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SOCIO-CULTURAL, DEMOGRAPHIC, KNOWLEDGE AND ECONOMIC FACTORS INFLUENCING ADHERENCE TO ANTIRETROVIRAL THERAPY AMONG PEOPLE LIVING WITH HIV AND AIDS (PLWHA) IN THREE SELECTED HOSPITALS OF ANAMBRA STATE, NIGERIA

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ABSTRACT

Despite the availability of treatment regime for PLWHA, especially in major cities on Nigeria, adherence to drug regimen seem to be facing some challenges towards achieving success in combating the issue of HIV/AIDS. A knowledge of the possible challenges that may be. A cross-sectional survey using self-reported tool was employed to determine the factors that influence adherence to Antiretrovirals among people living with HIV/AIDS currently on Antiretroviral Therapy in three selected hospitals in Anambra State, Nigeria. A purposive sampling technique was used to select five hundred and fifty four respondents who are currently on Antiretroviral Therapy for the study. The analyses consisted of basic summaries of respondents' characteristics, and bivariate analysis of the relation between adherence and the various factors that influence it. Further analysis using the inferential statistics (chi-squares) was carried out to test the significance of association between adherence and various factors associated with.
Five hundred and fifty four people living with HIV/AIDS completed the questionnaire from the study settings. Nnamdi Azikiwe Teaching Hospital had a higher percentage of respondents (38.1%) than the two other institutions. The longest duration of being on Antiretroviral Therapy was one hundred and seventy-three months (14 years, 5 months) with almost all the respondents (95.5%) reporting Antiretroviral Therapy as helpful to them. An adherence level of 85.2% was reported by self-report tool with alarm-clocks (66.1%) being the major reminder. The non-adherents reported forgetfulness, high transport cost to the clinic, and long waiting time at the clinic as their reasons for not adhering to their Highly Active Antiretrovirals Therapy (HAART). There is significant association between adherence and marital status, religion, long waiting time at the clinic, and poor supply of Antiretrovirals.
The adherence rate to antiretrovirals found in this study is 85.2% and is fairly appreciable when compared with WHO (≥95%) recommendation. Respondents recommended certain measures to ensure adherence to antiretroviral therapy which include, improved Antiretroviral services and continuous supply of free Antiretroviral medications, provision of functional CD4 T-cell machines, employment of more trained staff as well as the provision of more improved Antiretroviral drug. The conclusion is however reached that Antiretroviral medication still remains the best way to manage the virus in People living with HIV/AIDS. Therefore, everything should be done to mitigate factors that facilitate non-adherence among People living with HIV/AIDS.

Key words*: Antiretrovirals, Adherence, CD4 T-cell, Virus, PLWHA, HAART*

INTRODUCTION

One of the greatest health challenges of our time is that posed by infection with Acquired Immune Deficiency Syndrome (AIDS), a fatal disease caused by a retrovirus known as the Human Immuno-Deficiency Virus (HIV) with a characteristic feature of an infection that lasts a lifetime and

its antiretroviral treatment once started also lasts a lifetime. Highly Active Antiretroviral Therapy (HAART) is a breakthrough in the industrialized world that has proven to be effective in suppressing HIV replication. It ia also helpful in transforming the disease into a chronic treatable condition for a significant proportion of People living with HIV and AIDS (PLWHA) with access to this treatment (WHO 2003; Mannheimer, Matts, Telzak, Chesney, Child, Wu and Friedland, 2005).

HAART is the combination of three or more drugs from at least two different classes of antiretroviral (ARV) therapy. A key determinant of the success of HAART is adherence to the drug. Long-term adherence to antiretroviral is critical for a sustained response to HIV therapy. Adherence to ART is the second strongest predictor of success of HIV/AIDS treatment after CD4 count (Erah & Arude, 2008).

ARV treatment is costly and accessible to only a limited number of PLWHA who can afford it and access demands more patience and time. Hence, optimum access to ARV medication is not yet achieved and without access to this therapy, adherence to ARV would be in jeopardy. PLWHA cannot attain the fullest possible physical and mental health and cannot play their fullest role as actors in the fight against this epidemic because their life expectancy will be further reduced. Healthcare workers will indirectly be disempowered and cannot contribute to fight HIV to the fullest. Children will be orphaned early, stigmatized and discrimination will continue to be fuelled by the perception that HIV is a death sentence.

While the coverage on the average is poor in itself, only a small proportion of PLWHA accessing ARV centres are those who are nearer, can afford it and knowledgeable about the needs of ARV. The concern is whether all those who made effort to access ARV would adhere religiously to its regimen.

Some PLWHA who access the clinic do not return for follow up on schedule and are likely to be non-adherent. The observed loss to follow up could predispose to non-adherence to HAART which can lead to development of viral resistance, treatment failure, toxicities and waste of financial resources. Adherence describes the patient's behaviour of taking drugs correctly- the right drug, in the right dose, at the right frequency (dose), and at the right time. While nonadherence is the patient's inability to take his/her drugs in the prescribed manner (Frank & Miramontes (1997) and GHAIN (2005)). Berman, Snyder, Kozier and Erb (2008) and Brunner and Suddarth (2008) opine that adherence refers to the extent to which an individual's behaviour (for example, taking medications, following diets, or making lifestyle changes) coincides with medical or health advice. Such behaviours that facilitate health include taking prescribed medications, self-monitoring for signs and symptoms of illness and maintaining a healthy diet among others.

Medication adherence in HIV care specifically refers to the ability of the person living with HIV/AIDS to be involved in choosing, starting, managing and maintaining a given therapeutic combination to control viral replication and improve immune function (Asim, 2004). It is a decision patients make for their own health. Long-term adherence to antiretroviral is critical for a sustained response to HIV therapy. Consistent high level of adherence is also an important determinant of virologic and immunologic outcome, AIDS-related morbidity, mortality, and hospitalizations (Chirag, 2007). Non-adherence risks the development of drug resistance and failure of therapy. Various studies have documented the range of adherence to HAART from 25% to 85%. Although the minimum threshold of adherence necessary for the clinical effectiveness of HAART remains unclear, available data suggest that patients must take a high proportion (95% or more) of antiretroviral drug doses to maintain suppression of viral replication (WHO, 2003; WHO, 2004 ;WHO, 2005). With HIV treatment drugs, ≥95% adherence is required, at least 95% adherence to HAART is optimum and studies have shown that such adherence is associated with virologic failure rate of >50% (Chirag, 2007). The virus rapidly multiplies in the absence of the drugs, and with the increasing viral load, more mutations cause resistance to the drugs.

Adherent individuals have been shown to have reduced viral loads and increased CD4 counts, live longer, and have better quality of life (Machtinger and Bangsberg, 2005). Brunner and Suddarth (2008) reiterate the goals of patients education which is to encourage them to adhere to their therapeutic regimen. Given that medication-taking behaviour can immensely affect an individual's response; antiretroviral therapy (ART) adherence is now widely recognized as an 'Achilles heel' for the successful outcome (Alemayehu, Kifle, Sofonias, Belaineh and Kebede, 2008).

Joint United Nations Programme on HIV and AIDs (UNAIDS (2005 & 2006) reported that Sub-Sahara Africa has the largest number of HIV infected people (about 28.5 million adult and children). Access to ARV is limited to only a minority of individual living with HIV/AIDS in the region. An estimated 3.3 million adults and 290,000 children in Nigeria are also living with HIV, and approximately 1.8 million children have been orphaned by AIDS. Adherence to antiretroviral treatment is crucial to the success of ART programme in Nigeria too. Since 1986 when the first case of AIDS was reported in Nigeria (FMOH, 2002; FMOH, 2005), the number of PLWHA has steadily increased, the epidemic moved into a generalized state with sero prevalence from 1.8% in 1991 to 5.8% in 2001, a slight drop to 5.0% in 2003 sustained in 2005 to 4.4% and now at 3.1% (UNAIDS, 2009).This progressive decline is undoubtfully attributed to reduction in risk behaviours and government integration of antiretroviral medication (ARV) as part of care and supports to PLWHA.

It is therefore pertinent to find out the factors influencing adherence to ARV drugs among PLWHA in order to have a deep understanding of these factors and improve outcome of HAART and quality of life among PLWHA in Anambra State, Nigeria.

Literature Review

Adherence to therapeutic regimen

Chambers Dictionary defines adherence as sticking or remaining fixed to something while compliance is yielding (to give up or give in, to surrender) or submission. Adherence to the HAART regimen appears to be the single most important variable that predicts a patient's ability to achieve and maintain suppression of HIV viraemia to below the level of detection (Paterson, Swindles, Mohr, Brester,Vergis, Squier,Wagener and Singh, 2000).

One of the goals of patient education is to encourage people to adhere to their therapeutic regimen Brunner & Suddarth (2008). Adherence to treatment usually requires that a person makes one or more lifestyle changes to carry out specific activities that promote and maintain health Some researchers opined that sustaining high levels of adherence to antiretroviral therapy is difficult for many patients, but recent applied research among persons with HIV infection, including a study carried out in Barbados, had offers hope (Frank and Miramontes, 1997; Hogg, Health and Yip 1998; Smith and Marcus, 2003; Adomakoh, 2004; Tadios and David, 2006). These studies demonstrate that high-level adherence to HAAT is entirely possible with proper clinical management, strong patient confidence in the clinician and in the treatment, and effective involvement of patients as active agents in their own care and treatment. However, not all people who have HIV are ready to start ART. A patient is recommended to start ART when the virus has affected the person immune system to a certain level (i.e. CD4 count < 200 or opportunistic infections). Patients need to take different types of drugs in combination to effectively reduce the level of virus in the blood and prevent the development of resistance to the drugs (GHAIN, 2005). Sustained level of adherence to the HAART regimen is single most important variable that predicts a patient's ability to achieve and maintain suppression of HIV viraemia to below the level of detection (Paterson, *et al.*, 2000; Mannheiner, *et al.*, 2005).

Factors affecting adherence (predictor of adherence)

Studies reported conflicting evidence about the association between socio-demographic factors and adherence behavior. Some literatures reported that certain socio-demographic variables have influence over adherence to HAART; however, others showed no association (Rabkin and Chesney, 1999; Hoggg, Heath, Bangsberg, Yip and Press, 2002; Carter, 2005). More consistent associations are found between certain psychosocial factors and adherence behavior. Common predictors of non-adherence include depression/psychiatric morbidity active drug or alcohol use, sero status disclosure and lack of social support (Gao, Nau, Rosenbluth, Scott and Woodward, 2000; Carballo, Cararso-Suarez, Carrea, Fraga, Ocampo, 2004; John, Kaplan, Sheldon, Li and Wilson, 2005). The complexity of the regimen, side effects and various demands around medication and food timing caused by it are also associated with non-adherence (Adam, Maticka and Cohen, 2005). However, Gao *et al* showed that regimen complexity alone was not a significant predictor of patients' medication adherence (Bruno Segolene, Marc, Catherine Francois and Jean, 2002). Various studies have documented that inadequate knowledge and negative beliefs about HIV disease and treatment effectiveness present an important barrier to ART adherence (Chesney, 2000; Malcolm, Rosen and, 2003). Few studies describe a relationship between HIV-related symptoms and non-adherence. Patients who have experienced AIDS-related symptoms perceived as serious are usually more adherent than patients who never had symptoms, or who consider their symptoms unimportant (Gao *et al.*, 2000; Paterson, Swindellls and Mohr, 2000; Bangsberg, Perry, Charlebois, Clark, Roberston, Zolopa and Moss., 2001; Berg, Demas Penelope, Howard, Schoenbaum, Gourevitch and Arnsten, 2004). While the world gears toward increasing access to antiviral treatment in the developing world, it is critical to understand factors (motivators and barriers) that influence adherence to Antiretroviral and apply the lessons learnt in improving existing and new programs

Empirical studies

Numerous studies have been conducted both internationally and at local levels on adherence to ART. Global HIV and AIDS (2003) impact survey in December 2002, reported that Brazil provided ARVs to an estimated 125,000 people, accounting for more than one third of all people in developing countries on such programme. AIDS-related mortality declined between 40-70%. HIV related morbidity dropped by 60-80% and the countries experienced a seven-fold decline in HIV-related hospitalization. Thus, ARV treatment equally enabled the country to avert 58,000 new cases and 90,000 AIDS-related deaths. The national survey revealed that Brazil's success benefited from strong political leadership, provision of adequate national resources, and the development of strong partnerships between government and civil society. The survey also indicated a high rate of patient adherence to prescribed regimens, with 73% of patients on ARVs in seven Brazilian states reporting at least 95% adherence in the prior three days.

Similarly, in 2002, Haiti ARV projects administered by partners in Health that integrated HIV prevention and treatment, using a directly observed (DOT) approach borrowed from experience in Tuberculosis (TB) control. The survey reported that Haiti project promoted adherence through, use of accompagnateurs, selected by patients themselves, who visited patients daily to ensure they are taking their medications. Accompagnateurs were able to read and write and were at least 20 years of age. They received extensive training on TB and HIV, including medications and their side effects, confidentiality, referral system, and strategies for promoting adherence and were supervised by the 4 head nurses and received a monthly salary. This study also confirmed that of more than 3,000 PLWHA being followed and more than 400 patients provided with ARVs (DOT), 86% of patients on ARVs had suppressed viral loads, all had experienced weight gain and other improvements in health, and less than 1% had required medications changes due to side effects.

South Africa survey same 2002 reported using nurse-based care in primary care setting, standardized regimens, laboratory monitoring and patient centred adherence support strategies

experience. Same World Bank survey found that out of the more than 400 patients provided with ARVs, mean weight gained at six months was 8.8kg and at 12months there was an 83% survival rate and a 70% reduction in opportunistic infections. Adherence rates were as high as those reported in developed countries and 91% of patients have undetectable viral loads at six months. Chesney et al (2000) study on adherence to HIV combination therapy found that problem with adherence prior to combination therapy was reported, though adherence to combination therapy was significantly related to HIV viral load. Rabkin and Chesney (1999) and Carter 2005 in a cross-sectional study of determinants of adherence to ART in a developing country observed that some of the demographic or clinic variables were associated with adherence to ART while others are not. Recent studies found that a person's age does not interfere with the ability of HAART to reduce viral load but there may be difference between younger and older people in how well the immune system responds to treatment. A HIV outpatient study investigation by Patella, Delaney and Moorman 1998, confirmed that adherent patients on ARV therapy with potent combinations of drug indeed had dramatic reduced rates of hospitalization, opportunistic infections, and deaths associated with HIV infection.

Dimatleo (2004) study on 'variations in patients' adherence to medical recommendations using a qualitative review of 50 years of research in East Baltimore, observed that patients with more fiscal resources were somewhat more likely to adhere with treatment for chronic disease.

Bakken, Holzemer and Brown (2000) in a study "antiretroviral intervention to reduce mother-to-child transmission of HIV challenges for health systems, communities and society" in Thailand, found that a short course of Zidovudine treatment of 4 weeks reduced mother-to-child transmission of HIV by approximately half among women who did not breast-feed. It has few side effects and requires minimal monitoring may be feasible and affordable under certain conditions in low income and middle income countries. Data from studies in other African settings also suggest that patients of low socio-economic status are able to achieve excellent rates of adherence with access to routine medical care, subsidised ART and free lab monitoring (Asim, 2004). In a recent cohort study of antiretroviral adherence in semiurban South Africans living in extreme poverty, Olusoji *et al*. (2006) found that lower socioeconomic status was not a predictor of adherence among patients receiving fully subsidised therapy. In fact, adherence levels were similar to or better than those found in industrialised countries. Weiser *et al*, (2003) study on Barriers to ARV adherence for PLWHA in Botswana reported financial constraints, stigma, travel/immigration, side effects as principal findings for non-adherence. Nakiyemba, Kwasa, and Aurut, (2005) in their study on barriers to ARV adherence for PLWHA in Uganda found insufficient training of staff, poor infrastructure, long waiting time, lack of trust, stigma, poor supply system and poor motivation of staff. Stigma, cultural beliefs, pill burden, poor patient information and knowledge, the use of traditional medicine and poverty also seem to negatively affect the way patients adhere to ARV.

Makwiza, Neuhann, Chiunguzeni, Lalloo and Kemp (2004) in their study on patient adherence to ART reported that most patients not only had a comprehensive understanding of their illness and the ways through which HIV were transmitted but also how anti-retroviral therapy works. The high cost of accessing therapy was commonly cited as the major factor that caused patient to stop therapy. This was perceived as a particular risk for patients who received ART through sponsorship from their employers and relatives. Other barriers were side effects, reluctance to disclose their HIV status and as well as long waiting times to access to care. Some respondents seek cure through prayers and Lighthouse services and staff gave to support patients in their therapy.

Alemayehu *et al*., (2008) in a prospective study in Southwest Ethiopia of predictors of adherence among PLWHA, found that adherence was common in those patients who self-reported dose adherence of 94.3% among other methods (Self-reported time adherence, Self-reported food adherence) used for measuring adherence. Other findings were that patients who were not

depressed were two times more likely to be adherent than those who were depressed, while the principal reasons reported for skipping doses in this study were simply forgetting, feeling sick or ill, being busy and running out of medication in more than 75% of the cases.
Uzochukwu, Onwujekwe and Nd, (2007) in a study on determinants to ARV treatment in South East Nigeria, found that non-adherence are due to physical discomfort, non-availability of drugs and fear of social rejection. In a prospective study evaluating adherence to ART among 125 outpatients in University of Benin Teaching Hospital, Benin City, Erah and Arute (2008) reported adherence level of 58.1% ± 2.4% which was significantly lower than those reported in many other sub-Saharan African countries. They also found that adherence was dependent on adverse effects and educational level of patients. Poor financial status, medication adverse effects, lack of confidentiality, occupational factors and stigmatization were the major reasons given for non-adherence. Olowookere, Fatriegun, Akinyemi, Bamgboye and Osagbemi (2007), in a cross-sectional survey on prevalence and determinants of non-adherence to HAART among PLWHA in Ibadan, equally found that non-adherence is a problem in the ARV clinic and that the feeling of being healthy, forgetfulness, and unwillingness to disclose HIV status by PLWHA were significant barriers to adherence. Chijioke, Osaro, Adebayo and Chris (2006) in study evaluating the factors militating against adherence to antiretroviral therapy among HIV-infected individuals in the resource -limited setting of the Niger Delta of Nigeria reported an adherence level of 49.2%. They equally identified factors associated with non-adherence to include cost of antiretroviral, educational status, medication adverse effects, occupational factors, and high pill burden of prescribed regimen. They suggested simplifying the therapeutic regimen to reduce the pill burden and substitution with treatment combination and strategies that minimize negative adverse effects, coupled with the re-intensification of patient's education and counseling. Mukhtar-Yola1, Adeleke, Gwarzo, Zubaida (2006), also in a cross-sectional study to determine the adherence level and the reasons for non-adhering to (ART) in Aminu Kano Teaching Hospital, Zaria, Nigeria, reported that thirty-two patients (80%) were 95% or more adherent to their medications among forty children with HIV infection who had been on ART for at least six months. Running out of medicines and the inability to purchase more due to financial constraints; non-availability and inaccessibility to medications were common reasons for non-adherence. The cost of ART, and availability and accessibility to medications were the most significant barriers to adherence.

METHODOLOGY

Study design

This study design was descriptive cross-sectional survey of PLWHA registered at the antiretroviral therapy clinic in General Hospital, Amaku (Anambra Central zone), Borromeo Mission Hospital (Anambra North zone) and Nnamdi Azikiwe Teaching hospital (NAUTH) (Anambra South) of Anambra State, Nigeria. These centers are chosen on the merit of their being representative and strategic in their respective zones as well as serving more PLWHA than other health care facilities.

Study setting

Anambra State was created in 1991 with twenty-one Local Government Areas (LGA) with Awka as the state capital (See Apendix 3- Map of Anambra state). The state is located in the South-East zone of Nigeria and is bounded by Delta State to the West, Imo State to the South, Enugu State to the East and Kogi State to the North. The twenty-one LGAs are spread into three zones namely Anambra North, Anambra Central and Anambra South, housing seven LGAs respectively. Anambra North consists Onitsha North, Onitsha South, Anambra East, Anambra West, Ogbaru, Oyi and Ayamelum LGAs. Anambra Central is made up of Awka North, Awka South, Njikoka, Dunukofia, Anaocha, Idemili North and Idemili South; while Anambra South zone consists Nnewi North (location of NAUTH), Nnewi South, Aguata, Orumba North, Orumba South, Ekwusiogo and

Ihiala LGAs. Anambra State is in the center of the West-East highway. The position of the state makes it a focal point for transport and trade in Nigeria.

There are many health facilities of varied ownership. The government owned institutions include Nnamdi Azikiwe Teaching hospital in Nnewi North LGA of Anambra South zone which is an ARV treatment center serving the seven LGAs in its zone. Secondary health facilities abound including a newly commissioned Pro-state Teaching Hospital (Amaku General Hospital) in Awka South LGA of Anambra Central zone. This is an ARV Treatment Centre serving seven LGAs belonging to the zone. While Onitisha General Hospital and Borromeo Mission Hospital both in Onitsha North LGA under Anambra North zone, are ARV treatment centers serving seven LGAs in the zone. In the state are other Primary Health Care (PHC) centers, many privately own hospitals and clinics as well as Non-governmental Organizations who are collaborating with the State Government.

The settings are purposively chosen by the researcher based on their having numerous PLWHA in attendance as observed during initial familiarization visits. The three ART centers -Amaku General Hospital in Anambra Central zone, Onitsha General Hospital and Borromeo Mission Hospital in Anambra North zone are being supported by Global HIV/AIDS Initiative (GHAIN) and Family Health International under the coordination of the State Ministry of Health while NAUTH is supported by the Federal Government and President Bush's Emergency Plan for AIDS Relief (PEPFAR) for the scale-up of the nation's antiretroviral treatment.

Respondents and Sampling Technique

Purposive sampling technique was employed due to the nature of the study. The respondents interviewed were, 554 consenting males and females (PLWHA) , aged 19-65 years (mean age =36.97 years) on treatment at study setting were recruited to participate in the study following appropriate inclusion and exclusion criteria as listed below:

- PLWHA who voluntarily give informed consent to participate in the study.
- between ages 19 and 65 years
- PLWHA who registered or are receiving ARV treatment at the antiretroviral clinic in the selected Hospital.
- Clinically stable PLWHA.

The respondents were made up of 379 (68.4%) females and 175 (31.6%) males. Most of them (366 = 66.1%) were married with only a few (4 = 0.7%) being divorced. The educational qualification of the respondents ranged from no formal education to various forms of formal education which include primary, secondary, tertiary and others that were specified by the respondents. Those with secondary education were the highest (276 = 49.8%) while the least were those without any formal education (19 = 3.4%). The occupation of the respondents included students, skilled and unskilled, unemployed, housewives and the professional/managerial. Most of the respondents (234 = 42.2%) were either partly skilled or unskilled workers while only 36 (6.5%) were students. A very large proportion of the respondents (544 = 98.2%) were Christians and only 2 (0.4%) Muslims were interviewed. Also a large number of the respondents (541 = 97.7%) were of the Igbo ethnic group and only 2 (0.4%) were Yorubas.

Instrument development

The study adopted quantitative data collection technique. The instrument development followed rigorous review of literature for existing scale for assessing adherence. These included self-report structured questionnaire that assessed socio-demographic characteristics (that is, age, sex, education, occupation, income, marital status). A questionnaire containing fourty items were developed for the study. The research instruments consist two main sections: section one contains respondents' characteristics while section two contains questions eliciting influencing

factors to adherence to ART among PLWHA in Anambra State. Questions to elicit how many group of agents taken and how often they missed their antiretrovirals as prescribed within the last three days preceding the study were asked from those currently taking therapy coupled with frequent reasons (barriers) for not taking antiretrovirals as prescribed. The instrument was subjected to face validity from experts in the field, their observations and suggestions were used to revise the instrument. The instrument has reliability coefficient of Cronbach Alpha of 0.74

Procedure for data collection

Prior to data collection, series of advocacy visits were paid to the relevant authorities at the Ministry of Health and State Hospital Management Board, Officials of State Action Committee on AIDS /Zonal Programme Manager of GHAIN in the state. In this manner, visits were paid to the Medical Directors, senior clinicans and their healthcare providers at study settings and to solicit their cooperation in the study. Similar advocacy visits were paid to the excutives of the PLWHA in three zones of the state as well as to some religious leaders in order to gain their cooperation. Ten research assistants were trained for three days in the administration of the questionnaires for data collection from the respondents. These trainees demonstrated the taining skills through role-plays (See Appendix 11- Some field photographs) by which they displayed the acquired skills in participating in Pilot-study. Five PLWHA officials were copted as members of the research team to instill confidence. The consenting members interviewed were entertained after data collection.They were present on all the days of data collection of three study settings which made data collection among members easier.All members of the research team were remunerated accordingly at the end of the field work.

Study participants purposively selected were approached at the study centers as they come for their appointment at which time, the purpose of this study was introduced and briefly discussed. Their consent was sought; only those who meet the inclusion criteria and voluntarily consented participated in the study. Data was collected using a pre-tested interviewer-administered structured questionnaire. The interview guide was translated into the major indigenous language (Igbo) of the study area for easy understanding and data collection by the research assistants. The dependent variable which is adherence to antiretroviral therapy was measured using the Self-reported dose adherence method.

RESULTS

Factors that encourage adherence to ARV medication

Of all the factors listed that encourage the respondents to adhere to their medication, the belief that the drug works was the most picked by most of the respondents (411 = 75.3%), closely followed by the readiness to get well (394 = 72.2%). The other factors not listed were the least picked (17 = 3.1%) as an encouraging factor to adherence. Table 6 below presents the responses and frequencies.

Table 1. Factors that encourage respondents to adhere to their medication (N=554)

Factors	Frequency (%)
Belief that drug works	411 (75.3)
Readiness to get well	394 (72.2)
Severity of the illness	76 (13.9)
Use of reminder	68 (12.5)
Social support of family and friends	131 (24.0)
Teaching and concerns of healthcare providers	119 (21.8)
Others	17 (3.1)

Other factors that can help adherence

When asked of other factors that can help them to adhere to their medication, family support was picked by most of the respondents (357 = 65.9%) followed by availability of drug 9255 = 47.0%). Employer support was the factor least selected by the respondents (37 = 6.8%). The responses are presented in table 7 below.

Table 2. Other factors that can help adherence (N = 554)

Factor	Frequency (%)
Employer support	37 (6.8)
Family support	357 (65.9)
Caring and friendly healthcare providers	142 (26.2)
Availability of drug	255 (47.0)
Affordability of drug	109 (20.1)
Social acceptance	77 (14.2)
Reduced physical symptoms	154 (28.4)
Free ARVs	163 (30.1)

Adherence and factors influencing adherence to ARV

Source of information about ARV centre

The respondents had different sources of information about the ARV centres they were taking treatment from. The sources included friends and peer group, healthcare workers, church leaders, media, employers and others; mostly were relatives. Healthcare workers were the highest (358 = 65.2%) source of information about ARV centres followed by friends and peer group (119 = 21.7%). Employers were the least (6 = 1.1%) source of information about ARV centres. This is presented in figure 1 below.

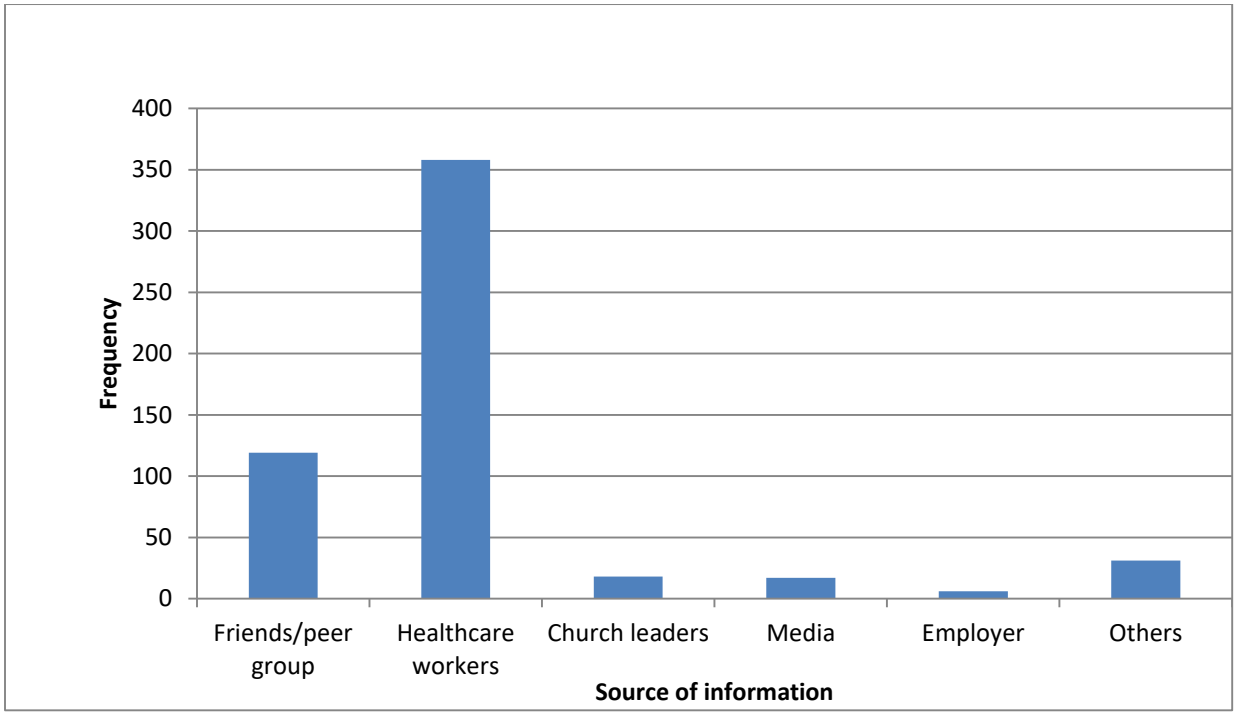

Fig. 1. Source of information about ARV centres

Test statistics/hypothesis testing

Chi-square test was carried out for the different variables and factors to determine the association between them and adherence to ARV by PLWHA. The results are presented in tables below.

Table 3. Chi-square of demographic characteristics and adherence

Variable	X^2 value	Df	P.value
Age	25.873	20	0.170
Sex	9.662	5	0.085
Marital status	51.689	20	0.000*
Religion	15.434	5	0.009*
Ethnic group	1.597	15	1.000

Note: Asterisk variables are significant and show an association with adherence.

Table 4: Chi-square of socio-economic characteristics and adherence

Variable	X^2 value	Df	P.value
Educational level	13.606	15	0.556
Occupation	28.283	25	0.295
Cost of laboratory	13.319	10	0.206
Cost of ART	8.404	5	0.135
Cost of non-ART	10.116	10	0.430
Cost of transport	17.393	15	0.296
Cost of other charges	5.896	5	0.316
Who pays the cost	10.793	20	0.957
Type of reminder	11.090	15	0.746

Table 5: Chi-square of perceptions, socio-cultural characteristics and adherence

Variable	X^2 value	df	P.value
Do you think your medication is helping you?	23.413	10	0.009*
Do you feel bad after taking your medication?	13.245	5	0.021*
Herbal medicine is best	26.739	20	0.143
HIV is prayer treated	19.445	20	0.493
AIDS does not exist	14.215	20	0.819
HIV is given as poison	20.741	20	0.413
Sleeping with uninfected virgins cures HIV	29.353	20	0.081
ART needs family approval	16.671	20	0.674
ART has bad effects	47.054	20	0.001*
Who takes decision for your going for ART	18.209	15	0.252
Do you belong to any HIV/AIDS support group	1.486	5	0.915

Note: Asterisk variables are significant and show an associtiion with adherence

How helpful medication has been to respondents

When asked if the medication was helping them, 540 (98.5%) of the respondents responded positively to it, 5 (0.9%) responded negatively and 3 (0.5%) responded that they do not know. Table 4 below presents the responses.

Types of reminders used for adherence to medication

The respondents use different forms of reminders to adhere to time of taking their ARV medication. Most of the respondents (362 = 66.1%) said that they used various types of alarm watches to adhere, 95 (17.3%) said that they use other form of reminders which include their consciousness (being used to the time of taking the drugs due to long use) or being reminded by their family members, 48 (8.8 %) of respondents used the time for network news while 43 (7.8%) said that they used meal times as reminders to adhere to their drugs. The responses are presented in table 6 below.

Table 6. Type of reminders used to adhere to ARV medication

Reminder	Frequency (%)
Alarm watches	362 (66.1)
Time for network news	48 (8.8)
Meal time	43 (7.80
Others	95 (17.3)
Total	**548 (100.0)**

However, some patients still miss out on using the drugs regularly and the major reasons is that they live far away from the centres thereby incurring high cost of transportation which they could not afford. This is closely followed by long waiting hours at the clinic/centres where some patients wait for longs hours or even days before they are attended to.

Another factor responsible for adherence to drugs usage or otherwise was the feelings experienced after taking their pills. While majority (76.9%) reported they don't feel bad, and would continue to use the drugs if their experiences continued that way; those who said they feel bad said they may not continue with the use of the drugs if such feelings persist. Some of the feelings reported were that the drug make them feel very hungry and as a result, they eat a lot. Some also complained of stomach upset, dizziness, tiredness and weakness. There was also a complaint of the effect of the drug on menstrual flow, rashes on different parts of the body, pains in the joints and legs and blurring of sight.

Beliefs against ART

Different questions were asked about beliefs for or against ART and different responses were obtained. Most of the respondents (272 = 49.8%) strongly disagreed with the statement that herbal medicine was best for HIV/AIDS and only 7 (1.3%) strongly agreed. That HIV was treated/curable by prayers was agreed to and strongly disagreed to by 197 (36.1%) and 167 (30.6%) respectively with only 43 (7.9%) being undecided. Majority of the respondents (252 = 46.5%) strongly agreed that AIDS does not exist and only 5 (0.9%) were undecided. Majority of them (219 = 40.9%) also strongly disagree that sleeping with an uninfected virgin cures HIV while 8 (1.5%) each agreed and strongly agreed with the statement. That ART needs family approval was agreed to by 216 (39.9%) of the respondents and strongly agreed to by 126 (23.3%) while 32 (5.9%) were undecided. Also 214 (39.6%) of the respondents strongly disagreed that ART has bad effects and 212 (39.2%) disagreed with 28 (5.2%) being undecided. The responses to the beliefs are shown in table 16 below.

Table 7. Beliefs against ART

Statement	Strongly agree F (%)	Agree F (%)	Undecided F (%)	Disagree F (%)	Strongly disagree F (%)
Herbal medicine is best for HIV	7 (1.3)	14 (2.6)	41 (7.5)	212 (38.8)	272 (49.8)
HIV is prayer treated	167 (30.6)	197 (36.1)	43 (7.9)	73 (13.4)	66 (12.1)
AIDS does not exist	48 (8.9)	111(20.5)	5 (0.9)	126 (23.2)	252 (46.5)
HIV is given as poison	14 (2.6)	38 (7.1)	61 (11.4)	204 (38.1)	219 (40.9)
Sleeping with uninfected virgins cures HIV	8 (1.5)	8 (1.5)	53 (9.7)	208 (38.2)	268 (49.2)
ART needs family approval	126 (23.3)	216 (39.9)	32 (5.9)	97 (17.9)	70 (12.9)
ART has bad effects	28 (5.2)	59 (10.9)	28 (5.2)	212 (39.2)	214 (39.6)

Paying the cost and taking the decision for ART

The respondents gave different answers as to who pays the cost of the ART treatment. A large proportion (395 = 74.5%) said that they bore the cost themselves while only 2 (0.4%) had the costs being paid by their employer. Also a large proportion (406 = 75.3%) said that they took the decision to go for ART themselves while 24 (4.5%) had the 'others' (apart from those listed) taking

the decision for them. These 'others' included parents, siblings, and children of the respondents. Table 19 below shows the responses.

Table 8. Responses to who pays the cost of ART treatment and who takes decision to go for ART treatment

Variable	Response	Frequency (%)
Who pays the cost of treatment	Yourself	395 (74.5)
	Your spouse	97 (18.3)
	Charity	11 (2.1)
	Employer	2 (0.4)
	Others	25 (4.7
	Total	**530 (100.0)**
Who takes decision for your going for ART	Myself	406 (75.3)
	Elder in the family	29 (5.4)
	Husband	80 (14.8)
	Others	24 (4.5)
	Total	**539 (100.0)**

Knowledge of effect of adherence or non-adherence

A very large proportion of the respondents (518 = 96.3%) reported that they know that adherence to ARV drugs made their health better. Also, majority of the respondents (422 = 79.2%) also claimed that they know that non-adherence to ARV treatment makes their health worse. These are presented in table 21 below.

Table 9. Knowledge of effect of adherence or non-adherence

Question	Response	Frequency (%)
Do you know that adherence to ARV drugs makes your health better?	Yes	518 (96.3)
	No	2 (0.4)
	Not sure	18 (3.3)
	Total	**538 (100.0)**
Do you know that non-adherence to ARV treatment makes your health worse?	Yes	422 (79.2)
	No	79 (14.80
	Not sure	32 (6.0)
	Total	**533 (100.0)**

This is slightly complemented by being a member of social support group where a large proportion (72.0%) reported to being in social support group.

DISCUSSION OF FINDINGS

The first step at getting well from an ailment, psychologists believe, is acceptance that one is suffering from the ailment, and second is the acceptance of treatment, particularly if one believes that the treatment regimen would be effective. These assumptions were investigated in the

present study, where it was revealed that readiness to get well and belief in drugs working well for patients dominated responses from the patients. Others things mentioned were severity of the illness, social support, especially from family, positive and cooperative dispositions of health care providers, availability and affordability of drugs and social acceptance were mentioned. The presence of all these, it is believed would provide the necessary framework for adherence to drugs regimen of PLWHA patients,

Table 1 shows that three-quarters (75.3%) of the respondents were encouraged to adhere to their ARV medication due to the belief that the drug works. Almost three-quarters (72.2%) are also being encouraged to adhere by their readiness to get well. Almost one-quarter (24.0%) are encouraged by the social support of family and friends while slightly above one-fifth are encouraged by the teaching and concerns of healthcare providers. Severity of the illness and use of reminders are each slightly above one-tenth (13.9% and 12.5% respectively) while 'others' is less than on-twentieth of the response. The belief that the drug works being a factor that encourages adherence could be said to be consistent with earlier studies that stated that negative beliefs about treatment effectiveness present an important barrier to ART treatment (Chesney, 2000; Malcolm *et al.*, 2003).

Almost two-thirds (65.9%) of the respondents responded that family support can help them adhere. Less than half (47.0%) said that availability of the drug can help adherence. Free ARVs and affordability of the drug were seen as factors that could help adherence by 30.1% and 20.1% of the respondents respectively. Almost three-tenth (28.4%) supported the factor of caring and friendly healthcare providers. The response of free ARVs, availability and affordability of drugs combined is consistent with the works of Alemayehu *et al.* (2000), Mukhta-Yolal *et al.* (2006), and Uzochukwu *et al.* (2007) who all reported non-availability or running out of medication and not having money to purchase them as one of the main reasons for non-adherence.

Less than two-thirds (65.1%) of the respondents reported that they were given two packets of ARV treatment pills, while less than one-quarter (24.2%) were given three packets and 8.7% had only one packet. From these different groups, more than four-fifth (83.5%) of those with drug one was asked to them twice daily, and that same fraction (84.5%) of those with drug two were asked to take them twice daily while 74.3% of those with drug three were asked to take them twice daily.

More than four-fifth (85.2%) of the respondents reported that they did not miss any dose of the ARV drugs within the last three days preceding the study. Less than one-tenth (7.0%) reported missing only a dose, 4.1% reported missing 2 doses, 2.1% reported missing 3 doses, while 0.8% only each reported missing 4 doses and more within that period. Using this self-reported adherence to medication within the last three days it can be said that adherence is 85.2% among the respondents. This figure is higher than that of Uzochukwu et al (2007) who obtained 75% in South Eastern Nigeria, Erah and Arute (2008) who reported 58.1% ± 2.4% among studied out patients in University of Benin Teaching hospital, Benin City, and Chijoke et al (2006) who reported an adherence level of 49.2% in a resource-limited setting of the Niger Delta area of Nigeria. The differences may be as a result of different locations or the increasing HIV/AIDS education and awareness on the need for adherence to drugs by PLWHA being carried out by healthcare providers and stakeholders and global health partners.

More than three-tenth (33.3%) had other factors responsible for missing their drugs other than those listed. These reasons included forgetfulness or not being at home at the time that they should take the drug and not being with the drug. All those who missed more than four doses included two persons who were locked up (one in police custody and the other in prison custody) and had no access to their drug. The other person gave birth to a new born baby and had nobody to get her the drugs while the last person travelled for a week without the drugs. More than one-tenth of those who missed their drugs (14.5% and 13.0% respectively) cited higher transport cost to clinic and long waiting at clinics as factors responsible for missing the drug doses. Other factors

cited were less than one-tenth of the responses: 8.7% -long distance to clinic; 7.2% -poor drug supply; 5.8% each –increased side effects of drugs and stigma; 4.3% each –high cost of drugs, pill burden, patient low income and poor provision of services; and 1.4% said it was due to complex doses of the drugs. The issue of forgetfulness is reported Olowookere et al (2007) and Alemayehu et al (2008) see it as one of the barriers to adherence. These findings are in consonance with the findings of Wolfe et al (2003) who reported financial restraints, side effects as factors of non-adherence; and those of Nakiyemba et al (2005) who reported long waiting time, stigma, poor drug supply system, pill burden, and poverty as factors affecting adherence. Makwia et al (2004) also reported high cost of assessing therapy, and long waiting time, while Chijoke et al (2006) reported cost of assessing antiretroviral drugs, medical adverse effects, and high pill burden of the prescribed regimen as factors affecting adherence.

Variables/factors considered as influencing adherence

Beliefs against ART

More than three-quarters (76.9%) of the respondents reported that they do not feel bad after taking their ARV medications while less than one-quarter (23.1%) reported that they feel bad after taking their drugs. The reason given for the feelings reported included feeling good and healthy, feeling no effects at all, feeling hungry and therefore eat a lot, feeling bad, feeling weakness in different parts of the body, dizziness, tiredness, stomach upset, rashes on different parts of the body, pains in the joints and blurring of sight. More than nine-tenth (93.6%) of the respondents responded that they would continue their medication even if the feelings persist. Almost half (49.8%) of the respondents strongly disagreed with the statement that herbal medicine is best for HIV treatment while 38.8% disagreed and 7.5% was undecided. Only 1.3% strongly agreed while 2.6% agreed. Almost two-fifth (36.1%) agreed to the statement that HIV is prayer treatable and 30.6% strongly agreed while 7.9% were undecided. Almost half (46.5%) of the respondents strongly disagreed with the statement 'AIDS does not exist', 0.9% were undecided while 8.9% strongly agree. Another 40.9% strongly agreed strongly disagreed that HIV is given as poison with 2.6% strongly agreed. Almost half (49.2%) of the respondents strongly disagreed that sleeping with uninfected virgins cures HIV while 1.5% each agreed and strongly agreed to the statement. For the statement that ART needs family approval had 39.9% and 23.3% agreeing and strongly agreeing to it while 17.9% and 12.9% disagreed and strongly disagreed. That ART has bad effects had 39.2% and 39.6% for disagreed and strongly disagreed respectively while undecided and strongly agreed had 5.2% each.

Health facility factors and services

More than half (56.4%) of the respondents reported that they spend more than an hour waiting for ARV treatment at the respective centres while 29.0% reported that they spend longer periods which could be as long as the whole day or even 2 days before they are being attended to at the hospital. Only 4.7% of the respondents said they wait less than 30 minutes. More than half (56.4%0 of the respondents said that the ARV centre they visit was more than 5km from their homes while 20.2% said that it was less than 5km. Majority (93.3%) of the respondents responded that the clinics had adequately trained health workers. Most (85.9%) of the respondents reported that there was a treatment guideline for them in the clinic while 90.3% reported that the healthcare providers were friendly to them. More than half (57.1%) of the respondents rated the ARV supply to them as excellent, 34.9% rated it as good while 3.8% rated it as poor. Most of the respondents (85.2%) responded that there was sufficient infrastructure for them in the clinic. Half 950.2%) of the respondents responded that the health facility was far from them, while 26.6% and 23.2% reported that the health facility was very far and nearby respectively. Majority (96.3%) of the respondents claimed that they know that adherence to ARV medication makes their health better

while 79.2% claimed that they know that non-adherence to ARV treatment makes their health worse.

Cost of going for ART treatment

The cost of laboratory test for the respondents ranged from being free (₦0) to ₦16,000 with most of the test being free (₦0 = mode). The mean cost of the laboratory cost for all the respondents was ₦222.56 and a median of ₦0.00. The standard deviation of the laboratory cost is 1004.842. The cost of ART medication ranged from free (₦0) to ₦2,000 with a mean cost of ₦150.06, median of ₦0.00 and a standard deviation of 274.302. Most of the respondents reported having free ART medication (hence the mode = ₦0). The cost of non-ART medication ranged from ₦0 (free or none) to ₦3,000 with a mean cost of ₦205.78, median of ₦100.00 and standard deviation of 319.877 and a mode of ₦0 (as most either had it free or had nothing given to them). The cost of transportation to the clinic ranged from ₦0 (for those living very close to the ART centres and can afford to walk the short distance) to ₦36,000 (for those living very far away from the ART centres like Kaduna or Lagos). The mean was ₦595.05, median ₦300.00, mode ₦200.00 and a standard deviation of 1781.504. For other charges like the cost of folders, administrative and consultative charges, the range is from ₦0 (free or none) to ₦2,500. The mean is ₦205.78 with a median of ₦100.00, mode ₦0.00 and a standard deviation of 319.877.

Family and social support

Almost three-quarters (74.5%) reported that they offset the cost of going to ART treatment themselves while 18.3% is paid by their spouses and only 0.4% by their employers. Also 75.3% also reported that they took the decision to go for ART treatment themselves while 14.8% was taken by 'others' which were mostly siblings, children or parents of the respondent (table 19). Almost three-quarters (72.0%) reported that they belonged to a HIV/AIDS support group and 94.8% of these belonged to a hospital based support group with only 0.5% belonging to a workplace based support group.

Other factors

Demographic variables

From table 3 it can be seen that testing the demographic variables with adherence at $p < 0.05$ that only marital status (0.000) and religion (0.009) are statistically significant and so show an association with adherence. So we reject the null hypothesis that there is no significant association between marital status or religion and adherence but fail to reject it for the other demographic variables. This finding is partly consistent with the study of Rabkin and Chesney (1999) and Carter (2005) who found that while some demographic variables were associated with adherence to AR, some others are not. The significance in religion could be as a result of the dominance of the Christian religion but not so in the case of marital status.

Socio economic variables.

Statistical values in table 4 show that none of the variables was significant at $p < 0.05$, so we fail to reject the null hypothesis. This finding is in consonance with the study of Asim (2004) and Orrel et al (2003) who found that socio-economic status were not a predictor of adherence while Nakiyemba et al (2005), Erah and Arute, (2008), reported that poverty negatively affected the way patients adhere to ARV.

Who pays for the cost of the drugs could also play a major role in whether individuals would adhere or not to the drug regimen among PLWHA. As reported by Nguyen, et al (2014) that if cost burden can be reduced greatly and co-bearer of drug cost is available in order to access treatment, adherence may improve as reported among Zimbabwean patients. However, Mbachu,

et al (2017) reported that some patients were willing to bear the full cost of their treatment, especially those in higher social economic status, and are educated to an extent.

Socio cultural beliefs
A look at table 5 shows that only 3 beliefs were significant at $p < 0.05$ (belief that medication is helping them (0.009), do you feel bad after taking your medication (0.02) and ART has bad effects (0.001)). So for the individual beliefs that are significant we reject the null hypothesis but fail to reject it for the other items on the table.
This is partially consistent with the work of Nakiyemba et al (2005) who reported that cultural beliefs negatively affect the way patients adhere to ARV medication. Beliefs of patients also influence their adherence behaviour. Whereas, Azia, et al, 2022 found that cultural beliefs influence adherence among Cape Town living in the metropolis of in South Africa. Same findings were also reported by Croome, et al. (2020) among Vietnamese patients

Reminders:
Reminders are equally important to patients' adherence to ARV drugs treatment, as many individuals fail to remember what time of the day/week/month to take their drugs. The importance of time was confirmed in the study of Haberer, et al (2020); Rodriges, et al (2012) where phone use as a reminder increased adherence and improved health of patients in South India.

Health care facilities
Table 7 shows that the long waiting time before treatment, and rating of ARV supply are both significant at $p = 0.003$ and 0.032 respectively. So we reject the null hypothesis for both variables and fail to reject it for the others. The long waiting time, and ARV supply rating is consistent with findings earlier depicted in the non-adherence framework of Nakiyemba et al (2005) and Makwiza et al (2004). These researchers cited long waiting time and poor ARV supply as negatively affecting patients' adherence to ARV.

Limitation of the study
One of the limitations of this study is Bureaucracy. Having to solicit for the cooperation of PLWHA coordinators in the three zones to permit the voluntary participation of their members was an uphill task. Generalization of findings is limited by the nature of this study. This study utilized purposive sampling technique.

Implication of Study for Nursing
By virtue of our expertise in health and health care delivery coupled with long-established credibility with consumers, nurses have a vital role play in health promotion. In many instances, through initiating health promotion and health screening programs or participate in collaboration with other care personnels in developing and providing wellness services in a variety of settings. This study reaffirms patient's teaching as an integral tool with which all nurses assist patients and their families in developing effective health behaviours and in altering lifestyle patterns that predispose people to health risks.
Expert assessment and clinical management skills to provide optimal care for people with HIV infection and AIDS should be encouraged among nurses and other health care providers. Teaching programs are more likely to succeed if the variables affecting patient's adherence are identified and considered in the teaching plan. Nurses are most vulnerable to HIV infection by virtue of their nearness to all hospital clients and clinical procedures. There is a need for strict adherence to standard precautions and immediate resort to post exposure prophylaxis (PEP) when exposure to blood or other body fluids occur in order to lessen the risk of transmission. Until

an effective vaccine is developed, preventing HIV by eliminating or reducing risky behaviours is essential. By the commissionable status as health education specialist, nurses must encourage infection control and disease prevention: primary, secondary and tertiary preventive measures (Newman System Model) in the nursing care. Nurses in all settings need more updates and an understanding of the disorder, knowledge of the physical and psychological consequences associated with the diagnosis, lessen discrimination, be empathic and friendly.

Nurses should sustain remarkable progress made in improving the quality and duration of life for people living with HIV infection. Nurses as HIV team members should ensure that treatment decisions are individualized based on the willingness of the client to adhere to a lifelong treatment regimen, not only on such factors as CD4+ T-cell count, HIV RNA (viral load), severe symptoms of HIV disease or AIDS.

REFERENCES

Adam, B. D., Maticka-Tyndale E. and Cohen, J. 2005. Adherence practices among people living with HIV. *AIDS care*, 15.2**:** 263-274.

Adomakoh, N. 2004. Adherence strategies in Barbados. *Proceedings at the 1st CHART Caribbean Conference on the Clinical Management of HIV/AIDS: A Multidisciplinary Team Approach, 16-19th Jun , Kingston, Jamaica*.

Alemayehu, A. K., Sofonias, W., Belaineh, G., G. and Kebede, D. 2008. Predictors of antiretroviral therapy among HIV-infected persons: a prospective study in Southwest Ethiopia. *BMC Public Health* 8: 625.

Asim, A.J. 2004. Adherence to HIV Treatment Regimens. Recommendations for Best Practices, Washington, D.C., *American Public Health Association*. 13.2:243-267

Azia, I.N, Carelse, S. Nyembezi, A. & Mukumbang, F.C. (2022) Role of religious beliefs in adherence to antiretroviral therapy in the Cape Town metropole: a study protocol. *BMJ Open*, 12(9) DOI: 10.1136/bmjopen-2022-062464

Bakken, S., Holzemer, W. L., Brown M. A., *et al.* 2000. Relationships between perception of engagement with health care provider and demographic characteristics, health status, and adherence to therapeutic regimen in persons with HIV/AIDS. *AIDS Patient Care STDs*. 14: 189-197.

Bangsberg D. R., Perry, S., Charlebois, E. D., Clark, R. A., Roberston, M., Zolopa, A. R. and Moss, A. 2001. *Non-adherence to highly active antiretroviral therapy predicts progression to AIDS*. 15.9**:** 1181-1183.

Berg Karina M, Demas Penelope A, Howard Andrea A, Schoenbaum Ellie E, Gourevitch Marc N, Arnsten Julia H. 2004. Gender Differences in Factors Associated with Adherence to Antiretroviral Therapy. *Journal of General Internal Medicine*, 19**:** 1111-1117.

Berman, Synder, Kozier and Erb. 2008. *Fundamentals of Nursing Concepts, Process and Practice.* 8th ed. Pearson Education.

Brunner, L.C., Suddarth, D.S. & Smelter, S.C.O. (2008) Textbook of Medical-Surgical Nursing (11 eds,) Philadelpia: Lippincott, Williams & Wilkins

Bruno Spire, Segolene Duran, Marc Souville, Catherine Leport, Francois Raffi and Jean-Paul Moatti 2002. Adherence to highly active antiretroviral therapies (HAART) in HIV-infected patients: from a predictive to a dynamic approach. *Social Science Medicine***.** 54:1481-1496**.**

Carballo E., Cadarso-Suarez, C., Carrera, I., Fraga, J., de la Fuente J., Ocampo, A., Ojea R and Prieto A 2004. Assessing relationships between health-related quality of life and adherence to antiretroviral therapy. *Quality of Life research*, 13.3**:**587-99.

Carter, M. 2005. *Adherence – information series for HIV-positive people*. 3rd ed. London, NAM.

Chesney, M. A. 2000. Factors affecting adherence to antiretroviral therapy. *Clinical Infectious Disease*, 30**:** S171-S76.

Chijioke A. N., Osaro, E. O., Adebayo, E. and Chris, I A. 2006. Adherence to antiretroviral therapy among HIV-infected subjects in a resource - limited setting the. Niger Delta of Nigeria. *Africa Journal of Health Science*. 13:13-17.

Chirag, A.S. 2007. Adherence to High Activity Antiretroviral Therapy (HAART) in Pediatric patients infected with HIV: Issues and Interventions. *Indian Journal of Pediatric* 74.1: 55-60.

Croome N, Potter L. Bere T, et al (2020) Medication beliefs among people living with HIV taking antiretroviral treatment in Zimbabwe: a qualitative study. *Journal of Global Health Reports*. 2020;4:e2020101. doi:10.29392/001c.18083

DiMatteo, M.R. 2004. Variations in patient's adherence to medical recommendations: a quantitative review of 50 years of research. *Medcare,* 42: 200-209.

Dybal M., Fanci A.S., Bartlett J. G., Kaplan J.E., Paul A.K. 2002. Panel on Clinical Practices for treatment of HIV: Guidelines for using ARV Agents among HIV-Infected Adults and adolescents. *American Internal Medicine*. 137, 381-433.

Erah, P.O and Arute, J.E. 2008. Adherence of HIV/AIDS patients to Antiretroviral therapy in a tertiary health facility in Benin City. *African Journal of pharmacy and pharmacology*. 2.7: 145-152

Erlon, J. A. and Mellors, P. 1999. Adherence to combination therapy in persons living with HIV: balancing the hardships and the blessings. *Journals of the Association of Nurses in AIDS care*. 10.4: 75-84.

Federal Ministry of Health (FMOH) 2002. *The National AIDS and STD control programme* 2002 Department of primary Health care and Disease control.

FMOH. 2005. *2003 National HIV sero-prevalence sentinels survey: Technical Report*. FMOH. Abuja.

Frank, L. and Miramontes, H. 1997. *AIDS Education and Training Centre Adherence Curriculum Principles.*

Gao X., Nau, D. P., Rosenbluth, S. A., Scott, V. and Woodward, C. 2000. The relationship of disease severity, health beliefs and medication adherence among patients**.** *Aids Care*, 12.4**:** 387-398.

GHAIN. 2005. Anti-Retroviral Adherence Training Participant Guide

Haberer, J.E., Muslimenta, A., Atukunda, E.C., Musinguzi, N., Wyatt, M.A., Ware, N.C. & Bangsberg, D.R. (2020)**.** Short message service (SMS) reminders and real-time adherence monitoring improve antiretroviral therapy adherence in rural Uganda. *HIV AIDS (Auckl)*. *12*: 687–695.

Hoggg, R.S., Heath, K., Bangsberg, D., Yip, B., Press, N. *et al.*, 2002. Intermittent use of triple-combination therapy is predictive of mortality at baseline and after 1 year of follow-up. *AIDS**,*** 16: 1051-8.

John Schneider, Kaplan Sherrie H, Sheldon Greenfield, Li Wenjun and Wilson Ira B. 2005. Better Physician-Patient Relationships Are Associated with Higher Reported Adherence to Antiretroviral Therapy in Patients with HIV Infection. *Journal of General Internal Medicine*, 19**:**1096-1103.

Machtinger EL, Bangsberg DR. 2005 *Adherence to HIV antiretroviral therapy.* 2005 Retrieved from http://hivinsite.ucsf.edu/InSite?page=kb-03-02-09**.**

Makwiza, I., Neuhann, F., Chiunguzeni, D., Lalloo, D. and Kemp, J. 2004. Barriers to patient adherence to anti-retroviral therapy (ART) in Lighthouse Clinic, Lilongwe, Malawi. *International Conference on AIDS.* 2004 Jul 11-16; 15: abstract no. B10820.

Malcolm, S. E., Rosen, R. K., and Stone, V. E. 2003. An examination of HIV/AIDS patients who have excellent adherence to HAART. *AIDS Care*, 15.2**:**251-261.

Mannheimer SB, Matts J, Telzak E, Chesney M, Child C, Wu A.W. and Friedland G. 2005. Quality of life in HIV-infected individuals receiving antiretroviral therapy is related to adherence. *AIDS Care*, 17.1**:**10-22.

Mbachu,C., Okoli, C., Onwujekwe, O., & Enabulele, F. (2017). Willingness to pay antiretroviral drugs among HIV and AIDS clients in south-east Nigeria. *Health Expectations,* 21(1), 270 -278 https://doi.org/10.1111/hex.12612

McNicholi. 2004 and 2005. “Advents of ARV Drugs” University of California San Francisco.

Miller, L. G., Liu H. and Hays, R. D., *et al.* 2002. How well do clinicians estimate patients' adherence to combination antiretroviral therapy? *Journal of General Internal Medicine.* 17:1-12.

Mukhtar-Yola, M. Adeleke, S. Gwarzo, D. & Ladan, Z.F. (2006) Preliminary investigation of adherence to antiretroviral therapy among children in Aminu Kano Teaching Hospital, Nigeria, African Journal of AIDS Research, 5:2, 141-144, DOI: 10.2989/16085900609490374

Nachega Jean B, Michael Hislop, Dowdy David W., Lo Melanie, Omer Saad B., Leon Regensberg, Chaisson Richard E. and Gary Maartens. 2006. Adherence to Highly Active Antiretroviral Therapy Assessed by Pharmacy Claims Predicts Survival in HIV-Infected South African Adults. *Journal of Acquired Immune Deficiency Syndrome,* 43.1**:**1-7.

Nakiyemba, A. Kwasa, R. and Aurut, D. 2005. Barriers to ARV adherence for patients living with HIV infection and AIDS in Uganda.

Nguyen, L.T., Tran, B., Tran, C., Le, H.T. & Tran. S.V. (2014). The cost of antiretroviral treatment service for patients with HIV/AIDS in central outpatient clinic in Vietnam. *ClinicoEconomics and Outcomes Research, 6:* 101-108, DOI: 10.2147/CEOR.S57028

Olowookere, S.A, Fatiregun, A.A, Akinyemi, J.O, Bamgboye, A.E and Osagbemi, G. K. 2007. *Prevalence and determinants of non-adherence to HAART among PLWHIV/AIDS in Ibadan, Nigeria.*

Olusoji, A. Phyllis, J. Kank, O.O. and Idoko, J.A 2006. AIDS in Nigeria- A Nation on the Threshold. President and Fellows of Harvard College, USA.

Orrell C, Bangsberg D, Badri M, et al. 2003. Adherence is not a barrier to successful antiretroviral therapy in South Africa. *AIDS.*17:1369–1375.

Patella F.J Jr, Delaney K.M, Moorman A.C et al (1998). Declining morbidity and mortality among patients with advanced Human Immunodeficiency Virus Infection (HIV) outpatients study investigators, N. Engl. J. Med: 338: 853-860

Patterson, D., Swindells, S., Mohr, J., Brester, M., Vergis, E., Squier, C., Wagener, M. and Singh, N. (2000) Adherence to Protease Inhibitor Therapy and Outcomes in Patients with HIV Infection. Annals of Internal Medicine, 133, 21-30.
http://dx.doi.org/10.7326/0003-4819-133-1-200007040-00004

Rodrigues R, Shet A, Antony J, Sidney K, Arumugam K, Krishnamurthy S, D'Souza G, & DeCosta A. (2012) Supporting adherence to antiretroviral therapy with mobile phone reminders: results from a cohort in South India. PLoS One. 2012;7(8):e40723. doi: 10.1371/journal.pone.0040723. Epub 2012 Aug 27. PMID: 22952574; PMCID: PMC3428344.

Rabkin, J. G., Chesney, M. A. 1999. Treatment adherence to AIDS medications: the Achilles heel of the new therapeutics**.** *Psychosocial and Public Health Impacts of New HIV Therapies*. Ostrow D, and Kalichman S. Eds. New York: *Kluwer/Plenum* 61-68.

Smith, S. and Marcus, C. 2003. A medication self-management program to improve adherence to HIV therapy regimens. *Pat Eduation Counselling*;50.2:187-99.

Tadios Y. and Davey, G. 2006. Antiretroviral treatment adherence and its correlates among people living with HIV/AIDS on highly active antiretroviral therapy in Addis Ababa, Ethiopia. *EMJ.* 44.2**:**237-244.

UNAIDS. 2005. AIDS Epidemic Update/Global summary of AIDS epidemic: Special Report on HIV prevention.

UNAIDS. 2006. Prevention of mother-to-child Transmission of HIV.

UNAIDS. 2009. AIDS Epidemic Update/Global summary of AIDS

Uzochukwu, B., Onwujekwe, O., and Ndu, A. *et al.* 2007. *Determinants of Non Adherence to ARV Treatment South East Nigeria.*

Weiser, S., Wolfe, W., Bangsberg, D., *et. a.l* 2003. Barriers to antiretroviral adherence for patients living with HIV infection and AIDS in Botswana. *Journal of Acquired Immune Deficiency Syndromes.* 34.3: 281–288.

WHO. 2003. *Scaling up antiretroviral therapy in resource-limited settings: treatment guidelines for a public health approach.*

WHO. 2005. World Health Report 2005. Geneva