

## Nutritional Knowledge, Attitude and Practices of Women Living with HIV/AIDS in Lagos Southwest, Nigeria

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### ABSTRACT

**Introduction:** Behaviour change and the use of antiretroviral drugs have been the main focus of most human immunodeficiency virus (HIV) prevention and control programs, with minimal focus given to the role of nutrition. Additionally, women are affected the most and have the responsibility to care for other family members. **Methods:** The study used a cross-sectional study design to determine the nutritional knowledge, attitude, and practices of women living with HIV/acquired immune deficiency syndrome (AIDS). A pre-tested structured questionnaire was used to obtain information from women selected through systematic random sampling at a large HIV treatment Centre in Lagos, Nigeria. **Results:** The majority of the respondents in this study were less than 40 years (70%), married (67.2%), and had at least a secondary education (83.0%). The majority (59.7%) of the women earned less than USD 200 per month. Although knowledge of nutrition and attitude was poor, nutritional practices were good. Older women who were married and had at least a secondary education were found to have better knowledge of nutrition than their younger peers who were single and less educated. Education was also found to positively influence nutritional practice as having at least a secondary education was found to be significantly associated with good nutrition. **Conclusion:** This study showed that HIV positive mothers had poor knowledge and attitude to nutrition but relatively good nutritional practices. Nutrition education should be integrated into routine counselling at HIV treatment centres, aimed at improving the knowledge and attitude to nutrition among HIV positive women.

**Key words:** Awareness, HIV, knowledge, nutrition practice, women

### INTRODUCTION

Globally, efforts to prevent and control the Human Immunodeficiency Virus (HIV) epidemic have mainly emphasised inducing behavioural changes in individuals at risk of infection, and the use of drugs in treating persons who are already infected. (Derex-Briggs, 1998). Rather unfortunately, the roles of nutrition and socio-economic factors have been

largely overlooked (Anand & Puri, 2013).

The failure to consider other aspects in the control of the HIV/acquired immune deficiency syndrome (AIDS) epidemic, such as nutrition and socio-economics that may pose a serious challenge to reducing the spread of HIV infection (Lurie, Hintzen & Lowe, 1995; Odimayo, Adediran & Araoye, 2010). The epidemiology of HIV infection in low income countries reflects

the effects of nutritional issues and socio-economic factors among other factors (Nasidi & Harry, 2006; Taye, Shiferaw & Enquselassie, 2010).

Several studies, both in developed and developing countries, have reported malnutrition as a major contributor to the rapid progression of HIV infection to AIDS in low income countries (Anabwani & Navario, 2005; Taye *et al.*, 2010). This has been attributed to the role of nutrition in the maintenance of human immunity and restoration of tissues and cells destroyed as a result of the catabolic process of HIV infection (Anabwani & Navario, 2005).

Adequate nutritional knowledge has been shown to be effective in the management of HIV infections, and has an influence on the health outcomes of infected individuals (Masuku & Lan, 2014). However, available evidence suggests that low socio-economic status may be a confounding factor as it is an independent predictor of HIV transmission and mortality, even after controlling for confounders such as, age, disease stage, and access to health care (Anabwani & Navario, 2005; Nasidi & Harry, 2006; Odimayo *et al.*, 2010). Additionally, while several studies have separately studied the effect of nutrition and the effect of socio-economic factors on HIV, there is paucity of information on the effect of having a HIV positive status on nutritional knowledge (Anabwani & Navaril, 2005; Lurie *et al.*, 1995; Odimayo *et al.*, 2010). Eliciting such information is essential for the planning of educational intervention to improve nutrition knowledge among those with HIV/AIDS.

In low income settings, malnutrition and HIV infection are endemic and may account for the disease's observed rapid progression (Nasidi & Harry, 2006, Galindo *et al.*, 2015). Fawzi *et al.* (2004), in a randomised controlled trial on micronutrient supplementation in HIV positive persons, showed that multivitamin

supplementation significantly delayed the disease's progression). Educating HIV positive persons on the relationship between HIV disease progression and malnutrition has the potential to reduce the morbidity and mortality associated with HIV infection (Fawzi *et al.*, 2004). Mounting an effective nutritional education campaign among HIV positive persons requires a deep understanding of their nutritional knowledge, attitude, and current practices related to nutrition.

In Nigeria, women constitute about two-thirds of HIV positive persons, and they often are caregivers of husband and children who may also be infected with HIV. Secondly, their knowledge of nutrition, especially that of infant feeding in the context of HIV infection, has a great impact on the rate of transmission of HIV from mother to infant (Ezechi *et al.*, 2012). Determining their knowledge of nutrition, and attitude to and practice of nutrition are essential in the planning of effective HIV intervention programs. Thus, this study aimed to assess the nutritional knowledge, attitudes, and practices of Nigerian women living with HIV/AIDS.

## METHODS

### Study design and setting

This was a cross-sectional study among HIV positive adult women aged 18-years and above seen at a large HIV treatment centre in Lagos, Southwest Nigeria. The study was conducted in the second week of December 2013. Cumulatively, the centre had enrolled over 23,000 HIV positive men, women, and children since it commenced operations in 2002 with women constituting over two-thirds of the cases. On the average, 650 adult patients present each day at the clinic as new patients (3.1%), for follow up consultation (27.7%), or for monthly antiretroviral (ARV) drug refills (69.2%). On a daily basis, patient's hospital number, names, and types of service accessed are entered into

the clinic's attendance register. Apart from keeping track of the attendance, the clinic's register also assists the nurses in triaging and ensuring orderliness at the clinic.

#### Sample size determination and sampling technique

The sample size for this study was based on the total adult HIV positive population of 19,037 at the time of the study. The study sample size was calculated according to the formula:

$S = P / [1 + Pe^2]$ , where S is the desired sample, P is the population size, e is the maximum acceptable error margin (0.05), and 1 is a theoretical constant (Onwe, 1998). The required sample was calculated to be 392. However, the sample size was increased by 10% in anticipation of non-response. The final minimum sample size was set at 431.

A systematic random sampling method was used to select respondents for this study. The daily clinic attendance register was used as the sample frame. For convenience, a maximum of eighty respondents were interviewed in a single day. On each day, consecutive numbers from 1 to N, were assigned to all women in the register. The sampling fraction (N/80) was then calculated. The sampling fraction was used to select respondents from the register for an interview. Informed consent was then sought from the women before they were given the questionnaire. The women were allowed to complete the questionnaire in private. However, those with low literacy were interviewed either in pidgin English, or in a local language of their choice.

#### Questionnaire

A pre-tested structured questionnaire adapted from a previously used questionnaire in similar settings (Bukusuba, Kikafunda & Whitehead, 2010; Masuku & Lan, 2014), was used for data collection. The questionnaire consisted of four sections, namely socio-demographic information,

nutrition knowledge, nutrition attitude, and nutrition practices (questionnaire attached). This was to elicit information on nutrition knowledge, attitude, and the practices and the influence of socio-demographic factors on adults living with HIV/AIDS.

The scoring system for the knowledge, attitude and practice (KAP) portions were similar to those used in previous studies (Bukusuba *et al.*, 2010; Masuku & Lan, 2014) and is listed below:

- Knowledge: 'disagree' = 1 'don't know' = 0, and 'agree' = 2. Scores ranged from 0 to 20 and were categorised into 0 to 8 for 'poor', 9 to 14 for 'average', and 15 to 20 for 'good'.
- Attitude: 'disagree' = 1, 'undecided' = 0, and 'agree' = 2. Scores ranged from 0 to 20 and were categorised into 0 to 8 for 'poor'; 9 to 14 for 'average'; and 15 to 20 for good'.
- Practices: 'disagree' = 1; 'undecided' = 0; and 'agree' = 2. Scores ranged from 0 to 20 and were categorised into 0 to 8 for 'poor'; 9 to 14 for 'average'; and 15 to 20 for 'good'.

The final KAP score was calculated by summing up the individual scores from each section. The total KAP scores ranged from 0 to 60 and were categorised into: 0 to 24 = 'poor'; 25 to 44 = 'average', and 45 to 60 = 'good'. The higher the score, the better were the respondent's nutrition-related KAP.

The reliability of the questionnaire was determined using split-half reliability method (Ifeagwu, 2012). Twenty HIV positive women who were not part of the main study were interviewed using the questionnaire designed for this study. The reliability of half of the test was 0.50. The reliability of the total test was then calculated using the Spearman Brown formula =  $2 \times \text{reliability of half test} / 1 + \text{reliability of half test}$  (Ifeagwu, 2012). The reliability of study questionnaire was 0.70, showing that the instrument was reliable.

### Data analysis

Information obtained was coded and entered into the computer using SPSS version 19. Frequencies of all variables were determined and presented in appropriate tables with explanations. Socio-demographic variables, nutritional knowledge, attitude, and practices were described using descriptive statistics. The association between socio-demographic variables and nutritional knowledge, attitude, and practices were tested using bivariate and multivariate logistic regression analysis. P value <0.05 was considered significant.

### Ethical consideration

Ethical approval for the study was obtained from the Institutional Review Board, Nigerian Institute of Medical Research Lagos. Informed consent was sought and obtained from the patients before the administration of the study questionnaire. The information obtained from the respondents was handled confidentially.

## RESULTS

A total of 451 HIV positive women was approached for their permission to be enrolled into the study. Only 431 (93.9%) agreed to participate. Study questionnaires were administered to the 431 women who gave informed consent. However, of these 418 (97.0%) returned the questionnaire.

### Socio-demographic characteristics of the respondents

The socio-demographic characteristics of the study population are shown in Table 1. The age of the women ranged from 22 to 71 years with a mean of 36.(±7.) years. The majority of the respondents were aged 20 to 39 years (72.1%). Less than 6% of the respondents were aged above 50 years. Over 60% were married (67.2%), had at least a secondary education (83.0%), were employed (69.7%), were Christians (81.1%),

and of southern tribes (72.8%). Of the 381 participants (91.1%) who reported their monthly incomes, the majority (66.0%) earned less than USD200, and only 14.1% (59) earned above USD300.

Over three-quarters of the participants were on ARV drugs. The reported routes of infection were through heterosexual practice (56.0%), blood transfusion (14.6%), and intravenous drug use (2%). However, nearly half of the participants (41.9%) reported not knowing the exact route of their infection. They did not think any of the routes listed led to their infection.

### Nutritional KAP

The respondent's nutritional knowledge score ranged from 2 to 20 with a mean score of 12.4±3.5 and a median of 13. While most respondents had an average nutritional knowledge (64.8%), nutritional knowledge of others were either good (23.5%) or poor (11.7%) as shown in Table 2. Of the 418 respondents, over two-thirds agreed to the statements that protein-rich foods are needed to build and repair body tissues" (80.6%), and "Balanced diet is important in the prevention of infection" (70.6%). Only 16.7% and 36.4% of them agreed to the statements "Banana is good for control of diarrhoea in HIV patients" and "HIV infection increases the body's food requirement," respectively. A little over half of the respondents (51.9%) agreed to the statement "mixed feeding is not good for the baby of a HIV positive mother."

The respondents' nutritional attitude score ranged from 2 to 18 with a mean of 10.1±3.5 and a median of 13. The majority of the respondents had an average (51.2%) or poor (32.8%) score towards attitude to nutrition. Only 16.0% had a good attitude to nutrition. Participants' responses to specific nutritional attitude statements are shown in Table 3. The participants had good nutritional attitude to washing fruits and vegetables before consumption (95.5%), taking vitamin or mineral

**Table 1.** Socio-demographic characteristics of the respondents

Characteristics	N (%)
Age (n=418)	
20 - 29	55 (13.2)
30 - 39	246 (58.8)
40 and above	117 (28.0)
Marital status (n=414)	
Unmarried	96 (23.0)
Married	281 (67.2)
Widow	37 (8.9)
Educational status(n=414)	
Less than Secondary	67 (8.8)
Secondary and above	347 (83.0)
Occupation (n=413)	
Student/Housewife	80 (19.2)
Unemployed	42 (10.0)
Employed	291 (69.7)
Religion (n=418)	
Christian	339 (81.1)
Islam	56 (13.4)
others	23 (5.5)
Ethnic group (n=418)	
Yoruba	89 (21.3)
Igbo	119 (28.5)
Hausa/Fulani	36 (8.6)
South Minority Tribes	96 (23.0%)
Northern Minority tribes	66 (15.8)
Non-Nigerians	12 (2.9)
Monthly income (n=381)	
<USD100	174 (45.7)
USD101-200	65 (20.3)
USD201-300	83 (26.2)
>USD300	59 (14.1)

supplements daily (81.3%), usually taking ARV drugs after meals (87.4%), and eating at least three main meals daily (71.3%). However, they also indicated some poor nutritional attitude, including consuming a lot of meat (74.1%), often consuming soft drinks and confectioneries (50.7%), and not taking fruits and vegetables as they were not their favourite food (57.5%).

The respondents' nutritional practice scores ranged from 5 to 20 with a mean of  $15.2 \pm 3.0$  and a median of 16. The majority of the respondents had good nutritional practice scores (65.1%), while the remaining

had either an average (33.0%) or poor (1.9%) nutritional practice scores. Good nutritional practices included preparing balanced meals on a regular basis (78.3%), maintaining good nutrition despite low family income (60.7%), and engaging in good eating habits in order to maintain overall health (80.7%) as shown in (Table 4). In contrast, poor nutritional practices included not eating fruits regularly (59.7%) and taking herbs along with ARV drugs (48.1%), not preparing balanced meals because they were of the opinion it was time consuming (53.5%).

**Table 2.** Distribution of nutritional knowledge responses of women living with HIV

<i>Statement</i>	<i>Agree (%)</i>	<i>Disagree (%)</i>	<i>Don't Know (%)</i>
1. Carbohydrates and fats are energy-giving foods	60.5	30.2	9.3
2. Balanced diet is important in prevention of infection	70.1	28.5	10.5
3. Fish is a good source of protein	63.4	29.2	12.6
4. Frequent stooling leads to nutrient loss	52.4	25.4	22.2
5. Protein-rich foods are needed to build and repair body tissues	80.6	15.1	4.3
6. HIV infection increases the body's food requirement	36.4	33.7	29.9
7. Water is a nutrient	47.4	17.5	35.2
8. Banana is good for control of diarrhoea in HIV patients	16.7	47.3	35.9
9. Fruits and vegetables are rich in vitamins and minerals	63.9	21.1	15.0
10. Mixed feeding is not good for the baby of a HIV positive mother	51.9	30.2	17.9

**Table 3.** Distribution of nutritional attitude responses of women living with HIV

<i>Statement</i>	<i>Agree (%)</i>	<i>Disagree (%)</i>	<i>Undecided (%)</i>
1. I eat at least three main meals a day	71.3	28.7	0.0
2. I often snack on soft drinks and confectioneries	30.9	50.7	18.4
3. Fruits and vegetables are not my favourite foods	41.3	57.5	1.2
4. I drink at least 8-10 glasses of water every day	40.6	37.4	22.0
5. Meat, fish or milk products are included in my diet daily	66.3	30.8	2.9
6. I usually take my ARV drugs after meals	87.4	10.4	2.2
7. My meal is mainly carbohydrate based	62.4	35.3	2.3
8. I include a lot of meat in my food	25.9	74.1	0.0
9. I take vitamin or mineral supplements daily	81.3	19.7	0.0
10. I wash fruits and vegetables before consumption	95.5	4.5	0.0

**Table 4.** Distribution of nutritional practice responses of women living with HIV

<i>Statement: In the last 2 weeks</i>	<i>Agree (%)</i>	<i>Disagree (%)</i>	<i>Undecided (%)</i>
1. I eat washed raw vegetables more than cooked vegetables.	40.9	34.7	24.4
2. My nutritional needs differ from non-HIV positive persons so I make an effort to eat a balanced diet	36.8	49.3	13.9
3. I eat fruits only when I feel like it	31.7	59.7	8.6
4. I prepare balanced meals regularly	78.3	10.7	11.0
5. I eat balanced meals	59.3	29.5	11.2
6. My family maintained good nutrition despite our income	60.7	30.4	8.9
7. I do not take herbs along with my drugs	41.5	48.1	10.4
8. I eat a variety of foods in moderation	53.7	22.4	23.9
9. I engage in good eating habits in order to maintain my overall health	80.7	18.8	0.5
10. Preparing a balanced meal is not time consuming for me	40.1	53.5	6.4

#### **Association between socio-demographic characteristics and nutritional knowledge**

To determine the effect of socio-economic characteristics of the HIV positive women on their nutritional knowledge, the level of knowledge was dichotomised as 'inadequate' (scores of 0 to 10) and 'adequate' knowledge (scores of 11 to 20) as shown in Table 5. Being aged above 40-years ( $P=0.000$ ), having at least a secondary education ( $p=0.03$ ), married ( $p=0.01$ ), and working ( $p=0.002$ ) were found to have a statistically significant association with adequate nutritional knowledge in bivariate analysis. Ethnicity ( $P=0.81$ ;  $0.90$ ), being aged less than 30 years ( $P=0.99$ ) and having a monthly income ( $P=0.89$ ;  $0.99$ ) were found not to be associated with adequate knowledge. The four socio-demographic characteristics of respondents, namely, age greater than 40-years, having at least a secondary

education, married and working that were found to be associated with adequate nutritional knowledge via the bivariate analysis were further subjected to multivariate analysis while controlling for potential confounding variables. Working status lost its association with adequate nutritional knowledge when it was controlled for educational status of the respondents ( $p=0.08$ ). The other three variables of age greater than 40 years ( $p=0.001$ ), having at least a secondary education ( $p=0.003$ ), and married ( $p=0.03$ ) retained their independent association with adequate nutritional knowledge.

#### **Association between socio-demographic characteristics and nutrition practices**

The nutritional practices of the respondents were re-categorised into two groups, namely, 'good' (scores of 15 to 20) and 'not good' (score<15). This enabled the determination of the effect of socio-eco-

**Table 5.** Association of socio-demographic characteristics of the respondent and their knowledge of nutrition

Socio-demographic characteristics	Knowledge of nutrition		
	Adequate N (%)	Inadequate N (%)	P value *
Age group(years)			
20-29	37 (67.3)	18 (32.7)	0.99
30-39	168 (68.3)	78 (31.7)	1.0
≥40	108 (92.3)	9 (7.8)	0.000
Marital status			
Unmarried	86 (64.7)	47 (35.3)	1.0
Married	220 (78.3)	61 (21.7)	0.01
Educational status			
< secondary	46 (68.7)	21 (31.3)	1.0
≥ Secondary	273 (78.7)	74 (21.3)	0.03
Occupation			
Not working	80 (65.6)	42 (33.4)	1.0
Working	238 (81.8)	53 (18.2)	0.002
Ethnic group			
Majority Southern	145 (69.7)	63 (30.3)	1.0
Northern Tribes	69 (67.5)	33 (32.5)	0.81
Southern minority	67 (69.8)	29 (30.2)	0.90
Monthly income			
<USD 100	117 (70.1)	50 (29.9)	0.89
USD 101 -300	112 (71.3)	45 (28.7)	1.0
>USD 300	40 (70.2)	17(29.8.)	0.99

\*Chi square test

conomic characteristics on the nutritional practices of the respondents. From the bivariate analysis only marital status ( $P=0.000$ ) and having at least a secondary education ( $P=0.000$ ) were found to have statistically significant associations with good nutritional practice as shown in Table 6. No statistically significant associations were found between age ( $p=.12$ ), ethnic group ( $P>0.051$ ), occupation ( $P=0.94$ ), monthly income ( $P=0.31$ ) and good nutritional practice. Further multivariate analysis while controlling for possible confounding variables found that having at least a secondary education ( $P=0.03$ ) retained the association previously found with the bivariate analysis with good nutritional practices.

#### Association between nutritional knowledge and attitude to nutrition

The nutritional knowledge of the respondents was found not to have any influence on their attitude to nutrition. Though the proportion of respondents with poor nutritional attitude was smaller among the respondents with adequate knowledge (54.2%) compared to those with inadequate knowledge (69.5%), the difference was not statistically significant ( $p=0.62$ ; OR:1.5; 0.7-2.4). However, nutrition knowledge among the respondents was found to have a statistically significant influence on their nutrition practice ( $p=0.001$ ; OR: 3.2; 95% CI: 1.6-7.1). Compared to respondents with adequate knowledge where 90.1% had

**Table 6.** Association of socio-demographic characteristics of the respondent and their nutritional practice

Socio-demographic characteristics	Nutritional practice		P value*
	Good N=272 (%)	Not good N=146 (%)	
Age group (years)			
20-29	30 (54.5)	25 (45.5)	0.26
30-39	157 (63.8)	89 (36.2)	1.0
≥40	85 (72.6)	32 (27.4)	0.12
Marital status			
Unmarried	62 (46.6)	71 (53.3)	1.0
Married	206 (73.3)	75 (26.7)	0.00
Educational status			
< secondary	28 (41.8)	39 (58.2)	1.0
≥ Secondary	244 (70.3)	103(29.7)	0.000
Occupation			
Not working	80 (65.7)	42 (34.4)	1.0
Working	188 (64.6)	103(35.4)	0.94
Ethnic group			
Majority South	145 (69.7)	63 (30.3)	1.0
Northern	72 (70.6)	30 (29.4)	0.97
Minority Southern	55 (70.5)	41 (29.5)	0.05
Monthly income			
<USD100	113 (64.9)	61 (35.1)	0.31
USD101 - 300	111 (70.1)	46 (29.3)	1.0
>USD300	41 (69.5)	18 (30.5)	0.99

\*Chi square test

good nutritional practices, only 66.3% of respondents with inadequate knowledge had good nutritional practices.

Among the 108 respondents with a good attitude to nutrition, 95.5% (103) had good nutritional practices compared to only 76.8% among the respondents with poor attitude to nutrition. The difference was also found to be statistically significant ( $p < 0.001$ ; OR; 6.4; 95% CI: 2.8-15).

## DISCUSSION

This study was conducted to assess the nutritional knowledge, attitudes, and practices of women living with HIV/AIDS, with the purpose of contributing to policy formulation and the development of an effective nutrition program to prevent morbidity and mortality associated with

nutritional deficiencies among Nigerians living with HIV/AIDS.

A total of 418 women living with HIV infection selected through systematic random sampling who returned completed questionnaires were eligible for statistical analysis. The majority of the women were aged between 30 to 39 years (59.9%), Christians (86.6%), married (67.2%), and had at least a secondary education (83.0%). Respondents earning less than USD200 per month and of the southern ethnic group were in the majority. Over two-thirds of the women were on ARV drugs.

While the majority of the respondents had average to good nutritional knowledge (88.3%), and good nutritional practices (65.3%), their attitude to nutrition was either poor (32.8%) or average (51.2%).

Having at least a secondary education ( $p=0.03$ ), being married ( $p=0.003$ ), and being aged at least 40 years ( $p=0.000$ ) were found to be associated with having adequate knowledge of nutrition. Although adequate nutritional knowledge ( $p=0.001$ ) and attitude ( $p<0.001$ ) were found to influence nutritional practice, nutritional knowledge ( $p=0.062$ ) was found not to influence the respondents' attitude to nutrition. Also having at least a secondary education was found to have a significant association with good nutritional practice ( $P=0.03$ ).

The increased burden of HIV infection among women compared to men as a result of their increased vulnerability to HIV infection is a major challenge to the prevention and control of HIV infection. Women are not only caregivers, but are also the bread winners in many cases, especially in female headed households. When they are infected with HIV, it is not only a tragedy for the family, but to the entire society. Nutritional knowledge, attitude, and practice impacts heavily on their responsibility as both providers and caregivers. Understanding the levels of their knowledge, attitude, and practice of nutrition is essential for the development of programs for the improvement of those living with HIV/AIDS and their families, especially as good nutrition and ARV drugs use have been shown to improve the health status of individuals living with HIV/AIDS (Masuku & Lan, 2014). This study also assessed the interaction of responder's' socio-demographic characteristics, nutritional knowledge, attitude, and practices.

This study shows that the age of the respondents ranged from 22 to 71 years with a mean age of  $36.8(\pm 7.5)$  years. The majority of the respondents were aged between 20 to 39 years (72.1%), which concurred with previous studies in and outside of Nigeria (Achebe, 2004; UNAIDS, 2005). As this is the age at which young

people experiment with sex and take risks, it is not surprising that the majority of the respondents belong to this age group.

The educational status of the respondents shows that the majority (83.0%) had at least a secondary education, while 6.9% had no formal education. This finding is similar to previous studies from other centres in Lagos, and other state capitals (Aliyu *et al.* 2010; Ezechi, 2006). The high educational attainment of this cohort compared to the general population can be accounted for by the location of the study centre in the heart of Lagos, a cosmopolitan city where the majority of the residents are expected to be educated.

Although the majority of the respondents were engaged in an income generating activity, their incomes of USD200 per month, or less indicates that the respondents were employed in low paying jobs. The respondents' nutritional knowledge scores ranged from 2 to 20 with a mean of  $12.4\pm 3.5$  and a median of 13. The nutritional knowledge of most respondents (64.8%) was average. This shows a gap in the nutritional knowledge among the respondents. The finding was comparable to the result of an Argentinian study in which a large proportion of women living with HIV infection were found to have inadequate nutrition knowledge (Hess & Maughan, 2012). Although the design of this study was different from that of Hess & Maughan (2012), both confirmed the poor nutritional knowledge of women infected with HIV.

The attitude score of the respondents ranged from 2 to 18 with the majority of the respondents having either average (51.2%) or bad (32.8%) attitudes to nutrition. Only 16.0% of the respondents had a good attitude to nutrition. The finding from this study differed from that of a similar study in Uganda, in which over two-thirds of HIV positive women studied were found to have a good attitude to nutrition (Bukusuba *et al.*, 2010). The difference in

the findings were not surprising as over 85% of the respondents in the Ugandan study reported having undergone formal training in nutrition. This finding underscores the importance of patients education to the care and treatment of their disease. It therefore calls for the integration of specific nutrition education into the current HIV treatment program across all treatment sites in the country.

The majority of the respondents in this study had good nutritional practices (65.1%). The good nutritional practices shown by the respondents despite their inadequate nutrition knowledge could be attributable to their age and good cultural nutritional practices rather than their level of education. Although educational attainment has been shown to increase respondents' knowledge of nutrition, only specific and targeted nutritional education, especially on deep-seated cultural taboos and fads, may change poor nutritional practices (Galindo *et al.*, 2015). Thus specific education is needed to change an individual's mindset. In Nigeria, a number of cultural food practices have been reported to be good, and participants may have picked up these practices as a routine practice without knowing the scientific basis of those practices. Thus despite scoring poorly for nutritional knowledge, they had high scores for nutritional practice. The disconnect between nutritional knowledge and practice found in this study is similar to findings from eastern Uganda, where it was found that despite 89.5% of participants reporting having received training on nutrition, only 21.8% and 39.8% of them reported consuming three or more meals per day from six or more food-groups in the preceding 24 hours (Bukusuba *et al.*, 2010). Petrie *et al.* (2007) studied the prevention of mother-to-child transmission of HIV and reported that knowledge of mother-to-child HIV transmission and attitude towards breastfeeding significantly, and

positively correlates with nutritional and feeding practices among pregnant HIV positive women. Their study also involved pregnant HIV positive women, and this may have contributed to good practice despite their average nutritional knowledge. In contrast to the findings of this study, studies by Bukusuba *et al.* (2010) and Baghel, Srivastava & Verma (2015) in India found a positive relationship between nutritional education and good practice. Their findings confirmed that well-structured nutritional counseling is helpful in raising awareness about the importance of nutrition. Nutritional counseling not only improves dietary intake, but also empowers dietary diversity (Baghel *et al.*, 2015). The statistically significant association found in this study between having at least a secondary education and good nutritional practice further supports the role of education in the improvement of nutritional wellbeing of patients.

This study also showed that nutritional knowledge was found not to influence the attitude of the respondents to nutrition. Although a smaller proportion of the respondents with adequate nutritional knowledge (47.3%), had poor nutritional attitude compared to those with inadequate knowledge (56.8%); the noted difference was not statistically significant ( $p=0.62$ ). This could be attributed to 6.8% of respondents having average nutritional knowledge.

There was a statistically significant difference in the nutritional practices of the respondents with adequate and inadequate knowledge of nutrition ( $p=0.001$ ). Most of the respondents with adequate knowledge of nutrition (94.7%) had good nutritional practices compared to only 17.8% of respondents with inadequate knowledge. This finding agrees with the results of the findings of a nutrition survey in Taiwan, which showed significant positive correlations between nutrition knowledge and nutrition practice (Lin *et*

*al.*, 2011). A larger proportion (95.5%) of the respondents with a good attitude to nutrition had good nutritional practices compared to 76.8% of respondents with a poor attitude to nutrition. The difference was found to be statistically significant ( $p < 0.0001$ ). Nutritional attitude has a strong influence on nutritional behaviour and practices, especially as it relates to food taboos, and some cultural and peculiar food practices.

Age, being married, and level of education were also found to influence the nutritional knowledge, but not occupation or monthly income. While the effect of educational attainment is obvious, that of age and marital status was not and might be confounded by the level of education. With increasing age, women are likely to be better educated, and be married (Galindo *et al.*, 2015). However, further analysis is therefore required to control for these two possible confounders before a conclusion can be made.

The study has various strengths: the diversity in the type of women recruited being an important one. The inclusion of women of diverse characteristics could make the generalisation of the findings easier. The use of systematic random sampling and recruitment of respondents beyond the calculated sample size ensured that bias and errors of chance were eliminated.

A possible limitation of the study was possible biased answers from the patient to please the investigator who they might have seen as one of the care providers. This could have influenced their responses to the questionnaire. This was mitigated by only administering the questionnaire to the patients after they had completed their routine visit for the day and informing them of the interviewer's role before the interview.

## CONCLUSION

A large majority of respondents in this study had inadequate nutritional knowledge despite over 80% having at least a secondary education. Despite their poor attitude to nutrition, they had average or good nutritional practices. The socio-demographic variables of age, level of education, and marital status were found to influence nutritional knowledge. It is recommended that nutritional education targeting specific food taboos and fads be integrated into the current management plan for persons living with HIV, especially women.

## Conflict of Interest

The authors declare no conflict of interest in the running and reporting of this study

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**STUDY QUESTIONNAIRE****SECTION A:DEMOGRAPHIC CHARACTERISTICS**

[Instructions: Fill in the space provided or tick (✓) where appropriate].

1. Age (years) of the women at last birth day .....
2. Marital status (a) Single (b) Married (c) Separated (d) Divorced (f) Widow
3. Education level completed (a) None (b)Arabic (c) Primary (d) Secondary (e)Tertiary
4. Religion (a) Christianity group (a) Yoruba (b) Igbo (c) Hausa/Fulani (d)Others (specify).....
7. Risk factor for HIV acquisition (a) Sexual (b) IV drug (c) Blood transfusion (d) MTCT (e)Others (specify).....
8. HIV treatment status (a) On antiretroviral treatment (b) Not yet on antiretroviral treatment
9. What is your estimated total monthly income from all sources (a)<USD100 (b) USD101- 300 (c)>USD300

**SECTION B: NUTRITIONAL KNOWLEDGE**

[Instruction: Tick (✓) where appropriate].

S/N	Statement	Agree	Disagree	Don't Know
	Carbohydrates and fats are energy-giving foods			
	Balanced diet is important in prevention of infection			
	Fish is a good source of protein			
	Frequent stooling leads to nutrient loss			
	Protein-rich foods are needed to build and repair body tissues			
	HIV infection increases the body's food requirement			
	Water is a nutrient			
	Banana is good for control of diarrhoea in HIV patients			
	Fruits and vegetables are rich in vitamins and minerals			
	Mixed feeding is not good for the baby of a HIV positive mother			

**SECTION C: NUTRITIONAL ATTITUDE**

[Instruction: Tick (✓) where appropriate].

S/N	Statement	Agree	Disagree	Undecided
	I eat at least three main meals a day			
	I often snack on soft drinks and confectionery			
	Fruits and vegetables are not my favourite foods			
	I drink at least 8-10 glasses of water every day			
	Meat, fish or milk products are included in my diet daily			
	I usually take my ARV drugs after meals			
	My meal is mainly carbohydrate based			
	I include a lot of meat in my food			
	I take vitamin or mineral supplements daily			
	I wash fruits and vegetables before consumption			

**SECTION D: NUTRITIONAL PRACTICE**

[Instruction: Tick (✓) where appropriate].

S/N	Statement: In the last 2 weeks	Agree	Disagree	Undecided
	I ate washed raw vegetables more than cooked vegetables.			
	My nutritional needs differed from non-HIV positive persons so I made the effort to eat a balanced diet			
	I ate fruits only when I felt like it			
	I prepared balanced meals regularly			
	I ate balanced meals			
	My family maintained good nutrition despite our income			
	I did not take herbs along with my drugs			
	I ate a variety of foods in moderation			
	I engaged with good eating habits in order to maintain my overall health			
	Preparing a balanced meal wasn't time consuming for me			

