

# Factors Influencing Adherence to HAART among Patients Living with HIV Infection in Southwest Nigeria: A Cross-Sectional Analysis

Abayomi Joseph Afe<sup>1\*</sup>,  
Olanrewaju Motunrayo<sup>2</sup> and  
Gbadebo O Ogungbade<sup>3</sup>

- 1 Equitable Health Access Initiative, Equitable Health Access Initiative, Lagos, Nigeria
- 2 Babcock University, Ilishan Remo Ogun State, Nigeria
- 3 Adeleke University, Adeleke University, Loogun-Ogberin Road, Ede, Osun State, Nigeria

**\*Corresponding author:**  
Abayomi Joseph Afe

✉ abayomiafe@yahoo.com

Equitable Health Access Initiative, Lagos, Nigeria.

**Tel:** 34-8023368959

**Citation:** Afe AJ, Motunrayo O, Ogungbade GO (2018) Factors Influencing Adherence to HAART among Patients Living with HIV Infection in Southwest Nigeria: A Cross-Sectional Analysis. J HIV Retrovirus. Vol.4 No.1:1

## Abstract

**Background:** Nigeria has 10% of the global burden of HIV/AIDS and had HIV prevalence rate of 3.0% in 2014. Adherence to ART is a determinant of viral suppression and risk of transmission, disease progression but suboptimal adherence has been a major challenge associated with a diversity of patient- and programme-related challenges. This study was done to find factors that influence adherence to HAART among HIV/AIDS Patients in Southwest Nigeria.

**Methods:** Structured interviewer-administered questionnaires were used to collect information from the 225 participants.

**Findings:** There were more female (80.4%) than male (19.6%) living with HIV infection. About 96% of the respondents were literate with 2.7% illiteracy rate.

Employment rate was also more than half (59%). Over 90% were of the Christianity faith. None of these and other factors had any significant influence on ability of the study participants to adhere to HAART ( $P > 0.05$ ).

Excellent or optimal HAART adherence level ( $\geq 95\%$ ) was found among 42% of the respondents. Another 49% had fair adherence level of between 85% and 94% while 8.4% had poor level of adherence of  $< 85\%$ .

The five commonest reasons given for failure to adhere were forgetfulness, Stigma, seeing someone with HIV doing well on HAART, fear of discrimination and the fact that HIV has no known cure.

**Conclusion:** In conclusion, demographic factors such as gender, religion, finance, education, marital status do not have any significant associations with adherence to HAART.

In addition, less than half of the study participants living with HIV infection had excellent adherence level needed to ensure treatment success and good health. These findings showed that there is still a huge gap in PLHIV achieving optimal adherence on HAART and therefore health workers and HIV control programme implementers need to continually emphasize and support optimal adherence.

**Keywords:** HIV; HBV; PMTCT; Vertical transmission; ART (Antiretroviral therapy)

**Received:** June 23, 2017; **Accepted:** August 17, 2017; **Published:** August 24, 2017

## Introduction

### Epidemiology

Globally in 2015 there were about 36.7 million (34.0 million-39.8 million) people living with HIV, out of which 2.1 million were new HIV infections [1]. This gives a global HIV prevalence of 0.8%.

About 71% of the global burden of HIV infection is borne by the Sub-Saharan region, which account for about 11% of the world population [2]. In 2015, there were 2.1 million (1.8 million-2.4 million) new HIV infections and 1.5 million deaths due to HIV/AIDS. In addition, although the prevalence has stabilized, the absolute number of people infected with HIV continues to

grow steadily as the number of new infections outnumbers the number of AIDS-related deaths and access to HAART improves in the developing world [3].

In the world's most affected region, eastern and southern Africa, the number of people on treatment has more than doubled since 2010, reaching nearly 10.3 million people in 2015. AIDS related deaths in the region have also decreased by 36% since 2010.

Global coverage of antiretroviral therapy reached 46% (43-50%) at the end of 2015. Gains were greatest in the world's most affected region, eastern and southern Africa. Coverage increased from 24% (22-26%) in 2010 to 54% (50-58%) in 2015, reaching a regional total of 10.3 million people. South Africa alone had nearly 3.4 million people on treatment, more than any other country in the world. Next to South Africa is Kenya, which has the largest treatment programme in Africa, with nearly 900,000 people on treatment at the end of 2015. Botswana, Eritrea, Kenya, Malawi, Mozambique, Rwanda, South Africa, Swaziland, Uganda, the United Republic of Tanzania, Zambia and Zimbabwe all increased treatment coverage by more than 25 percentage points between 2010 and 2015. Western and central Africa and the Middle East and North Africa also made important gains but achieved lower levels of coverage in 2015, 28% (23-34%) and 17% (12-24%), respectively. Treatment coverage in other regions of the world like the Latin American, the Caribbean, the Asia and Pacific region were also more than doubled, in 2015 [3].

The gains in treatment are largely responsible for a 26% decline in AIDS-related deaths globally since 2010, from an estimated 1.5 million (1.3 million-1.7 million) in 2010 to 1.1 million (940,000-1.3 million) in 2015. The reduction in deaths since 2010 has been greater among adult women (33% decrease) compared with adult men (15% decrease), reflecting higher treatment coverage among women than men, 52% (48-57%) and 41% (33-49%), respectively. This gender gap in HIV treatment among adults highlights the impact of gender norms on delay initiation of treatment among men, reduced treatment adherence among men, thus leading to men accounting for 58% of adult AIDS related deaths.

This expansion in HIV treatment globally is responsible for the declines in new HIV infections among adults which have slowed alarmingly in recent years, with the estimated annual number of new infections among adults remaining nearly static at about 1.9 million (1.7 million-2.2 million) in 2015. However, marked disparities in HIV incidence still exists across regions, within countries, between men and women and young and old and among specific key populations [4]. Ignorance and misunderstanding leading to discriminatory attitudes and behavior continue to undermine efforts to end AIDS. This is particularly seen with the key populations. The People Living with HIV Stigma Index measures stigma and discrimination reported by people living with HIV. Stigma Index surveys has been conducted in more than 65 countries. In 22 of these countries, more than 10% of people living with HIV reported they had been denied health care and more than 1 in 10 people living with HIV reported they had been refused employment or a work opportunity because of their HIV status in the 12 months before the survey [5]. In 30 countries where surveys were conducted, 1 in 10 people living with HIV

reported they had lost a job or another source of income because of their HIV status [6].

A collection of effective HIV prevention strategies is available, including condoms, harm reduction, voluntary medical male circumcision, pre-exposure prophylaxis, cash transfers for girls and structural approaches that promote gender equality and access to secondary education. Community and peer-based approaches to sharing prevention tools have also proven effective. The key is to combine these tools into combination HIV prevention packages that address the specific needs of key populations, and to establish enabling environments that allow these populations to access HIV, health and social services without fear of violence, arrest or persecution.

Though much progress has been made in reaching people with HIV treatment and in reducing AIDS related deaths, approximately 54% (50-57%) of people living with HIV are still in need of treatment, many of whom do not know their HIV status.

### Antiretroviral therapy (ART)

This refers to the use of antiretroviral drugs in the management of HIV/AIDS conditions in humans. ART should be offered to all persons who are eligible in a comprehensive manner, which means that the persons should have access to ongoing HIV Counseling for adherence, baseline and routine periodic laboratory investigation, concurrent management of OIs and routine treatment monitoring and follow-up. When properly administered ART should achieve the following goals:

- 1) Reduce morbidity (includes morbidity from OIs)
- 2) Prolong life of HIV infected individuals: Prior to the advent of ARVs mortality rates due to advanced HIV disease was unacceptably high nearing 100% in most cases. However, following the introduction of HAART many people on HAART live long and productive lives.
- 3) Improve quality of life of infected persons: The absence of symptomatic HIV and HIV-related illness means that persons infected with HIV are able to go about their normal existence and fend for themselves and their families unlike in the past when they were largely bedridden and dependent on others for support
- 4) Achieve rapid and sustained suppression of viral load: Under optimal conditions of excellent adherence should lead to rapid and sustained suppression of viral load. Usually by the 24 weeks following initiation of treatment patient's viral load should be undetectable.
- 5) Enhance immunity by increasing CD4+ cell count: Under optimal conditions patients should be able to achieve a CD4 cell count increase of 50 to 100 cells/ $\mu$ l per year.
- 6) Reduce risk of transmission of HIV to infants (mother to child transmission) and sexual partners: ART is effective in reducing transmission of HIV from an infected person to another.
- 7) Treatment as Prevention: By causing viral suppression in infected individuals, ART can prevent transmission of HIV

from infected individuals to the sexual partners, especially in sero-discordant relationships.

- 8) Prophylaxis (Pre-exposure/Post-exposure): HIV negative individuals can take ARV to reduce their chances of contracting the HIV prior to or after their being exposed to high risk behaviors.

### ART adherence

Adherence to ART is an essential component of individual and programmatic treatment success. Higher levels of drug adherence are associated with improved virological, immunological and clinical outcomes. Adherence rates exceeding 95% are necessary in order to maximize the benefits of ART. Adherence is crucial for delaying or avoiding the development of drug resistance and ensuring maximum durability of the first-line ARV regimen. The measures to ensure optimal adherence should be taken before commencement of therapy, at initiation and should continue during therapy.

In recent studies in children and adolescents with HIV infection, adherence to ART, using varied definitions and assessment methods, has ranged from 97% to 25% [7-12].

### Measurement of adherence

Adherence in many studies is measured by expressing the number of doses taken as a percentage of the number of doses prescribed. For example if 20 doses are prescribed and 19 doses are taken adherence is 95%. This translates to missing one dose in ten days on a twice daily regimen. Other measurement methods include the patient self-report, pharmacy drug pick-up and electronic method (e.g. the MEMS cap)

The gold standard for assessing adherence is the ARV level in the blood. Viral load could also serve as a surrogate for assessing adherence because medication adherence will lead to low viral load, but self-reported data is reliable and easier to obtain. Studies show that self-reported data correlates with viral load [10], so self-reporting using interviewer-administered questionnaire was used in this study.

Adherence Formula:

$$\text{Adherence Level (\%)} = \frac{\text{Doses Taken}}{\text{Total Expected Doses}} * 100$$

#### Category

Adherence	%	Missed doses per month
Optimal	≥ 95%	≤ 3 doses
Fair	85-94%	4-8 doses
Poor	<85%	≥ 9 doses

### Study rationale

While so many works have been done on factors influencing adherence to HAART in other parts of the world and other geopolitical zones in Nigeria, none has looked at these factors among people living in southwest Nigeria with all their peculiarities. This study was conceived to plug this knowledge gap. Knowledge of the factors influencing HAART adherence

are important, as they would help in the design of intervention strategies in the care of HIV patients in this setting (**Table 1**).

## Objectives

### Research objectives

1. To categorize HAART adherence level among HIV/AIDS patients in Nigeria using a cross-sectional design that involves survey.
2. To list factors that influence adherence to HAART among PLWHA in Nigeria.

## Methodology

### Study design

Questionnaire based cross sectional study.

### Study population

Persons living with HIV/AIDS infection.

### Study areas

Public hospitals in Ondo and Ekiti states.

### Sample and sampling technique

Convenient sampling.

### Sample size

225 persons were recruited for this study. The sample size was calculated online using raosoft statistical package online formula: Sample size  $n = N \times \frac{x}{((N-1)E^2 + x)}$  (17).

### Sampling method

Non-probability convenient sampling was used to select the sample size of into 225 HIV infected persons.

### Study instrument design

Structured questionnaire was used to gather the needed information and data needed in this research. The reliability and validity of the questionnaire was tested in a pilot study and subjected to review by experts in the field.

### Inclusion criteria

1. HIV infected patients
2. Be residents of Nigeria within the past 6 months
3. Understand and speak English
4. Adults not less than 18 years of age
5. Male or female
6. Provide voluntary informed consent

### Exclusion criteria

Participation was restricted from individuals who were:

Table 1 Factors associated with HAART adherence.

		Adherence to HAART				Total
		No	Percent	Yes	Percent	
Religion (P=0.913)	Christianity	38	19%	164	81%	202
	Muslim	4	17%	19	83%	23
	<b>Total</b>	42	-	183	-	225
		Adherence to HAART				Total
		No	Percent	Yes	Percent	
Monthly income (P=0.195)	<N30,000.00	19	18%	84	82%	103
	N30,000-N50,000	8	24%	25	76%	33
	>N50,000	0	0%	33	100%	33
	No Income	15	27%	41	73%	56
<b>Total</b>		42	-	183	-	225
		Adherence to HAART				Total
		No	Percent	Yes	Percent	
Highest Educational Level (P=0.769)	No Formal Education	11	32%	23	68%	34
	Bachelor/HND	7	28%	18	72%	25
	Postgraduate	2	15%	11	85%	13
	Primary	7	19%	30	81%	37
	Secondary School	15	13%	101	87%	116
<b>Total</b>		42	-	183	-	225
		Adherence to HAART				Total
		No	Percent	Yes	Percent	
Marital Status (P=0.696)	Co-Habiting	7	21%	26	79%	33
	Divorced	2	50%	2	50%	4
	Married	19	16%	102	84%	121
	Separated	0	0%	5	100%	5
	Single	9	18%	42	82%	51
	Widowed	5	45%	6	55%	11
	<b>Total</b>	42	-	183	-	225
		Adherence to HAART				Total
		No	Percent	Yes	Percent	
Gender (P=0.772)	Female	33	18%	146	82%	179
	Male	9	20%	37	80%	46
	<b>Total</b>	42	-	183	-	225
		Adherence to HAART				Total
		No	Percent	Yes	Percent	
Finance will help me adhere (P=0.262)	Don't Know	6	16%	31	84%	37
	No	12	14%	71	86%	83
	Yes	24	23%	81	77%	105
	<b>Total</b>	42	-	183	-	225
		Adherence to HAART				Total
		No	Percent	Yes	Percent	
Do you have enough more time for HAART (P=0.419)	Don't Know	5	14%	32	86%	37
	No	2	9%	20	91%	22
	Yes	35	21%	131	79%	166
	<b>Total</b>	42	-	183	-	225
		Adherence to HAART				Total
		No	Percent	Yes	Percent	
Having Support from others (P=0.006)	Don't Know	10	21%	38	79%	48
	No	4	10%	35	90%	39
	Yes	28	20%	110	80%	138
	<b>Total</b>	42	-	183	-	225
		Adherence to HAART				Total
		No	Percent	Yes	Percent	

Accessibility to ARV medication (P=0.230)	Don't Know	9	21%	34		79%	43
	No	2	15%	11		85%	13
	Yes	31	18%	138		82%	169
Total		42	-	183		-	225
		Adherence to HAART				Total	
		No	Percent	Yes		Percent	
Assurance of ethical standards in the health care system (P=0.995)	Agree	36	19%	150		81%	186
	Disagree	1	25%	3		75%	4
	Don't Know	5	14%	30		86%	35
Total		42	-	183		-	225
		Adherence to HAART				Total	
		No	Percent	Yes		Percent	
Confidentiality of information (P=0.541)	No	2	29%	5		71%	7
	Yes	36	20%	142		80%	178
	Don't Know	4	10%	36		90%	40
Total		42	-	183		-	225

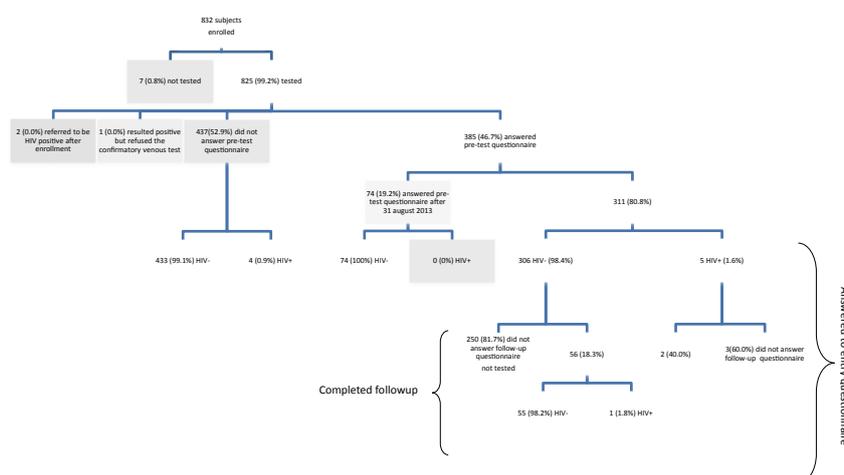


Figure 1 Distribution of different adherence levels among respondents.

drug cocktail 46%, stigma 68%, inaccessible treatment 20%, believe that HIV is a hoax 18%, to avoid discrimination 57% and believe that HIV has no treatment (23%) (Table 3).

## Discussion

All the 225 questionnaires were administered to the respondents and were completely filled, cleaned and retrieved for analysis. This represents 100% response rate. A higher proportion of the respondents, were female, married and had secondary school as the highest levels of education attained. These findings are similar to results from other works done on adherence in the region [13]. Other African studies among adult HIV patients in clinic settings also had higher proportions of female respondents [14,15]. More than half of the respondents were employed and most were of the Christianity faith. This is contrary to national demographic survey which showed almost equal proportions of Christian and Muslims in the country and lower proportions of Nigerians with secondary and tertiary education [16]. However, it is a reflection of the demographic distribution in the southwestern part of the

country where a greater proportion of the populace is of the Christian faith and the level of literacy is very high compared to the other parts. The adherence levels among the respondents were classified into three categories with adherence level of above 95% being excellent or optimal, while adherence level of between 85% and 94% was classified as being Fair and Adherence level of less than 85% being Poor Adherence. This classification was based on the PEPFAR adherence assessment tool used in all PEPFAR supported facilities in Nigeria. Less than half (42%) of the respondents had excellent adherence. This translates to missing only one dose in ten days on a twice daily regimen. Whereas about half (49%) had fair adherence level, very small proportion (8.4%) had poor level of adherence. This low level of optimal adherence has been corroborated by almost all the adherence studies conducted in other regions of Nigeria [12,13,17]. It is however lower than 87.9% reported in a tertiary facility in Jos, north-central Nigeria [18]. Excellent adherence to antiretroviral therapy is essential to reaching and maintaining an undetectable viral load and avoiding emergence of resistant HIV,

- Not mentally capable of providing response
- Previously sampled by the same questionnaire

### Data analysis

This was done using statistical package for the social sciences (SPSS) for windows version 20.0 software (SPSS Inc.; Chicago, IL, USA). Frequency counts were generated for all variables but all the continuous and categorical variables expressed in percentage frequency. Statistical test of significance was performed with chi-square test. Significance was fixed at  $P < 0.05$ .

### Ethical consideration

Ethical approval with protocol number (ERC/2016/03/02/10B) was obtained from the IRB committee of the Federal Teaching hospital, Ado ekiti, Ekiti state, Southwest Nigeria.

## Results

### Sociodemographic characteristics of respondents

**Table 2** summarized the sociodemographic characteristics of the respondents. About three-quarter (181, 80.40%) of the

**Table 2** Sociodemographic characteristics of respondents.

Gender	Frequency	Percent
Female	181	80.4
Male	44	19.6
Total	225	100
Marital status	Frequency	Percent
Co-Habiting	3	1.3
Divorced	4	1.8
Married	136	60.4
Separated	4	1.8
Single	66	29.3
Widowed	12	5.3
Total	225	100
Highest educational level	Frequency	Percent
No Formal Education	6	2.7
Primary	36	16
Secondary School	150	66.7
Bachelor/HND/OND	23	10.2
Postgraduate	10	4.4
Total	225	100
Employment Status	Frequency	Percent
Employed	133	59.1
Retired	4	1.8
Student	17	7.6
Unemployed	71	31.6
Total	225	100
Religion	Frequency	Percent
Christianity	202	89.8
Muslim	23	10.2
Total	225	100

respondents were females and about 20% male; majority (202, 89.8%) were Christians and 10.2% Muslims (23). Over a half (139, 61.7%), of the respondents were married or living with partners while less than a fifth (66; 29%) were singles. More than half (150, 66.7%) of the respondents had secondary education while 23 (10.2%) had bachelor degree/national diploma and 6 (2.7%) had no formal education.

### HAART adherence levels among PLHIV

About 42% of the HIV positive respondents had an excellent level of adherence ( $\geq 95\%$  adherence), 49% had fair adherence level (85-94% adherence) while 8% had poor level of adherence ( $< 85\%$ ) (**Figure 1**).

### Relationship between HAART adherence and PLHIV demographics

The percentage of the respondents who were adherent was the same across the two major religious groups (Christian-81% and Muslim (83%), likewise roughly equal proportions of the respondents who are Muslims (17%) and Christians (19%) were non-adherent. A higher proportion of respondents were HAART adherent irrespective of monthly income; 82% of those who earned less than N30,000 (\$100), 76% of those who earned between N30,000-N50,000(\$100-167), 100% of those who earned  $> N50,000$ (\$167) and 73% of those with no income were adherent. A higher proportion of respondents who were illiterates (68%), who had Bachelor/National diplomas (72%), postgraduate (85%), had primary school education (81%) and who had secondary school education (87%) were adherent. All the 5 (100%) respondents who were separated were adherent, while 82% (42) of the singles, 55% (6) of the widows, 84% (102) of the married, 50% (2) of the divorcees and 79% (26) of the cohabiting respondents were adherent.

The proportions of those adherent and those not adherent were also the same across the two genders (Male-80%, Female-82%) and (Male-20%, Female-18%) respectively. Equal number of respondents believed that having more money (77%, 81) and not having more money (71, 86%) will improve adherence. Respondents who having more time dedicated to ARV treatment (79%, 131) and those who do not have enough time (91%, 20) were ART adherent. 80% (110) of the respondents who had psychosocial support from others and 90% (35) of those who did not have the social support were HAART adherent. 82% (138) of the respondents who had access to ARV and 85% (11) of those who had difficulty access to ARV were adherent to HAART. About 80% of the respondents believed that the presence or absence of ethical practice at the care centers will make them adhere to HAART. Equal number of respondents who believed that there was confidentiality of information (80%; 142) and those who believed there was none (71%; 5) had good adherence.

### Common reasons for non-adherence to HAART

Among the list of reasons given for non-adherent to HAART, bitter taste accounted for 20%, forgetfulness 54%, cumbersome

**Table 3** Reasons for non-adherence to HAART among HIV patients.

<b>The medication is bitter to taste</b>		<b>Percent</b>
P=0.001	Don't Know	8.90%
	No	70.70%
	Yes	20.40%
	Total	100%
<b>I forgot</b>		<b>Percent</b>
P=0.000	Don't Know	6.20%
	No	39.60%
	Yes	54.20%
	Total	100%
<b>The medication cocktail is too cumbersome</b>		<b>Percent</b>
P=0.000	Don't Know	6.70%
	No	47.10%
	Yes	46.20%
	Total	100%
<b>Stigma associated with HIV patients</b>		<b>Percent</b>
P=0.001	Don't Know	7.10%
	No	24.90%
	Yes	68%
	Total	100%
<b>The treatment is not accessible</b>		<b>Percent</b>
P=0.000	Don't Know	4.90%
	No	74.70%
	Yes	20.40%
	Total	100%
<b>HIV is a hoax (practical joke, deception, fraud, trick)</b>		<b>Percent</b>
P=0.081	Don't Know	7.60%
	No	73.80%
	Yes	18.70%
	Total	100
<b>To avoid discrimination</b>		<b>Percent</b>
P=0.001	Don't Know	6.70%
	No	36%
	Yes	57.30%
	Total	100%
<b>HIV has no treatment</b>		<b>Percent</b>
P=0.001	Don't Know	5.30%
	No	71.60%
	Yes	23.10%
	Total	100%
<b>HIV has no cure</b>		<b>Percent</b>
P=0.000	Don't Know	5.80%
	No	24.90%
	Yes	69.30%
	Total	100%

particularly for newly diagnosed patients. Medication adherence is extremely important for successful treatment in HIV because without it patients are less likely to be virally suppressed and can develop resistance. People living with HIV are known to do

relatively well at taking their drugs compared to people with other chronic conditions. For example, people with diabetes have around a 67.5% adherence rate, while the adherence rate in those with HIV is closer to 88%, according to some studies. People living with HIV relatively adherent, are also usually honest about skipping doses or stopping treatment, hence self-reported data is fairly reliable.

For patients having problem with adherence, options to consider include switching the patient to medication with a longer half-life, moving to medication that will reduce any side effects the patient is experiencing or reducing the patient's pill burden, treatment counseling which could include SMS text-message reminders, leveraging on a patient's existing social relationships (treatment partner) as an extra support system for medication adherence could also help [11,19,20]. But offering small payments to patients in exchange for adherence has been proven not to make much of a difference in adherence rates [21].

All the factors studied in this research which include religion, monthly income, highest educational level attained, marital status, gender, finance, having enough more time for HAART, having psychosocial support from others, accessibility to ARV medication, assurance of ethical standards in the health care system and confidentiality of information do not have any significant associations with adherence level among the respondents (P>0.05). Other studies have however suggested a mixed outcome in the association between adherence and sociodemographic characteristics; while some studies found associations, others did not [22,23]. Among factors that have been known to promote adherence include lower pill burden such as the use of fixed dose combination (FDC) and patient adherence counseling [24].

Some of the common reasons for failure to adhere to HAART among the PLHIV respondents include forgetfulness(54%; P=0.00), Stigma(68%, P=0.001), seeing someone with HIV doing well on HAART (71%, P=0.041), fear of discrimination (57%, P=0.001) and the fact that HIV has no known cure (69%, P=0.00). These findings are similar to what has been highlighted in other studies [13,15]. For instance, the WHO 2015 guideline on when to start ART and PrEP which stipulate that adherence to ART is a primary determinant of viral suppression and risk of transmission, disease progression and death also acknowledged that suboptimal adherence is a major challenge in all regions, at all stages of HIV disease, and is associated with diversity of patient and programme-related challenges. According to this guideline some individual factors responsible for failure to adhere may include forgetting doses; being away from home; changes in daily routines; depression or other illness; limited understanding of treatment benefits; a lack of interest or desire to take the medicines; and substance or alcohol use. Adherence to ART may also be challenging in the absence of supportive environments for people living with HIV and because of HIV-related stigma and discrimination. Medication-related factors may include adverse events; the complexity of dosing regimens; the pill burden; and dietary restrictions. Health system factors include distance to health services; long waiting times to receive care and obtain refills; and the burden of the direct and indirect

costs of care. Specific population groups facing additional adherence challenges may include pregnant and postpartum women, adolescents, infants and children, key populations and people with mental health and substance use disorders.

A limitation to this study was that it depended mainly on self-report to assess adherence level, which could be influenced by patient ability to recall and patient's desire to provide socially desirable answers.

### Strengths and weaknesses (advantages and limitations) of the method used

The study is limited to Nigeria residents, a heterogeneous population. Conclusions on the random sample will be representative of those who complete the survey and not the Nigeria resident as a whole. The respondents are likely to give the socially acceptable answers and incomplete responses, considering the sensitive questionnaire and perceived socioeconomic position.

As a cross-sectional analysis, the study is short of temporal sequence; incapable of estimating any causal association. Additionally, the findings may be subject to potential selection bias as women and men who failed to participate in the survey may have differed from respondents with respect to Adherence to HAART. The accuracy of the study depends on the authenticity of the responses given by the participants. Information and selective bias are potential limitations of this study.

In spite of these limitations, this research had strength, including (a) the use of accurate point estimate (prevalence odds ratio) to

examine the association between the independent and dependent variables which does not inflate the effect size compared with odds ratio, and (b) the ability to identify Adherence to HAART risk determinants/factors in Nigerian resident sample, which have neither been studied nor documented as far as we know.

### Conclusion

In conclusion less than half of the study participants living with HIV infection had excellent adherence level needed to ensure treatment success and good health.

There were more female than male living with HIV infection among the respondents. Over 90% of the respondents were literate with less than 3% illiteracy rate.

Employment rate was also more than half (59%) while the unemployed rate was about 31.6%. Most were of the Christianity faith

None of the factors studied had any significant association with HAART adherence.

The five commonest reasons for failure to adhere were forgetfulness, Stigma, seeing someone with HIV doing well on HAART, fear of discrimination and the fact that HIV has no known cure.

These findings showed that there is still a huge gap in PLHIV achieving optimal adherence on HAART and therefore health workers and HIV control programme implementers need to continually emphasize and support optimal adherence.

### References

- 1 Global AIDS Update UNAIDS 2016.
- 2 The Joint United Nations Programme on HIV/AIDS (UNAIDS) (2002) Report on the Global HIV/AIDS Epidemic, Geneva.
- 3 UNAIDS (2015) Fact sheet: 2014 statistics.
- 4 Williams A, Friedland G (1997) Adherence, compliance and HAART. *AIDS Clin Care* 9: 51-56.
- 5 UNAIDS, (2016) Review of data from people living with HIV stigma index surveys conducted in more than 65 countries.
- 6 (2016) Advancing HIV justice 2: Building momentum in global advocacy against HIV criminalisation. Brighton and Amsterdam: HIV Justice Network and Global Network of People Living with HIV.
- 7 Murphy DA, Wilson CM, Durako SJ, Muenz LR; Adolescent Medicine HIV/AIDS Research Network (2000) Antiretroviral medication adherence among the REACH HIV-infected adolescent cohort in the USA. *AIDS Care* 13: 27-40.
- 8 Reddington C, Cohen J, Baldillo A, Toye M, Smith D, et al. (2000) Adherence to medication regimens among children with human immunodeficiency virus infection. *Pediatr Infect Dis J* 19: 1148-1153.
- 9 Steele RG, Anderson B, Rindel B, Dreyer ML, Perrin K, et al. (2001) Adherence to antiretroviral therapy among HIV-positive children: examination of the role of caregiver health beliefs. *AIDS Care* 13: 617-629.
- 10 Dolezal CM, C Brackis-Cott E, Abrams EJ (2003). The reliability of reports of medical adherence from children with HIV and their adult caregivers. *J Pediatr Psychol* 28: 355-361.
- 11 Farley J, Hines S, Muska, Ferrus S, Tepper V (2003) Assessment of adherence to antiretroviral therapy in HIV-infected children using the medication event monitoring system, pharmacy refill, provider assessment, caregiver self-report and appointment keeping. *J Acquir Immune Defic Syndr* 33: 211-218.
- 12 Goode M, McMaugh A, Crisp J, Wales S, Ziegler JB (2010) Adherence issues in children and adolescents receiving highly active antiretroviral therapy. *AIDS Care* 15: 403-408.
- 13 Kasumu LO, Balogun MR (2014) Knowledge and attitude towards antiretroviral therapy and adherence pattern of HIV patients in southwest Nigeria. *Int J Infect Control* 10.
- 14 Potchoo Y, Tchamda K, Balogou A, Pitche VP, Guissou IP, et al. et al. (2010) Knowledge and adherence to antiretroviral therapy among adult people living with HIV treated in the health care centers of the association "Espoir Vie Togo" in Togo, West Africa. *BMC Clin Pharmacol* 10: 11.
- 15 Talam NC, Gatongi P, Rotich J, Kimaiyo S (2008) Factors affecting antiretroviral drug adherence among HIV/AIDS adult patients attending HIV/AIDS clinic at Moi Teaching and Referral Hospital, Eldoret, Kenya. *East Afr J Public Health* 5: 74-78.
- 16 National Population Commission (NPC) (2013) Nigeria Demographic

- and Health Survey, 2013 Preliminary Report Abuja, Nigeria: National Population Commission and Measure DHS, ICF International.
- 17 Erah PO, Arute JE (2008) Adherence of HIV/AIDS patients to antiretroviral therapy in a tertiary health facility in Benin City. *Afr J Pharm Pharmacol* 2: 145-152.
  - 18 Falang KD, Akubaba P, Jimam NS (2012) Patient factors impacting antiretroviral drug adherence in a Nigerian tertiary hospital. *J Pharmacol Pharmacother* 3: 138-142.
  - 19 Salzman S (2015) Del Rio, "Treatment adherence optimization: Acting with humility to move beyond preconceived ideas".
  - 20 Simoni JM, Frick PA, Pantalone DW, Turner BJ (2003) Antiretroviral adherence interventions: A review of current literature and ongoing studies. *Top HIV Med* 11: 185-198.
  - 21 El-Sadr W (2015) Effect of financial incentives on linkage to care and viral suppression: HPTN 065. CROI, Seattle, WA.
  - 22 Monjok E, Smesny A, Okokon IB, Mgbere O, Essien EJ (2010) Adherence to antiretroviral therapy in Nigeria: An overview of research studies and implications for policy and practice. *HIV AIDS (Auckl)* 2: 69-76.
  - 23 Paterson DL, Swindells S, Mohr J, Brester M, Vergis EN, et al. (2000) Adherence to protease inhibitor therapy and outcomes in patients with HIV infection. *Ann Intern Med* 133: 21-30.
  - 24 Montessori V, Heath KV, Yip B (2000) Predictors of adherence with triple combination antiretroviral therapy.