	80	24.6
No formal education	24	7.4
Total	325	100
Occupation		
Civil servant	66	20.31
Trader	135	41.54
Farmer	28	8.62
Artisan	13	4.00
Unemployed	40	12.31
Students	43	13.23
Total	325	100
Residence		
Urban	233	71.69
Rural	92	28.31
Total	325	100
Monthly income		
<₦36,000 (USD100)	146	44.9
₦36,360-72,000 (USD 101-200)	49	15.1
₦72,360 – 108,000 (USD 201-300)	80	24.6
>₦ 108,000 (USD 300)	50	15.4
Total	325	100

Nutritional knowledge, attitude and dietary practice of PLWHA

Majority (65.5% 78.2% and 71.1%) had good nutritional knowledge, attitude and dietary practice respectively (Table 2).

Anthropometric Indices of PLWHA

Body mass index (BMI) of the subjects showed that 11.08% (underweight), 21.23% (overweight), 13.23% (obese) while waist-hip ratio (WHR) showed that 49.3% of the women had high risk for cardiovascular diseases (CVDs) and 18.1% male had high risk for CVDs (Table 3).

Table 2: Nutritional knowledge, attitude and dietary practice of PLWHA

Nutritional knowledge and attitude	n (325)	Percentage (100)
Nutritional knowledge		
Poor nutritional knowledge	46	14.2
Average nutritional knowledge	66	20.3
Good nutritional knowledge	213	65.5
Total	325	100
Nutritional attitude		
Poor nutritional attitude	29	8.9
Average nutritional attitude	42	12.9
Good nutritional attitude	254	78.2
Total	325	100
Dietary practices		
Poor dietary practice	30	9.2
Average dietary practice	62	19.1
Good dietary practice	233	71.7
Total	325	100

Table 3: Anthropometric Indices of PLWHA

Anthropometric indices	Frequency	Percentages
BMI Class		
Underweight	36	11.08
Normal body weight	177	54.46
Overweight	69	21.23
Obesity grade 1	36	11.08
Obesity grade 2	4	1.23
Obesity grade 3	3	0.92
Total	325	100
Waist-hip ratio Class		
<u>For Women</u>		
Low risk (≤ 0.80)	80	38.3
Moderate risk (0.81 to 0.85)	26	12.4
High risk (≥ 0.85)	103	49.3
Total	209	100
<u>For male</u>		
Low risk (≤ 0.95)	76	65.5
Moderate risk (0.96 to 1.0)	19	16.4
High risk (≥ 1.0)	21	18.1
Total	116	100

Food frequency consumption by cereal and grain food group

Food frequency consumption was shown in Table 4a-4f. Table 4a revealed that rice (39.08%), agidi (26.15%), bread (28.0%), instant noodles and pap (25.5%) respectively were the cereals consumed daily.

Food frequency consumption by fruit and vegetable food group

In fruits and vegetable group, orange (39.7%), pineapple (36.3%), cabbage (35.3%), and green leafy vegetables (36.0%) were consumed daily. Garri (32.0%) in root and tuber food group was consumed daily.

Table 4a: Food frequency consumption by cereal and grain food group

Cereal food group	Occasionally F (%)	Daily/2- 3times/week F (%)	4-5 days/ week F (%)	Once weekly F (%)	Total F (%)
Rice	109 (33.53)	127 (39.08)	44 (13.54)	45 (13.85)	325 (100)
Agidi	136 (41.85)	85 (26.15)	70 (21.54)	34 (10.46)	325 (100)
Bread	128 (39.4)	91 (28.0)	57 (17.5)	49 (15.1)	325 (100)
Oat	189 (58.1)	62 (19.1)	35 (10.8)	39 (12.0)	325 (100)
Wheat	176 (54.2)	52 (16.0)	54 (16.6)	43 (13.2)	325 (100)
Corn based food	163 (50.1)	59 (18.2)	46 (14.2)	57 (17.5)	325 (100)
Instant noodles	144 (44.3)	83 (25.5)	46 (14.2)	52 (16.0)	325 (100)
Pap	136 (41.85)	83 (25.5)	46 (14.2)	52 (16.0)	325 (100)
Custard	199 (61.2)	61 (18.8)	36 (11.1)	29 (8.9)	325 (100)
Semovita	185 (56.9)	62 (19.1)	36 (11.1)	42 (12.9)	325 (100)

Table 4b: Food frequency consumption by fruit and vegetable food group

Fruits/vegetable food group	Occasionally F (%)	Daily/2- 3times/week F (%)	4-5 days/ week F (%)	Once weekly F (%)	Total F (%)
Orange	110 (33.8)	129 (39.7)	36 (11.1)	50 (15.4)	325 (100)
Pineapple	118 (36.3)	118 (36.3)	43 (13.2)	46 (14.2)	325 (100)
Banana	274 (84.3)	29 (8.9)	16 (4.9)	6 (1.8)	325 (100)
Pawpaw	138 (42.4)	101 (31.1)	36 (11.1)	50 (15.4)	325 (100)
Cabbage	114 (35.1)	115 (35.3)	48 (14.8)	48 (14.8)	325 (100)
Green leafy vegetables	112 (34.4)	117 (36.0)	49 (15.1)	47 (14.4)	325 (100)
Okro	253 (77.8)	26 (8.0)	17 (5.2)	29 (8.9)	325 (100)
Carrot	100 (30.8)	69 (21.2)	89 (27.4)	67 (20.6)	325 (100)
Cucumber	145 (44.6)	77 (23.7)	46 (14.2)	57 (17.5)	325 (100)
Apple	152 (46.8)	44 (13.5)	66 (20.3)	63 (19.4)	325 (100)
Pear	102 (31.4)	103 (31.7)	53 (16.3)	67 (20.6)	325 (100)

Food frequency consumption by root/tuber food group

Apart from cocoyam (79.1%) which was mostly consumed occasionally, other food sources in root/tuber food group are consumed at equal rates (Table 4c).

pudding (39.7%), beans (36.3%), bean cake (35.3%), bambara-nut pudding (31.1%) and soybean (36.0%) were consumed daily/2-3times/week. Sea food (40.3%) and milk (29.8%) daily/2-3times/week for meat and milk food group respectively (Table 4d).

Food frequency consumption by meat/fish s nuts/beans food group

In meat/fish and nuts/beans food group, bean

Food frequency consumption by milk and milk product food group

Milk (29.8%) and yoghurt (18.2%) was poorly

Table 4c: Food frequency consumption by root/tuber food group

Root and tuber food group	Occasionally F (%)	Daily/2-3times /week F (%)	4-5 days/ week F (%)	Once weekly F (%)	Total F (%)
Garri	118 (36.3)	104 (32.0)	45 (13.8)	58 (17.8)	325 (100)
Potato	112 (34.5)	92 (28.3)	57 (17.5)	64 (19.7)	325 (100)
Yam	115 (35.4)	93 (28.6)	55 (1.7)	62 (19.1)	325 (100)
Plantain	138 (42.5)	82 (25.2)	65 (20)	39 (12)	325 (100)
Cocoyam	257 (79.1)	24 (7.4)	10 (3.1)	34 (1.0)	325 (100)

Table 4d: Food frequency consumption by grain legumes, nuts and seeds food group

Legumes, nuts and seeds food group	Occasionally F (%)	Daily/2-3times/week F (%)	4-5 days/ week F (%)	Once weekly F (%)	Total F (%)
Beans pudding	110 (33.8)	129 (39.7)	36 (11.1)	50 (15.4)	325 (100)
Beans	118 (36.3)	118 (36.3)	43 (13.2)	46 (14.2)	325 (100)
Groundnut	274 (84.3)	29 (8.9)	16 (4.9)	6 (1.8)	325 (100)
Bambara-nut pudding	138 (42.4)	101 (31.1)	36 (11.1)	50 (15.4)	325 (100)
Beans cake	114 (35.1)	115 (35.3)	48 (14.8)	48 (14.8)	325 (100)
Soy beans	112 (34.5)	117 (36.0)	49 (15.1)	47 (14.4)	325 (100)
Beef and offals	157 (48.3)	81 (24.9)	37 (11.4)	50 (15.4)	325 (100)
Poultry meat	158 (48.6)	83 (25.5)	38 (11.7)	46 (14.2)	325 (100)
Sea food	172 (52.9)	131 (40.3)	16 (4.9)	6 (1.8)	325 (100)
Eggs	151 (46.5)	69 (21.2)	36 (11.1)	69 (21.2)	325 (100)
Fish	166 (51.1)	84 (25.8)	34 (10.5)	41 (12.6)	325 (100)

Table 4e: Food frequency consumption by milk and milk related product food group

Milk and milk food group	Occasionally F (%)	Daily/2-3 times/week F (%)	4-5 days/ week F (%)	Once weekly F (%)	Total F (%)
Milk	134 (41.2)	97 (29.8)	59 (18.2)	35 (10.8)	325 (100)
Yoghurt	157 (48.3)	76 (23.4)	53 (16.3)	39 (12.0)	325 (100)
Ice cream	155 (47.7)	61 (18.8)	56 (17.2)	53 (16.3)	325 (100)
Cheese	169 (52.0)	49 (15.1)	51 (15.7)	56 (17.2)	325 (100)

consumed among the subjects both daily/2-3 times and 4-5 days per week respectively (Table 4e).

Food habits of the subjects

Food habits of the subjects showed that more than half (51.1%) had meal 3 times daily, breakfast (20.0%) was usually skipped. Reasons for skipping meal include no appetite (43.1%), vomiting (17.2%), and no food (13.8%). About 30% of the subjects were not eating well and reasons for not eating well include depression

(12.9%) and easily satiety (8.3%).

Health status of the subjects

Health status of the subjects showed that skin rashes (26.8%) and cough (20.97%) were the signs and symptoms mostly experienced, diet-related chronic diseases revealed that hypertension (21.8%), only 4.9% are in stage 3 of HIV/AIDS while in clinical observation they experience oedema (5.5%), irritability (8.0%) and two or more symptoms (21.5%) (Table 6).

Table 5: Food habits of the subjects

Food habit	Frequency	Percentage
Meal consumption frequency		
Once daily	62	19.1
Twice daily	56	17.2
3 times daily	166	51.1
More than 3 times daily	41	12.6
Total	325	100
Meals usually skipped		
Breakfast	67	20.6
Lunch	33	10.2
Dinner	18	5.5
None	207	63.7
Total	325	100
Reasons for skipping meal		
No appetite	50	42.4
Vomiting	20	17.0
Nausea	13	11.0
No food	27	22.8
Ill health	8	6.8
Total	118	100
Eating well at meals		
Yes	220	67.7
No	97	29.8
Total	325	100
Reasons for not eating well at meals		
Early satiety	27	8.3
Depression	42	17.2
Diarrhoea	20	4.0
Constipation	14	4.3
Nausea	2	0.6
None	220	67.7
Total	325	100

Table 6: Health status of the subjects

Health status	Frequency	Percentage
Signs and symptoms		
Skin rashes	87	26.8
Oral thrush	16	4.9
Diarrhoea	21	6.5
Cough	68	20.9
Tuberculosis	10	3.1
Skin rashes and thrush	1	0.3
Skin rashes and diarrhoea	8	2.5
Oral thrush and cough	6	1.8
None	107	32.9
Total	325	100
Diet-related chronic diseases		
Diabetes	30	9.2
Hypertension	71	21.8
Osteoporosis	5	1.5
Cancer	7	2.2
Obesity	43	13.2
Hypercholesterolemia	15	4.6
Chronic respiratory disease	8	2.5
Heart attack	20	6.2
None	126	38.8
Total	325	100
Current condition in relation to clinical stages		
Improved	239	73.5
Same	83	25.5
Deteriorating	3	0.9
Total	325	100
Clinical staging (WHO Criteria)		
Stage 1	224	68.9
Stage 2	85	26.2
Stage 3	16	4.9
Total	325	100
Clinical observation		
Wasting	36	11.1
Dementia	7	2.2
Eye problem	6	1.8
Osteomalacia	1	0.3
Beriberi	1	0.3
Oedema	18	5.5
Irritability	26	8.0
Anaemia	11	3.4
Oral thrush	8	2.5
Diarrhoea	6	1.8
Two or more symptoms	70	21.5
None	135	41.5
Total	325	100

Relationship between Body Mass Index and Food Habits

There was a positive relationship between BMI and dietary habits of the subjects (Table 7). There was a positive correlation between nutritional knowledge and nutritional attitude, dietary practices and health status.

Pearson's correlation between nutritional knowledge, attitude and dietary practices and body mass index, waist hip ratio and health status of HIV/AIDS subjects

Nutritional attitude correlated positively with dietary practices, BMI and health status. Dietary practices correlated positively with WHR, health status and nutritional attitude while BMI correlated with health status and WHR (Table 8).

Table 7: Relationship between Body Mass Index and Food Habits

Food habits	Under Wt	Normal weight	Overweight	Obesity grade 1	Obesity grade 2	Obesity grade 3	Total	x-value	p-value
	n %	n %	n %	n %	n %	n %			
Frequency of meal									
Once	2 (8.3)	14 (58.3)	8 (33.3)	0 (0)	0 (0)	0 (0)	24 (100)		
2times daily	6 (8.8)	50 (73.5)	8 (11.8)	1 (1.5)	1 (1.5)	0 (0)	68 (100)		
3times daily	28 (15.1)	93 (50.0)	36 (19.4)	2 (1.1)	2 (1.1)	1 (0.5)	186 (100)	26.10	0.037
More than 3X	0 (0)	20 (44.4)	17 (37.8)	1 (2.2)	1 (2.2)	2 (4.4)	45 (100)	1	*
Total	36 (11.1)	177 (54.4)	69 (21.2)	4 (1.2)	4 (1.2)	3 (1.0)	325 (100)		
Meal skipped									
Breakfast	13 (20)	30 (46.2)	12 (18.4)	8 (12.3)	2 (3.1)	0 (0)	65 (100)		
Lunch	10 (30.3)	7 (21.2)	12 (36.4)	4 (12.1)	0 (0)	0 (0)	33 (100)	13.60	0.543
Supper	3 (16.7)	4 (22.2)	7 (38.9)	4 (22.2)	0 (0)	0 (0)	18 (100)	1	
None	10 (4.8)	136 (65.1)	38 (18.2)	20 (9.6)	2 (0.9)	3(1.4)	209 (100)		
Total	36 (11.07)	177 (54.5)	69 (21.23)	36 (11.07)	4 (1.23)	3 (0.90)	325 (100)		
Reasons for skipping meal									
No appetite	14 (28.0)	9 (18.0)	8 (16.0)	15 (30.0)	3 (6.0)	1 (2.0)	50 (100)		
Vomiting	2 (10.0)	11 (55.0)	6 (30.0)	1 (5.0)	0 (0)	0 (0)	20 (100)		
Nausea	6 (46.2)	5 (38.4)	1 (7.7)	0 (0)	0 (0)	1 (7.7)	13 (100)	57.35	0.054*
No food	7 (43.7)	2 (12.5)	4 (25.0)	3 (18.8)	0 (0)	0 (0)	16 (100)		
Ill health	5 (62.5)	3 (37.5)	0 (0)	0 (0)	0 (0)	0 (0)	8 (100)		
No time	2 (22.2)	6 (66.7)	1 (11.1)	0 (0)	0 (0)	0 (0)	9 (100)		
Total	36 (31.0)	44 (37.9)	21 (18.1)	10 (8.6)	3 (2.6)	2 (1.7)	116 (100)		
Eating well									
Yes	8 (3.6)	114 (51.1)	65 (29.1)	30 (13.5)	3 (1.3)	3 (1.3)	223 (100)		
No	28 (27.5)	63 (61.7)	4 (3.9)	6 (5.9)	1 (1.0)	0 (0)	102 (100)	11.914	0.036*
Total	36 (11.1)	177 (54.5)	69 (21.2)	36 (11.1)	4 (1.2)	3 (0.9)	325 (100)		
If no what is your reason									
Early satiety	5 (38.5)	8 (61.5)	0 (0)	0 (0)	0 (0)	0 (0)	13 (100)		
Depression	5 (18.5)	21 (77.8)	0 (0)	0 (0)	1 (3.7)	0 (0)	27 (100)		
Diarrhoea	10 (52.6)	8 (42.1)	0 (0)	1 (5.3)	0 (0)	0 (0)	19 (100)	22.38	0.320
Constipation	0 (0)	9 (100)	0 (0)	0 (0)	0 (0)	0 (0)	9 (100)		
Loss of appetite	6 (60)	0 (0)	4 (40)	0 (0)	0 (0)	0 (0)	10 (100)		
Nausea	2 (8.3)	17 (70.8)	0 (0)	5 (20.8)	0 (0)	0 (0)	24 (100)		
Total	28 (27.5)	63 (61.8)	4 (3.9)	6 (5.9)	1 (0.9)	0 (0)	102 (100)		

Table 8: Pearson's correlation between nutritional knowledge, attitude and dietary practices and body mass index, waist hip ratio and health status of HIV/AIDS subjects

Variable	NK	NA	DP	BMI	WHR (M)	WHR (F)	HS
NK	1						
NA	0.056**	1					
DP	0.320**	0.412**	1				
BMI	0.072	0.123*	0.264**	1			
WHR(M)	0.035	0.028	0.038*	0.018	1		
WHR (F)	0.060	0.061	0.015*	0.095	-0.007	1	
HS	0.03*	-0.130*	0.221**	0.180**	0.415**	0.091**	1

Key: *p<0.05; **p<0.01

NK= nutritional knowledge; NA= Nutritional attitude; DP= Dietary practice; BMI= Body mass index; WHR (M) = waist hip ratio (male); WHR= waist hip ratio (female); HS= health status

DISCUSSION

Majority of the subjects were female, married and had secondary education in the present study. This was similar with Odukoya *et al.*, (18) they reported that 74.3% of their subjects were female, 67.0% (married) and 46.8% had secondary education in Lagos, Nigeria. This reveals that female gender has remained the most vulnerable in the society. Ogumola *et al.*, (19) was consistent with the present study that monthly income was <₦40,000. The lower the monthly income, the higher the risk of HIV infection and poverty may be associated with HIV infection spread as a result of high risk of sexual behavior in a bid to make both ends meet. Fight against HIV should include empowerment of women. Majority of the subjects had both good nutritional knowledge and attitude which translated into good practice. Unlike previous study that reported poor dietary practices despite good nutrition knowledge and attitude (19) but Ezechi *et al.* (17) and Lin *et al.* (20) reported good nutritional knowledge and practice. In the present stud, nutritional knowledge correlated positively with dietary practices and health status of the subjects. The contribution of nutrition in the management of HIV/AIDS is well established. Knowledge of nutrition enhances good dietary practices which improves good health. From the study, it was seen that majority of the subjects

consume fruit and vegetables followed by cereals on daily basis. These food groups in particular are well known for their abundant supply of micronutrients, phytochemicals and energy giving nutrient (21). This resulted in majority of the subjects having improved condition in relation to clinical stages of HIV/AIDS. A good number (38.8%) of the subjects do not have diet-related chronic diseases. Some diet-related chronic diseases like cardiovascular diseases, diabetes and cancer was observed in the present study. This agrees with Achwoka *et al.* (22) in their retrospective study on non-communicable diseases among HIV patients in Kenya which revealed that 87.5% patients had elevated blood pressure, diabetes mellitus (2.1%), chronic respiratory diseases (2.3%), cancer (1.1%) and cardiovascular diseases (88.9%). Diet- related chronic diseases are often expressed in adulthood coupled with other age-related losses in physiological function because of predisposing lifestyle people adopt. From the study, majority of the subject's age ranged from 40-65 years. This could mean that they were already suffering from some of the diseases before contracting the virus. HIV/AIDS is an immune depressant, so nutrition education tailored on adopting healthy lifestyle in order to manage any diet-related chronic disease among the subjects should be encouraged. On the other hand, HIV affects endocrine glands with

consequent endocrine disorder through the effect of HIV viral protein accumulated in the system through the generation of systematic and local cytokines and other inflammatory responses. This was consistent with Zaid and Greenman (23), they reported that HIV infection and its treatment increases the risk of endocrine complication among susceptible subjects. The incidence of metabolic diseases has been implicated among HIV patient like type 2 diabetes mellitus, hypercholesterolemia and lipoatrophy (24). Therefore, its early detection and management among the population should be encouraged. Majority (68.9%) of the subjects are in stage 1 of HIV/AIDS. This showed that early treatment and adequate nutrition helps to delay the course of the infection from graduating into another stage.

The study observed incidence of double burden (undernutrition and over-nutrition) of malnutrition though from the study we observed that more than half (54.46%) of the study population had normal BMI. Underweight (11.08%) among the subjects is one of the signs of HIV/AIDS especially as it regards to progression to AIDS. Underweight among the subjects could be explained by their physiological status which is characterized by muscle depletion. About 4.9% of the subjects were in stage 2 and 3 which indicates mild and moderate symptomatic stage. At this stage, unexplained weight loss is evident with other clinical observations like diarrhea, dementia, scurvy, oral thrush as was observed in the study. This study was similar to 19.9% of PLWHA who had BMI <18.5kg/m² (8). Ordinarily, HIV positive subjects expend about 10% calorie while resting than their HIV negative counterpart, this alone contribute to weight loss with inadequate food intake. About 36% of the subjects do not consume food 3 times daily. Their reasons include no food, no appetite, and ill-health. Also vomiting, diarrhea, nausea as experienced by the subjects could lead to undernutrition. Access to food is mostly determined by the purchasing power of the populace. Higher percentage (44.9%) of the subjects earn <₦36,000 (USD 100) which include farmers (at subsistence level), unemployed, and

students which is a clear indication of their low purchasing power. This could also be explained by lack of food and skipping of meals as reported by the subjects.

Over-nutrition (overweight and obesity) among the subjects accounts for 23.31% of the population studied. Over-nutrition could be explained by the effect of ART intake and food habits of the subjects. ART induces reduced basal metabolic rate thereby replacing muscle bulk that translate to normal BMI or even overweight (25). Similarly, recent study confirms the relationship between ART use and obesity among HIV/AIDS patients in Brazil (26). The study further revealed a positive relationship between food habit and BMI. The frequency of meal consumption and eating well could have also influenced the weight gain because a good number (63.7%) of the subjects were eating ≥3 times daily coupled with sedentary lifestyle as presented by their occupation (civil servants, unemployed, artisans, students) which accounts for half of the population studied. This may explain why 61.2% of the subjects had different diet-related chronic diseases like diabetes, osteoporosis, cancer, obesity, hypertension, hypercholesterolemia, heart attack and chronic diseases. This supports previous study that over-nutrition is associated with co-morbidities (27). This shows that cultivation of good food habits and lifestyle should be encouraged among PLWHA through nutrition education in their highly active antiretroviral therapy (HAART) clinic.

Dietary practice correlated positively with health status, WHR and nutritional attitude. Interestingly, the subjects consumed different food sources from different food groups on daily basis. High consumption of micronutrient, phytochemicals and macronutrients from fruits and vegetable / cereals food group was observed. This was consistent with Banwat *et al.* (28) they reported that the adult HIV/AIDS patients in Jos Nigeria who had fairly good practice and consumed more fruits and vegetables. That could explain why 73.5% of the subjects' current condition in relation to clinical

stage of HIV/AIDS was improved. Adequate nutrition is inevitable for maintaining good health status. Food consumption was similar with Mgbekem *et al.* (9) where HIV positive patients consumed food from different food groups. Consumption of wide variety of food from different food groups may help to support immune system.

Conclusion

Majority of the subjects in the study had good nutrition knowledge, attitude and dietary practice. There was prevalence of double burden of malnutrition and diet-related chronic diseases among the subjects. Studies should be carried out on weighed food intake and consumption of recommended dietary intake by the population.

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Conflict of interest

There are no conflicts of interest.

REFERENCES

1. United Nations programme on AIDS (2019). Global HIV & AIDS statistics — 2019 fact sheet
2. Nigeria National Agency for the Control of AIDS. (2012). GARPR; Abuja, Nigeria: 2012. Global AIDS Response: Country Progress Report. Available: < <http://www.unaids.org/en/dataanalysis/knowyourresponse/countryprogressreports/2012countries/Nigeria%202012%20GARPR%20Report%20Revised.pdf>> (accessed 7 February 2013).
3. UNAID and National Agency for Control of AIDS, (2019). New survey results indicate that Nigeria has an HIV prevalence of 1.4%. Available at http://www.unaids.org/en/resources/presscentr/pressreleaseandstatementarchive/2019/march/20190314_Nigeria
4. World Health Organization: Nutrient requirements for people living with HIV/AIDS: report of a technical consultation. Geneva, Switzerland 2003. Available at: <http://www.who.int/nutrition/publication/hivaids/9241591196/en/>
5. Maertens, J.A. (2011). Barriers to Nutrition management among people living with HIV on Antiretroviral Therapy. Dissertation for Doctor for Philosophy. 2011. Available at: http://digitool.library.colostate.edu/exlibris/dtl/d3_1/apache_media/L2V4bGlicmlzL2R0bC9kM18xL2FwYWNoZV9tZWRpYS8xMTc0ODA=.pdf.
6. Hailemariam, S., Bune, G. T. and Ayele, H. T. (2013). "Malnutrition: Prevalence and its associated factors in People living with HIV/AIDS, in Dilla University Referral Hospital," Archives of Public Health; 71(1): 13-22
7. Gebremichael, D.Y., Hadush, K.T., Kebede, E.M and Zegeye, R.T. (2018). Food Insecurity, Nutritional Status, and Factors Associated with Malnutrition among People Living with HIV/AIDS Attending Antiretroviral Therapy at Public Health Facilities in West Shewa Zone, Central Ethiopia. BioMed Research International: 1-9
8. Thapa, R., Amatya, A., Pahari, D.P., Bam, D.P.K. and M Sophia Newman, M.S. (2015). Nutritional status and its association with quality of life among

- people living with HIV attending public anti-retroviral therapy sites of Kathmandu Valley, Nepal. *AIDS Research and Therapy*; 12:14-24
9. Mgbekem, M.A., Atangwho, I.J., Duke, E., Ukam, N., Ojong, M., John, M.E., Eyong, E.U. and Chiotu, C. (2015). Food consumption patterns and nutritional status of people living with HIV in Calabar. *Pakistan Journal of Nutrition*; 14 (x): xx-xx.
 10. USAID (2001). HIV/AIDS: A guide for nutritional, care and support. Food and nutrition technical assistance (FANTA) Project. Washington, DC.
 11. WHO, (2003). Nutrient requirement for people living with HIV/AIDS. Report of technical consultations.
 12. Akwiwu, U.N and Akinbile, L.A. (2017). Dietary intake adequacy of people living with HIV/AIDS in Rural Community of Imo State, Nigeria. *Journal of Agricultural Extension*; 21 (1):1-13.
 13. Tang, A.U. (1993). Dietary micronutrient intake progression and risk of Acquired immune deficiency syndrome (AIDS) in HIV type 1 infected homosexual man. *American Journal of Epidemiology*; 138: 937-941.
 14. Ifeagwu, D. (2012). A learner friendly approach to research methodology. DIC publishing company, Lagos, Nigeria.
 15. WHO (2006). Global Database on Body Mass Index (BMI). Retrieved on February 2019.
 16. WHO (2000b). Global strategy for the prevention and control of non-communicable diseases. Geneva, World Health Organization (WHO).
 17. Ezechi, L., Brai, B., Osifeso, G., Mbah, P. and Ezechi, O. (2016). Nutritional knowledge, attitude and practices of women living with HIV/AIDS in Lagos Southwest, Nigeria. *Malaysian Journal of Nutrition*; 22 (1): 1-15.
 18. Odukoya, O., Badejo, O., Sodeinde, K., and Olubodun, T. (2020). Behavioral risk factors for hypertension among adults living with HIV accessing care in secondary health facilities in Lagos State, Nigeria. *Journal of Family Medicine and Primary Care*; 9:3450-7.
 19. Ogumola, O.J., Oladosu, Y.O. and Olamoyegun, M.O. (2014). Relationship between socioeconomic status and HIV infection in a rural tertiary health center. *HIV/AIDS (Auckl)*; 6:61-67.
 20. Anad, P. and Puri, S. (2013). Nutritional knowledge, attitude and practice among HIV positive individuals in India. *Journal of Health, Population and Nutrition*; 31 (2):195-201.
 21. Lin, W., Hang, C.M., Yang, H.C and Hung, M.H. (2011). Nutrition and health survey in Taiwan: the nutrition knowledge, attitude and behavior of 19-64 year old adult. *Asia Pacific Journal of Clinical Nutrition*; 20:309-318.
 22. Mirza, F.S., Luthra, P., Chirch, L. (2018). Endocrinological aspect of HIV infection. *Journal of Endocrinology Investigation*; 41 (8): 881-899.
 23. Achwoka, D., Waruru, A., Tai-Ho, C., Ngugi, E., Kimani, M., Mukui, I., Oyugi., Mutave, R., Achia, T., Katana, A., Nganga, L. and De Cock, K. (2019). 1. Noncommunicable disease burden among HIV patients in care: a national retrospective longitudinal analysis of HIV-treatment outcomes in Kenya, 2003-2013. *BBMC Public Health*; 19:

- 372-392.
24. Zaid, D. and Greenman, Y. (2019). Human Immunodeficiency Virus infection and the endocrine system. *Endocrinology and Metabolism*;34 (2): 95-105.
25. Joy Amadi A.C, Asinobi, C.O, Okechukwu-Ezike, N.C., Aloy-Amadi, O. and Ihemeje, A. (2019). Glycemic index and load responses of indigenous vegetable sauces among healthy young female adults. *Functional Foods in Health and Disease*; 9(9): 576-592.
26. Kirtika, DeepShikha, Semwal, J., Vyas, R. and Sati, H.C. (2014). Nutritional status and associated comorbidities among the elderly in Doiwala block, Dehradun. *India Journal of Community Health*; 26 (Suppl S2): 197-203.
27. Afolabi, W.A.O., Odebunmi, H.B., Onabanjo, O.O., Sanni, S.A. and Olonisakin, O.O. (2016). Dietary pattern, body composition, obesity and hypertension among a population of market women in Ibadan Metropolis, Nigeria. *Nigerian Journal of Nutritional Sciences*; 37 (2): 47-56.
28. Banwant, M.E., Yakubu, N.W., Olalude, E.O. and Ogunsakin, J.A. (2013). An assessment of the nutritional knowledge, practice and status of adult HIV/AIDS patient attending an ART centre in Jos, North Central Nigeria. *Health Care Current Reviews*;1: 101