Original Article

A comparative study of the predictors of treatment adherence among patients on antiretroviral therapy at rural and urban centers in Cross River State, Nigeria

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ABSTRACT

Objectives: Adherence to antiretroviral therapy (ART) is an important factor required to suppress viral activities and its load in the human body. There are identified factors that determine adherence to ART and these factors have been noticed based on environments. This study compared predictors of ART adherence between the urban and rural centers within the same State in Nigeria.

Material and Methods: The study was a cross-sectional analytic study involving 322 participants. Data were analyzed using Statistical Package for the Social Sciences version 20. Descriptive and inferential statistics were done with the data collected.

Results: There were more adherent participants in the urban than the rural center in a ratio of 2.2:1. There was also significant difference in the predictors of adherence to ART in these two centers. The factors that were not present in both centers were: Stigma experience, family support, and sex.

Conclusion: Predictors of treatment adherence vary between the urban and rural treatment centers even within the same senatorial district of a state. Therefore, it is advisable to always determine factors that predicts adherence to ART which would serve as a guide to proper treatment of the patient.

Keywords: Adherence, Antiretroviral therapy, Urban, Rural, Cross river state

INTRODUCTION

Human immunodeficiency virus infection/acquired immunodeficiency syndrome (HIV/AIDS) has remained a burden to most families in sub-Saharan Africa which harbors about 70% of the world's HIV infected population.[1] The prevalence of HIV/AIDS in Nigeria based on the sentinel surveillance of 2019 was 1.4% and Cross River State had an estimated prevalence of 1.7% which was the 5th medium prevalence in Nigeria with a range of 8.2% (in the urban areas) to 1.8% (in the rural areas).[1]

In the absence of a cure for HIV/AIDS, antiretroviral therapy (ART) has remained the only available option that offers the possibility of reducing HIV/AIDS-related morbidity and mortality while improving the quality of life of the people living with HIV and AIDS (PLWHA).[2,3] However, ART has to be taken as a lifelong therapy and its success depends on continual adherence to the medication regimen.[4,5]

ART has improved the health of many HIV positive individuals who would have died due to this infection.[6,7] This evidence was shown in the annual number of HIV/AIDS deaths which declined from 2.5 million in 2005 to 0.67 million in 2017.[8] In part, this decline in the death of PLWHA was likely a result of the substantial increase in access to HIV/AIDS treatment and adherence to ART.[8,9]

The World Health Organization defined adherence as the extent to which a person's behavior: taking medication, following a diet, and/or executing lifestyle changes, corresponds with agreed recommendations from a healthcare provider.[10] and the Nigerian National Guidelines for HIV and AIDS Treatment and Care in Adolescents and Adults agree with this ≥ 95% cutoff for ART adherence, asserting that for a patient to be tagged as adherent to ART, he must not miss more than one dose in 10 days if on a twice daily regimen or one dose in 20 days if on a once daily regime.[11]

The identified factors that can influence medication adherence in PLWHA can be categorized into three groups: Patient-related, health system-related, and clinical factors.[12] Predictors of adherence to ART vary among patients, environments, and communities.

The health system-related factors includes: Drugs being out of stock, insufficient amount of time a clinician spends with the patient due to overtaxing of the healthcare system, lack of utilization of health information, lack of feedback from patient, and meeting different doctors at each consultation follow-up visits.

The patient-related factors that may lead to non-adherence are lack of patient's understanding of the relationship between the disease, the required percentage of adherence and quality of life, lack of involvement in the treatment decision-making process, feelings of stigmatization, sharing drugs with spouse and other family members, feelings of wellness, undetectable level of virus in peripheral blood following long-term ART and faith in miraculous healing.[13,14]

The above listed factors can vary based on the environment such as urban and rural communities. This study aims to assess, identify, and compare the factors that predict treatment adherence among patients on ART in an urban and a rural clinic, to improve patients' management outcome.

MATERIAL AND METHODS

This was a cross-sectional analytical study conducted within 4 months from March to June 2015. Using interviewer's administered questionnaire of adapted Morisky 8-item medication adherence questionnaire,[15] Duke functional social questionnaire,[16] modified family support scale,[17] data for this study were collected at the Family Medicine Clinic of the University of Calabar Teaching Hospital (UCTH), Calabar and General Hospital (GH), Ikot Ene in Akpabuyo LGA, Cross River State, Nigeria. These intervention sites were established and funded by President's Emergency Plan for AIDS Relief (PEPFAR) and had been operational since 2005.

A total of 322 participants (161 from each study sites) were recruited into the study after calculating sample size using formula for demonstrating significant difference in two independent groups.[18] and systematic sampling technique was utilized for selection criteria into the study. The inclusion criteria were PLWHA 18 years of age and above that were on ART for at least 6 months, who had consented to participate in the study. All critically ill patients were excluded from the study.

Data collected for this study was analyzed using the Statistical Package for the Social Sciences version 20 software, manufactured by International Business Machines Corporations, United State of Ameriaca. Descriptive and inferential statistics were done.

Ethical approved for this study was given by the Health Research and Ethics Committee of the UCTH with protocol number NHREC/07/2012/UCTH/HREC/33/250. There was no conflict of interest in any of the authors.

RESULTS

Comparing the socio-demographic characteristics of the study participants in the urban and rural centers [Table 1]. The trend in the tribe distribution had a statistically significant difference ranging from 1.9% to 10.5% as seen among the Ejagham and Ibibio ethic groups respectively. There was a significant difference of 12.4% in the distribution of religion between the urban and rural respondents. The ratio of females to males in both centers was 1.1:1.0, however, this difference was not statistically significant. The difference in the trend of age group and marital status in the respondents in the urban and rural centers ranged from 1.3–5.5% and 0–9.9%, respectively. These differences were not statistically significant.

Table 2 compares the socio-economic characteristics of the study participants in the urban and rural centers. It was noticed that the trend in educational level had a differences ranging from 0.6% to 15.5%. The differences in the trend of the distribution of the employment of the respondents in both centers ranged from 0 to 8.6% with self-employment having the highest difference. Comparing the average monthly income and place of residence in both study centers, differences were 6.8% and 23.6%, respectively

Table 3 presents the comparison of the patient-related factors that predicted adherence to ART at the two study centers.

Table 1: Comparing the socio-demographic characteristics of study participants in urban and rural centers.

Variable	Urban (*n*=161) Frequency (%)	Rural (*n*=161) Frequency (%)	Total (*n*=322) Frequency (%)	Chi-square	*P*-value
Sex				1.393	0.498
Male	76 (47.2)	77 (47.8)	153 (47.5)		
Female	85 (52.8)	84 (52.2)	169 (52.5)		
Age group (years)				1.572	0.666
20–29	42 (26.2)	51 (31.7)	93 (28.9)		
30–39	78 (48.4)	75 (46.6)	153 (47.5)		
40–49	35 (21.7)	31 (19.3)	66 (20.5)		
≥50	6 (3.7)	4 (2.4)	10 (3.1)		
Mean age±SD	34.96±7.11	34.07±7.00	34.52±7.00	2.561**	0.320
Marital status				6.565	0.255
Never married	19 (11.8)	10 (6.2)	29 (9.0)		
Married	104 (64.6)	120 (74.5)	224 (69.6)		
Cohabiting	20 (12.4)	15 (9.3)	35 (10.9)		
Previously married	18 (11.2)	16 (9.9)	34 (10.5)		
Tribe				16.268	0.039*
Efik	49 (30.4)	61 (37.9)	110 (34.2)		
Ejagham	23 (14.3)	20 (12.4)	43 (13.3)		
Ibibio	34 (21.2)	51 (31.7)	85 (26.4)		
Annang	15 (9.3)	10 (6.2)	25 (7.8)		
***Others	40 (24.8)	19 (11.8)	59 (18.3)		
Religion				5.331	0.021*
Christianity	146 (90.7)	156 (96.9)	302 (93.8)		
Islam	15 (9.3)	5 (3.1)	20 (6.2)		

*Statistically significant. ***t-test. ***Others include Hausa, Yakkur, Ijaw, Ibo, Yoruba

Table 2: Comparing the socio-economic characteristics of study participants in urban and rural centers.

Variable	Urban (*n*=161) Frequency (%)	Rural (*n*=161) Frequency (%)	Total (*n*=322) Frequency (%)	Chi-square	*P*-value
Educational level				21.898	<0.001*
None	10 (6.2)	13 (8.1)	23 (7.1)		
Primary	14 (8.7)	16 (9.9)	30 (9.3)		
Secondary	65 (40.4)	84 (52.2)	149 (46.3)		
Post-secondary	43 (26.7)	44 (27.3)	87 (27.1)		
University	29 (18.0)	4 (2.5)	33 (10.2)		
Employment				10.562	0.032*
By Government	26 (16.1)	21 (13.0)	47 (14.6)		
By Private sector	48 (29.8)	48 (29.8)	96 (29.8)		
Self employed	68 (42.3)	82 (50.9)	150 (46.6)		
Unemployed	19 (11.8)	10 (6.3)	29 (9.0)		
Monthly income (₦)				5.610	0.061
<19,000	23 (14.3)	12 (7.5)	35 (10.9)		
≥19,000	138 (85.7)	149 (92.5)	287 (89.1)		
Area of residence				16.884	0.184
Urban	110 (68.3)	148 (91.9)	258 (80.1)		
Rural	51 (31.7)	13 (8.1)	64 (19.9)		

*Statistically significant

The result showed more participants (4.4%) in the rural center were aware of the need to take ART for life and this difference was statistically significant (*P* = 0.012).

The adherence to ART on pharmacy records had a difference 16.4% between the urban and rural centers. The trend in the distribution of clinical stages of the respondents in both study

Table 3: Comparing patient-related characteristics of study participants in urban and rural centers.

Variable	Urban (*n*=161) Frequency (%)	Rural (*n*=161) Frequency (%)	Total (*n*=322) Frequency (%)	Chi-square	*P*-value
Art should be taken for life					
Yes	153 (95.0)	160 (99.4)	313 (97.2)	6.354	0.012*
No	8 (5.0)	1 (0.6)	9 (2.8)		
≥95% Adherence is required					
Yes	96 (59.6)	91 (56.5)	187 (58.1)	0.319	0.572
No	65 (40.4)	70 (43.5)	135 (41.9)		
Self-reporting adherence					
Yes	107 (66.5)	95 (59.0)	202 (62.7)	1.68	0.715
No	54 (33.5)	66 (41.0)	120 (37.3)		
Adherence on pharmacy records					
Yes	106 (65.8)	80 (49.4)	186 (57.6)	1.85	0.001*
No	55 (34.2)	81 (50.6)	136 (42.4)		
Clinical stage					
Stage 1	25 (15.5)	9 (5.6)	34 (10.6)	13.229	0.004*
Stage 2	45 (28.0)	53 (32.9)	98 (30.4)		
Stage 3	61 (37.9)	51 (31.7)	112 (34.8)		
Stage 4	30 (18.6)	48 (29.8)	78 (24.2)		
CD4					
Class A (>500)	132 (82.0)	140 (87.0)	272 (84.5)	2.625	0.269
Class B (200–500)	28 (17.4)	21 (13.0)	49 (15.2)		
Class C (<200)	1 (0.6)	0 (0.0)	1 (0.3)		
BMI					
Underweight (<18.5)	3 (1.9)	2 (1.2)	5 (1.6)	2.402	0.121
Normal (18.5–24.9)	59 (37.1)	54 (33.5)	113 (35.3)		
Over-wt. (25–29.9)	65 (40.9)	58 (36.0)	123 (38.4)		
Obese (≥30)	34 (20.1)	47 (29.2)	81 (24.7)		

*Statistical significant

centers ranged from 4.9 to 11.2%. The difference in the self-reported adherence and awareness of the need for optimal adherence to ART was 7.5% and 3.1%, respectively. The trend in the distributions of CD4 and BMI had differences that ranged from 0.6–5% and 0.7–9.1%, respectively.

Table 4 presents the predictors of adherence to ART among the study participants in the urban and rural centers. The two centers had the following predictors in common: awareness that ≥95% adherence was a requirement, adherence on pharmacy records, clinical stage, family support, and stigmatization experience. In addition to, these predictors the rural center had family support.

The urban center had 7% more respondents that were aware of the need to take ≥ 95% of their ART. The pharmacy record in the rural center was 0.3% more relationship than the urban center. The differences between the trends in clinical stages of the respondents in the urban and rural centers range from 2.2–86.6% and 11.2–66.6%, respectively.

The trend in social support in the rural respondents ranged between 11.2 and 32.8%. The differences in the trend in family support between the urban and rural centers were in a range of 4.8–68%. About 8.6% of the participants in the

urban center experienced high stigmatization than those in the rural center.

Table 5 shows binary logistic regression of predictors of antiretroviral treatment adherence among study participants in the urban and rural centers. The result revealed that the two centers had in common adherence on pharmacy records and awareness that ≥95% adherence was a requirement as the predictors of adherence to ART. In addition to these, sex was a predictor in the urban center while family support and stigmatization were noticed as predictors in the rural center.

There were three times more respondents in the urban center that were aware that ≥95% adherence was required than in the rural center. The ratio of adherence on pharmacy records between the urban and rural centers was 2.2:1. In the rural center participants with no stigmatization experience were more than 4 times more likely to adhere to ART. In the urban center, males were < ½ times likely to adhere to ART.

DISCUSSION

In this study, 66.5% of urban respondents were adherent to ART based on self-reported method while 65.8% of them

Table 4: Predictors of art adherence among study participants in urban and rural centres.

Variable	Adherence to ARV therapy (on pharmacy records)					
	Urban			Rural		
	High (*n*=107)	Low (*n*=54)	X² (*P*-value)	High (*n*=95)	Low (*n*=66)	X² (*P*-value)
ARV drugs should be taken for life						
Yes	103 (67.3)	50 (32.7)	0.969 (0.530)	94 (58.8)	66 (41.2)	1.059 (0.132)
No	4 (50.0)	4 (50.0)		1 (100.0)		
≥ 95% adherence is required						
Yes	88 (91.7)	8 (8.3)	67.780 (< 0.001*)	77 (84.6)	14 (15.4)	56.747 (<0.001*)
No	19 (29.2)	46 (70.8)		18 (15.4)	52 (84.6)	
Adherence on pharmacy records						
Yes	99 (93.4)	7 (6.6)	101.022 (<0.001*)	74 (93.7)	5 (6.3)	78.524 (< 0.001*)
No	8 (14.5)	47 (85.5)		21 (26.7)	61 (73.3)	
Clinical stage						
Stage 1	15 (60.0)	10 (40.0)	14.959 (0.002*)	4 (44.4)	5 (55.6)	33.680 (< 0.001*)
Stage 2	23 (51.1)	22 (48.9)		16 (30.2)	37 (69.8)	
Stage 3	41 (67.2)	20 (32.8)		35(68.6)	16 (31.4)	
Stage 4	28 (93.3)	2 (6.7)		40 (83.3)	8 (16.7)	
Social support						
Low	2 (66.7)	1 (33.3)	2.495 (0.287)	1 (33.3)	2 (66.7)	7.841 (0.020*)
Moderate	34 (58.6)	24 (41.4)		21 (43.8)	27 (56.2)	
High	71 (71.0)	29 (29.0)		73 (66.4)	37 (33.6)	
Family support						
Low	42 (56.0)	33 (44.0)	13.967 (0.001*)	2 (10.0)	18 (90.0)	45.913 (<0.001*)
Moderate	40 (66.7)	20 (33.3)		48 (51.6)	45 (48.4)	
High	25 (96.2)	1 (3.8)		45 (93.8)	3 (6.2)	
Stigmatization experience						
No	42 (93.2)	3 (6.8)	22.579 (< 0.001*)	40 (91.3)	5 (8.7)	43.195 (< 0.001*)
Yes	65(56.0)	51(44)		55 (47.4)	61(52.6)	

*Statistically significant

Table 5: Binary logistic regression of predictors of antiretroviral treatment adherence among study participants in urban and rural centers.

Variable	Urban			Rural		
	Odds ratio	95% Confidence interval	*P*-value	Odds ratio	95% Confidence interval	*P*-value
≥ 95% adherence is required						
Yes	6.4	1.95–21.20	0.002*	4.17	1.37–12.72	0.012*
No	1			1		
Adherence on pharmacy records						
Yes	36.67	11.27–132.72	< 0.001*	16.97	4.91–58.56	<0.001*
No	1			1		
Clinical stage						
Stage 1 and 2	0.91	0.28–2.96	0.8790	0.511	0.161–1.622	0.254
Stage 3 and 4	1			1		
Family support						
Low / moderate	0.96	0.28–3.25	0.947	0.12	0.027–0.698	0.017*
High	1			1		
Stigma experience						
No	4.61	0.613–34.61	0.138	4.67	1.12–19.45	0.034*
Low / High	1			1		
Sex						
Male	0.4	0.20–0.96	0.039			
Female	1					
Social support						
Low / moderate				0.9	0.45–20.05	0.972
High				1		

*Statistically significant

were adherent as shown on pharmacy record. The difference between the two methods used was not significant. The adherence to ART was lower in the rural respondents both in the self-reported method (59.0%) and pharmacy record (49.4%). This difference between the methods could be explained by the suggestion that the use of pharmacy records in assessing adherence to ART is superior to self-reporting method, though not up to the 10–20% proposed difference.[19]

The proportion of adherence among urban respondents in this study was similar to a study in Ibadan (2015) with 63% adherence level.[20] However, it was different from a study carried out in Ethiopia (2015) where 83.1% of the respondents were adherent to ART.[21]

In this study, the predictors of ART adherence were: Sex, body mass index, family/community support, awareness of the need for ≥ 95% adherence, stigma experience, and adherence as shown on pharmacy records.

The difference in the ART adherence proportion between the rural and urban respondents in this study may be due to some environmental factors such as community/social supports. A study carried out in a Teaching Hospital in Wolaita Soddo, Ethiopia by Alagaw *et al*. (2013), revealed that the predictors of ART adherence were: Sources of food for consumption, food scarcity, the person or people the client lives with and presence of depression in the patient.[20] This was different from a study in Northern Ethiopia by Demeke and Chanie (2014), which showed that duration of treatment, family disclosure, living condition, and taking other medications along with ART were the predictors.[22] Another study in South-East Ethiopia by Lencha *et al*. (2015), reported that history of drug abuse, relationship with clinician and keeping to regular follow-up were the determinants of ART adherence.[23]

This study is in agreement with the studies cited above that predictors of ART vary with geographic areas and it further portrays that even in the same districts there could be difference between the urban and rural area.

CONCLUSION

There was the possibility of response bias by participants who may have falsely reported to be adherent to medications in order to impress the interviewer. However, the study showed that there are similarities and differences in the predictors of ART adherence between the urban and rural centers. The identified predictors above may serve as a guide for developing interventions aimed at improving the proportion of patient on ART and sustain the adherence among these clients.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent.

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Conflicts of interest

There are no conflicts of interest.

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