

Impact of Integrated Home-Based Care Programme on Antiretroviral Medication Adherence among Plwaha: A Quasi-Experimental Study.

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Abstract



Background:

Suboptimal Anti-Retroviral adherence is an advancing global issue.

Methodology:

One-Group Pre- and Post-Test Integrated Home-Based Care intervention program with control was adopted. The validated questionnaire was used to gather information from 60 PLWHA following ethical approval and informed consent. Descriptive statistics and frequency distributions are employed in data analysis. One-tailed independent sample T-test was used to determine the impact of the intervention using percentage-change and Cohen's Effect Size with a 5% level of significance. Validity and reliability of Instrument tested with Cronbach Alpha, 0.795.

Results:

Respondents mean age was 35.38 ± 9.061 , married (37.61%), females (66%) and self-employed (41.1%). Mumuye ethnic group (28.3%), Christians, 71.7% with lower educational attainments (56.6%). Control group reported predisposing factors in HIV treatment (137-point scale), = $82.17(2.18) \pm 11.92$ and = $86.50(1.69) \pm 9.23$; Reinforcing factors on 15-points scale, scored = $9.00(0.65) \pm 3.65$ and = $8.87(0.69) \pm 3.78$; Enabling factors on 15-points scale, = $8.23(0.46) \pm 2.50$ and = $8.00(0.51) \pm 2.77$ and Self-Reported Adherence on 24-points scale, = $16.23(0.82) \pm 4.49$ and = $17.87(0.91) \pm 4.99$ at baseline and post intervention respectively for each group and adherence prevalence rate of 60.

Experimental group at baseline reported predisposing factors on 137-points scale, = $80.90(2.77) \pm 15.15$ and = $97.13(8.12) \pm 1.48$; Reinforcing factors on 15-points scale, = $8.87(0.47) \pm 2.50$ and = $9.33(0.48) \pm 2.60$; Enabling factors on 15-points scale, = $7.23(0.41) \pm 2.24$ and = $7.40(0.41) \pm 2.25$ and Self-reported Adherence on 24-points scale, = $15.98(0.57) \pm 4.39$ and = $23.13(0.43) \pm 2.37$ at baseline and post intervention respectively for each group and adherence prevalence rate of 96%.

Conclusion:

Integrated Home-Based Care intervention program will be more effective than the usual clinic-based program for HIV/AIDS management.

Recommendation:

Integrated Home-Based Care intervention program should be adopted for all HIV interventions.

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1 Background to the study

Thirty-seven million people currently live with HIV globally, several people with active TB each year also get HIV and nearly 2 billion people are infected with TB (CDC, 2017). Out of these people, millions have died from AIDS-related causes since the beginning of the epidemic (WHO, 2017). The World Health Organization (WHO) had it that over 70 million people are infected with HIV with the death of an average of 36 million people since the first cases were reported in 1981 with 1.6 million HIV-related deaths in 2012. The most severely affected remains the Sub-Saharan region which accounts for 69% of the total number of people living with HIV globally (Fettig, JMS, Swaminathan, MMD, Murrill, CS and Kaplan, JMD, 2014 and WHO, 2017). Out of every twenty adults, one is said to be living with the disease in this region (WHO, 2017). HIV was first reported among gay men in some regions of the United States of America in 1981 (Denis and Becker, 2006), and since then the virus has affected all people of different sexual, ethnic, geographic, and racial orientations, and has spread to all parts of the globe. The first case of HIV was reported in Nigeria in 1986 (Happy Boss, 2017) thereafter, the prevalence rose sharply and then declined, giving a national prevalence rate of 4.1% as of 2010 and 2015, 3.10 (FMH, 2015) (With a rate of 0.9% among people ages 15-49). The second-largest population of people living with HIV in the world lives in Nigeria (Oluwaveeboy, 2014) with an estimated 210,000 deaths due to AIDS recorded in 2011 and 160,000 (2016) in Nigeria (UNAIDS, 2017).

The disease burden is worrisome and has impacted disastrously across the globe (CDC, 2017). However, with the advent of antiretroviral medications, disease management has been transformed. This reduced mortality from HIV infection within 10 years by about 50% — 80% with a resultant drop in the burden of HIV and AIDs (Gonzalo, García Goñi, and Muñoz-Fernández, 2009). Researchers have demonstrated preventive and therapeutic antiretroviral therapy benefits (Hyle and Dryden-Peterson, 2017, UNAIDS, 2016, Bendavid, Holmes, Bhattacharya, and Miller, 2012). They emphasized the importance of adherence to treatment in achieving positive clinical outcomes and bringing to a halt, the progression of AIDS (Chiegil, 2017). Poor ARVs adherence is associated with grave consequences locally and globally. Poor adherence

to antiretroviral therapy was a major predictor of progression to AIDS and death in a study by Gonzalo, *et al*, 2009, it determined failure or success of ARVs and improvement in the clinical condition of the patient receiving care. Resistance strains of the virus develop with poor medication adherence and eventually, the medications lose their potency. Researchers have also argued that for the best outcome from ARVs, medication adherence is standardized to be the use of not less than 95% of prescribed ARVs at a given period of medication refills (Ho, Bryson, and Rumsfeld (2009) and McKenney, Munroe, and Wright, Jr (1992).

Suboptimal ARVs adherence is a growing issue across Nigeria. Studies in Nigeria have linked poor adherence levels to ARV medications to various factors; non-adherence has been linked to educational status (Abo Deif, Elsawi, Selim, and NasrAllah, 2015, Antonogeorgos, Panagiotakos, Grigoriopoulou, Papadimitriou, Anthracopoulos Nicolaidou and Priftis, 2013), gender (Lauffenburger, Robinson, Oramasionwu, and Fang, (2014) and Berg, Demas, Howard, Schoenbaum, Gourevitch and Arnsten, 2004), Socio-Economic Status (Falagas, Zarkadoulia, Pliatsika and Panos, 2008) adverse effect of ARV medication and stigmatization (Ingrid Katz, Ryu, Onuegbu, Psaros, Weiser, Bangsberg, and Tsai, 2013, and Talam, Gatongi, Rotich and Kimaiyo, 2008). In addition, research has associated employment status, being busy at work or school, forgetfulness, fasting, and traveling away from home with non-adherence to ARVs (Suleiman and Momo. 2016 Nachega, Uthman, Peltzer, Richardson, Mills, Amekudzi and Ouédraogo 2014). Non-adherence among retroviral-positive pregnant women attending clinics has also been reported (Matsui, 2012). Adherence to ARV medication has however been linked to regular adherence counseling (Uusküla, Laisaar, Raag, Lemsalu, Lõhmus, Rütel and Amico, 2017), the use of an adherence aid (pillbox) (Hayes, Hunt, Adami and Kaye, 2006). A patient's educational level, marital status, and occupation are significantly associated with adherence to ARVs in a study conducted in Northern Nigeria (Nachega et al, 2014). Research work done on rivers in southern Nigeria in 2016 revealed a low adherence level of 71.2% (Kanu, Maduka, Okeafor (2017), the low level of adherence has also been reported in other places like Kano (Lawan, Amole, GamboJahun, EneAbute, 2015). Although an intervention study using text messages and adherence

counseling to improve HAART adherence in a tertiary hospital in Nigeria improved adherence to 76.9% when compared with 55.8% of the control group (Maduka, Tobin-West, 2012), this improvement still falls short of the standard cut off of $\geq 95\%$ (Suleiman and Momo. 2016, Ho, *et al*, 2009 and McKenney, *et al*, 1992).

In a major Specialist Hospital in Ilorin, a researcher reported a low adherence level of 73.3% and a low level of education, adverse effect of antiretroviral medication, and stigmatization were the major reasons for non-adherence (Bello, 2011). In Osun, Nigeria, HIV patients who did not pay for the preliminary ARV eligibility investigations, and those who were offered regular adherence counseling, adhered to their medication better (Afolabi, Ijadunola, Fatusi, and Olasode, 2009). In another study, an average adherence of 91% in southeastern Nigeria with the use of an adherence aid (pillbox) correlated positively with adherence to ARVs (Akahara, Nwolis, Odinaka, & Okolo, 2017 and Onyeonoro, Ebenebe, Ibeh, Nwamoh, Ukegbu, Emelumadu, 2013).

Major reasons for non-adherence were being busy at work or school, forgetfulness, fasting, stigmatization and traveling away from home, not having the medication with them, sleeping through the dose time, running out of the medication, being busy with other things (Lal, Kant, Dewan, & Rai, 2010). The patient's educational level, marital status, and occupation were found to be significantly associated with adherence to ARVs, being female, under 35 years, single, and having higher educational status were significantly associated with non-adherence (Silva, Dourado, Brito, Silva, 2015). In exploring the factors affecting medication adherence, five areas (social and economic factors, health care team and systems-related factors, therapy-related factors, condition-related factors, and patient-related factors, considered as individual and organizational level factors), should be considered in any interventions aimed at improving it (WHO, 2017 and Sapkota, Brien, Greenfield, & Aslani, 2015). Among Patient-related factors are behavioral issues, and other socio-demographic factors that may affect adherence behavior. The cognitive-Behavioral theory has significantly explained health behaviors and has guided the development of interventions to address many health behavioral issues. The Health Belief Model (Hochbaum, 1958), the theory of rea-

soned action (Ajzen, & Fishbein, 1969), and the theory of planned behavior (Ajzen, 1991) are examples of such models, all of which the preceding model (Green and Kauter, 1991) applies. Another example of cognitive-behavioral theory, the Information, Motivation, and Behavioral Skill (IMB) was employed in the study to provide a better understanding of a pathway that would enhance medication adherence in HIV and AIDS treatment. The IMB (Information, Motivation and Behavioral Skill) construct measured ARV's awareness, ARVs adherence motivation, self-efficacy, and reported medication adherence. The IMB model was initially used by Fisher, Fisher, Misovich, Kimble & Malloy (1996) in research that was targeted at reducing the incidence of AIDS-risk behavior, which demonstrated that after an intervention that made use of the IMB model, participants showed significant increments in their preventive AIDS-risk behavior (Fisher, *et al*, 1996). Limited research work has attempted the use of cognitive-behavioral theories in exploring ARVs adherence in Nigeria, its use could provide a significant explanation of how ARVs adherence can be achieved efficiently in the fight against the HIV/AIDS disease. Therefore, the purpose of this study is to improve medication adherence and appointment keeping through training of PLWHA using the Peer Education Model to influence their skills and competencies in motivational counseling to arouse concern and awareness necessary for ARV medication adherence. This method has been successfully used in capacity building of health workers, school children in substance abuse, and prevention among others. The specific objectives that guided the study include,:

1. Determine the level of change in predisposing factors within HIV-Medication Adherence between baseline and post-intervention for all groups amongst participants in this study.
2. Determine the level of change in Reinforcing and Enabling factors within HIV-Medication Adherence between baseline and post-intervention for all groups amongst participants in this study.
3. Determine the level of change in self-reported adherence to medication and instructions between baseline and post-intervention for all groups amongst participants in this study.
4. Determine the magnitude of the impact of the Peer Education Training program on Antiretroviral Medication Adherence amongst participants in this study.

2 METHODOLOGY

Research Design

This Peer-Education intervention utilized a Quasi-Experimental Research design (a one-Group Pre and Post-Test Peer-Education intervention program with control) following an adequate need assessment of the target population for aspects incorporated into the program.

Population

The study population consisted of the entire PLWHA Clinic-Attendees. The PLWHA has been attending clinic sessions in respective health centers. They are believed to have been receiving various information and instructions regarding the effective use of their treatments. The selection of participants was stratified by age and by gender (separate male and female) of PLWHIV receiving counseling information in these Hospitals. This ensured a heterogeneous distribution of the sample and comparable results.

3 Description of Study Area

This study was conducted in northern Taraba, from April 2018 to March 2019. Taraba State consists of three geo-political zones with Jalingo, the capital city. The pre-1976 division of Muri, Mambilla, and Wukari, with the creation of Taraba State on 27th August 1991, became the Northern, Central, and Southern Taraba. Taraba State has over 80 ethnic groups spread across these regions and each historically has its distinct cultural heritage.

Northern Taraba consists of six Local Government Areas (LGAs) with five General Hospitals/ Referral Hospitals, one in respective Local Government Area capital cities except Jalingo, the State Capital which have two tertiary Hospitals, one Specialist Hospital, and a Federal Medical Centre. Each of these Hospitals caters to the PLWHA.

The sample for this study was drawn from four Hospitals including General Hospital Zing, First Referral Hospital, Sunkani, Specialist Hospital, Jalingo, and First Referral Hospital, Mutum biyu. General Hospital, Zing, First Referral Hospital, Mutum biyu, and First Referral Hospital, Sunkani are situated in the capital cities of Zing, Gassol, and Ardo Kola Local Government Areas respectively; Specialist Hospital, is situated in Jalingo, the State capital city in Jalingo Local Government Area, in the Northern geopolitical region in Taraba State of the Federal Republic of Nigeria. Jalingo lies on coordinates

8°54'N 11°22'E. Specialist Hospital, Jalingo caters to approximately 118,000 population (2006 Census), who are mostly civil servants, peasant farmers, and peti-traders. It also caters to other people all around the neighboring regions and Local Government Areas- from a proportion of Benue State to as far as some immigrants from the Cameroon republic and across the State, being the only State Tertiary Hospital around the region.

General Hospital, Zing lies about 64.8Km apart from Jalingo the State Capital City on a latitude of 8°59'42.72"N and a longitude of 11°44'48.08"E and is being bounded south by Yoro LGA, North by Adamawa State, West by Lau LGA and East by Numan LGA. The Hospital, however, does not only cater to the approximately 126,000 population (2006 Census), who are mostly peasant farmers, peti-traders, and civil servants, but also other people all around the neighboring Local Government Areas, including a portion of Adamawa State. First Referral Hospital, Sunkani is a distance of 43.4Km away from Jalingo and is bounded South by the Gassol Local Government Area, North by Jalingo Local Government Area, and West by Bali Local Government Area. It caters to a population of about 86,921(2006 census). First Referral Hospital, Mutum biyu lie about 8°37'60"N and 10°46'0"E with a total population of about 245,086 at the 2006 census. Gassol is bounded North by the Benue River and the Taraba River flows north through the area to its confluence with the Benue. It is also bounded north by Ardo kola Local Government Area, East by Bali Local Government Area, South by Donga and Wukari Local Government Areas, and then west by Ibi and Karim Lamido Local Government Areas. These Taraba State-owned hospitals pull a crowd, especially from the neighboring states due to the subsidy (low cost) of care given to the PLWHA.

Some Non-Governmental Organizations (NGOs) also participate actively in the care of the PLWHA especially, in aspects of technical support, social support, drug supplies, and logistics. Some of these NGOs include but are not limited to the Global Healthplus Initiative (Ghin); Faith-based organizations and Support Groups. However, as a result of the recent Ethno-religious state of unrest in the study area, a large number of the population had been internally displaced away.

Sample Size determination/ Sampling technique

The setting: the study was conducted in four selected Districts in Jalingo LGA of Taraba State, a multi-ethnic multi-cultural rural community in North-Eastern Nigeria consisting predominantly of farmers, artisans, civil servants, and traders. The ART clinics in these Hospitals were approached respectively to access PLWHA and their social networks.

Sample Size: The sample size formula for comparison of two (2) independent group proportion was used.

$$N = \frac{(Z_{\alpha} + Z_{\beta})^2 \times p(1-p)}{D^2}$$

Where, $Z_{\alpha} = 1.96$ and $Z_{\beta} = 0.1.28$ are 95% confidence level desired to avoid type I error and 90% power desired for one-tailed test for type II error. D represents the minimum tolerable difference between pre- and post-intervention medication adherence for the groups of $P(1-p) = 45(1-0.45)$; where 95% medication adherence in HIV/AIDS treatment is considered optimal.

Therefore, computation shows that;

$$\begin{aligned} \text{Minimum 'N' per health district} &= \frac{(1.96 + 1.28)^2 \times 45(1-0.45)}{10.5} \\ &= 10.5 \end{aligned}$$

The minimum sample size per health district will be 10 but up to 15 per health district will be recruited to take care of response bias.

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Sampling/ Sampling technique: A multi-stage and systematic random sampling protocol were used in this study. A total of 60 participants were drawn from four Districts /LGAs in Taraba State. Of these,

two Districts (First Referral Hospital, Sunkani and Specialist Hospital, Jalingo) were assigned as Experimental conditions and two (General Hospital, Zing, and First Referral Hospital, Mutum biyu) as Control, each giving 30 Participants for Experimental condition and 30 for Control.

The study was conducted over 6 months to cover the communities selected. Generally, a two-phase random sampling involving simple random sampling and systematic random sampling technique was adopted in the study. Initially, the three Geopolitical regions were selected by random sampling yielding the Northern Taraba as the study region, followed by a selection of Districts randomly selected by balloting. Thirty participants for the study were then derived and selected by systematic random sampling technique per assigned condition in the two groups. Finally, participants meeting inclusion criteria were considered and consent was sought from those selected for the study.

Bias: considering the nature, confidentiality, and sensitivity attached to this level of research, only PLWHA, and their social contacts were contacted and more so, only the researchers were responsible for data collection. More importantly, samples were drawn systematically from the population giving PLWHA an equal chance of being picked within the district.

A random selection of participants was done with blind data collection to avoid selection bias, careful framing of research questions, and prospective design to avoid recall bias. Control and experimental groups were matched and restricted to respondents with similar characteristics.

3.1 Variables

The study measured primary and secondary dependent variables of ARV medication adherence (measured as self-reported, pill counts) for viral load respectively. Independent variables and moderating variables were also measured, developed from the PRECEDE meta-model of demographic characteristics, predisposing factors (Knowledge, Perceptions, attitudes,), reinforcing factors (Social support from family, health care providers, social network- these were self-reported), enabling factors (Facilitation by infrastructure provided by family, clinic-such as transportation, access, funds and access to drugs) and Medication Adherence including Appointment Keeping Behavior.

3.2 Null-Hypothesis Testing

Five variables measured in this study included respondents' socio-demographic characteristics relevant to this study such as age, sex, marital status, religion, education, ethnicity, and occupation. Other variables measured were Predisposing Factors in HIV-Medication Adherence, Reinforcing and Enabling Factors in ART Medication offered by Social Support and Medication Adherence and Appointment-Keeping Behaviour, being the outcome variable.

Null Hypotheses were tested to verify whether a strategically targeted theory-grounded Integrated Home-Based Care intervention program will be more effective than the usual clinic-based program for the management of HIV/AIDS.

Data Collection Methods and Instrument for the Study

A well-structured validated questionnaire was designed considering the Variables (Information) to be obtained from the target population. This questionnaire was divided into four main sections covering socio-demographic characteristics, Predisposing Factors in HIV-Medication Adherence, Reinforcing and Enabling Factors in Art Medication Offered by Social Support, and Medication Adherence and Appointment-Keeping Behavior.

Section B comprised 53 questions on predisposing factors in HIV adherence which was considered on a 137-point reference scale and divided into 3 sub-sections of Knowledge (information), perceptions, and Attitude. B1 and B2 have 5 and 6 questions respectively with a "Yes" or "No" response pattern enquiring whether messages related to the statements were delivered to the respondents during the counseling or information session(s). This was measured on an 11-point scale and the scope or adequacy of contents of Health counsel and messages delivered to PLWHA at the clinics was measured on 6 points reference scale. Sub-sections B3 to B5 measured variables on ordinal (Likert) scale response patterns ranging from "strongly agree" to "strongly disagree". Perceptions about HIV consist of 26 questions, considered on 105 points reference scale and including B3 measuring perception of confidence about the usefulness and applicability of health counsel and messages delivered to PLWHAs at the clinic. This was measured on a 27-point scale (with 9 questions). Section B4.1 measures perceived benefits with 6 items measured on

an 18 point scale; B4.2 measures perceived threats on a 30-points reference scale (with 5 items measured on 15 point scale for the perceived severity of symptoms associated with AIDS and 5 items measured on 15 point scale for the perceived severity of non-compliance to ART medication); B4.3 measured perceived Barrier with 5 items measured on a 15 point scale; B4.4 measuring perceived self-efficacy with 5 items on 15 point scale; the last sub-section for this was B5, measuring attitudinal disposition of mothers towards health counsels and messages delivered at the infant-welfare clinics with 7 items measured on a 21 points scale.

The next section measuring Reinforcing and Enabling factors in ART medication offered by social support had 2 parts on ordinal (Likert) scale response pattern ranging from "strongly agree" to "strongly disagree": Section C1 measuring reinforcing factors or emotional and appraisal supports with 5 items measured on a 15-point scale and C2, measuring enabling factors such as tangible services received with 5 items measured on a 15-point scale.

Finally, Section D on ordinal (Likert) scale response pattern measuring the self-reported level of Medication Adherence and Appointment Keeping Behaviour to HIV Counseling Information with response range of "None of the time" to "All of the time", measured on a 24-point scale.

Procedure for data collection

Fifteen participants were derived from two Health Facilities to yield thirty and considered as a control group. Another similar group was derived from another two Health Facilities, fifteen each to derive thirty participants, and named the intervention group. The intervention group was mixed with 10 other chronic diseases such as Hepatitis, hypertension, Diabetes, and Tuberculosis and blinded to destigmatize the HIV clients. These integrated cases actively participated in the study throughout the end life of the Integrated Home-Based Care intervention but were not considered as part of the study as the researcher's interest was in the 30 HIV cases. Initially, six research/program assistants (called case managers) were trained to become well acquainted with the rationale of the project materials to be employed, the outcome expected, and research ethics. This was followed by the development of a peer education training manual using information derived from the needs assessment conducted and structured in modular form.

Each of the eight modules was presented during each client visit (at least, a visit per week) and lasted 10 minutes with a 15-minutes interactive session at the end to reinforce what has been learned. The eight modules addressed (1) HIV infectivity, (2) enhanced knowledge about consequences of poorly controlled viral load, (3) understanding the benefits of persistence in medication-taking and appointment-keeping within the context of HIV/AIDS self-care activities, (4) clarifications of personal interpretations of the nature of HIV/AIDS derived from cultural influences and associated risk of poor adherence to ARV medications, (5) identification of early signs and symptoms of HIV/AIDS, (6) building network with other individuals living with the virus as social support, (7) motivational interview skills and information dissemination in replication training.

Detailed modules and training protocols were developed to ensure repeatability and contents were structured under the following headings; Session title, session objectives, Patient Education Protocol, Training contents, and Training Activities. Ethical approval was sought from the Taraba State Ministry of Health Ethics committee and Informed consent was sought from all participants.

Each module was delivered at each client visit as sessions per week for 8 weeks.

Data were collected in two phases, baseline data was collected from both the control and intervention groups using the questionnaires designed, followed by the training intervention administered to the intervention group. At the end of the intervention, post-intervention data were collected from both the control and the intervention groups using the same questionnaire.

Measures

A structured questionnaire enabled data collection on demographics, including Age, Sex, Marital status, Religion, Education, Ethnicity, Occupation, and the Precede Model constructs. Multiple-item summative scales were constructed from these questions to measure the items and potential mediators of interest in this study. Constructs of Precede model included Predisposing Factors in HIV-Medication Adherence: under this, Knowledge About HIV Infectivity and

Treatment Outcomes, Scope of Contents of Health Counsel and Messages Delivered to PLWHA at the Clinics, Perception of Confidence, Usefulness and Applicability of Health Counsel and Messages

Delivered to PLWHA Clinics; Perceptions About HIV: including Perceived Benefits of adherence to ART medication, clinic appointments and health counsels, Perceived Threat (Perceived Severity of symptoms associated with AIDS and Perceived Severity of non-compliance to ART medication), Perceived Barrier, and Perceived Self-Efficacy; Attitudinal Disposition PLWHA Towards Health Counsel and Messages the Clinics; Reinforcing and Enabling Factors in ART Medication Offered by Social Supports (Emotional and Appraisal Support), Enabling Factors (Tangible Services Received) and Medication Adherence and Appointment-Keeping Behaviour.

For each of these constructs, a scale of measurement was developed and the mean scores of responses were converted to a percentage of the maximum scores on the scale and rated in quartiles. For example, a mean score of 13.8 for the intervention group and control for predisposing factors consisting of knowledge about HIV infectivity and treatment outcomes, on a maximum scale of 14 was computed as $\frac{13.8}{14} \times \frac{100}{1} = 98.6\%$. In each case, percentages $\leq 25\%$ were considered low scores; $\geq 25\%$ and $\leq 50\%$ as below average scores and scores $\geq 50\%$ of the maximum score on scale as average scores, and then $\geq 75\%$ as high (good) scores. These precede construct measures are independently described below.

Predisposing factors: Fifty-three items constitute this construct on reference scale of 137, which was further divided into 5 sub-sections as follows:

Conscious Awareness and Knowledge about HIV and Treatment: this consisted of 11 items with a "Yes" or "No" response pattern on a reference scale of 11-points. The indicators used here were related to Information Adequacy about HIV Treatment and Knowledge about HIV.

Knowledge about HIV Infectivity and Treatment outcomes: Five items on a rating scale of 0–1 were used to measure this on a "Yes" or "No" response pattern, on a reference scale of 5-points. Indicators used here were related to HIV viral load, medication adherence, symptoms elimination, and stigmatization (eg, "HIV load cannot be significantly reduced by consistent medication", "Presently, no drug can eliminate HIV from the blood", etc).

Information Adequacy or Scope of contents of Health Counsel and Messages about HIV Treatment: this consisted of 6 items on a reference scale of 6-points. The indicator was related to counseling delivered about ART adherence, Infant feeding

options, HIV prevention, and risk reduction options (eg, “we were not told about risk reduction options”, “counseling included the use of condoms”, “Breast milk is the most nutritious food for infants because it contains all that the infant needs for growth and development”, etc)

Perceptions about HIV Treatment: This variable was measured on a 105-points reference scale and has five sub-variables under it Perceived Confidence about the usefulness of information received, Perceive Benefits, Perceived Threats, Perceived Barriers, and Perceived Self-Efficacy. It consists of 26 items with a response pattern, “Agree” to “disagree”. The 5 parts or sub-variables of perception are as follows: perceived benefits which have 6 items measured on a scale of 18 and whose indicators were related to what PLWHAs perceive as beneficial from adherence behavior such as “Strictly keeping appointments is beneficial”, “It is okay to skip only one dose of ART per week”, etc.

The second part here was perceived threats with 10 items measured on a scale of 30 points and investigated:

Perceived Severity of symptoms associated with AIDS. It consists of 5 items measured on 15 points scale and investigates the level to which PLWHAs perceive HIV symptoms as a serious problem, such as “Symptoms of AIDS cause serious problems to life”, “Having a fever, cough and/ or rashes in HIV is just mild problem” and perceived severity of non-compliance to ART medication having 5 items on a 15-point scale such as, “I am tired of taking my medications”, Attending every clinic appointment is tiring”, etc.

The next sub-variable is the perceived barrier. Indicators for this were related to the factors that serve as constraints to the adherence behavior such as “ART drugs sometimes finish in the pharmacy”, “My people do not encourage me to take my drugs”, etc. This aspect consisted of 5 items measured on a scale of 15.

Perceived Self-efficacy was considered with 5 items having a scale of 15 points. Indicators for this were related to the perceived energy or determination to stop the transmission of the disease, eg, “I cannot allow anyone to contract HIV”, “I will not deny my partner sex since it is, he/ she that refuses to use a condom”, etc. Perception of confidence about usefulness and applicability of Health Counsel and Messages delivered to PLWHAs Clinics: this variable was measured using 9 items on

a scale of 27-points. It used indicators related to patients’ trust, comprehension, and cultural compatibility of the health information received at the HCT/ ART clinic. Such items as “I seem to have confidence in the counsel offered to me at the clinic regarding ART medication”, “The instructions about Appointment keeping are clear to me”, “The counsels appear to be culturally incompatible with what is applicable in the community where I live”, etc.

Attitudinal Disposition of Mothers towards Health Counsel and Messages Delivered at Infant-Welfare Clinics: This variable has seven items with a rating scale of 0-3, measured on a 21-point scale, measuring the attitude of mothers towards Health information. Examples of statements for consideration in this part included, “I am willing to try to follow all the counsel offered to me at the ART clinic”, “I feel shy about being seen at the ART clinic all the time”,.

Reinforcing and Enabling Factors in ART Medication offered by Social Support: This is the third major variable in this study consisting of two sub-variables. It has 10 items with a rating scale of 0-3 and is measured on a 30-point scale.

The first sub-variable, reinforcing factors has 5 items measured on a 15-point scale. Indicators for this relate to the emotional and appraisal support accorded to the PLWHAs in the ART clinics such as, “No Family member has taken it as a duty to provide consistent care for me in my illness”, “Health care personnel are emotionally distant from me”.

The second part confirmed the Enabling factors as reported by respondents. Indicator for this relates to tangible services received by the PLWHAs and includes “I do not receive financial assistance from any source for my treatment”, and “Support group(s) assist me in providing medication subsidy reducing the cost of treatment”.

Medication Adherence and Appointment-Keeping Behaviour: For this variable, a rating scale of 0-3 was used on 8 items with a response pattern of “none of the time” to “all of the time” and measured on a 24-point scale. Indicator for this is related to Adherence and appointment keeping behavior such as, “How often do you forget to take your ART medicines?” “How often do you keep appointments scheduled by your doctor or Nurse?”, etc.

Data Management and Statistical Analysis

The validated questionnaire for this study was used to collect information from the patients. To

ensure that respondents understand the questions and respond accurately, and because of the sensitive nature of the research, a total of six (6) research assistants were trained for data collection by interviewer-administered technique. The training covered aspects of the study procedures: the objectives of the study; research ethics and conducts; patients' rights, confidentiality, informed consent, and identification of prospective respondents. These assistants were chosen from among the health professionals to shield them from outsiders who may spy on the environment (to maintain clients' confidentiality) and from the various representative tribes in the locality. They assisted in approaching prospective respondents and in providing information about the research in various local languages and obtaining informed consent.

Data collected were collated and analyzed with the use of statistical software, Statistical Packages for Social Sciences (SPSS) version 21, which allowed for the estimation of measures of central tendency and dispersion. Descriptive statistics and analytic/inferential statistics were used in expressing the data. Descriptive statistics which described the shape, central tendency, and variability by looking at variables one at a time: mean, range, proportion were reported.

Analytic/inferential statistics describing differences in means for pre-and post-test scores were applied and test of hypotheses was presented and a level of significance of ≤ 0.05 was considered statistically significant. The application of a paired-sample t-test comparing baseline data for interval scale of measures with outcome was undertaken to show the effectiveness of the intervention implemented in terms of impact using percentage change and Cohen's Effect Sizes (d). Other statistical analyses included measures of levels of knowledge, perception, and behavior practice of medication adherence for the sample as means, standard error of mean and variance to be used in the computation of confidence interval for population parameters.

Validity and reliability

The instrument for this study was validated by considering the structure of constructs, contents, and items generated by my supervisor, Professor Nnodimele Atulomah who scrutinized and made necessary corrections to ensure face validity. Construct and content validity was enhanced through literature content related to the problem under

review. A measuring scale was also developed to ensure the accuracy of the data collected. Constructing from a suitable model, the preceding model 1403352:24850956 was used to unveil the variables for designing the instrument. Reliability was ensured by pre-testing and by testing, a retest of the developed instrument to ensure that consistency was being maintained in the measurement of what it was intended to measure.

Having piloted the study, the questionnaires were modified, technical terms eliminated, and some items reformulated in clearer and everyday vocabularies. The researcher also eliminated duplicate questions. However, the major challenge was a possible disguise of the translational meaning of the questions by the research assistants (interpreters) into the local languages and which was addressed during the training. The questionnaire scales were sufficiently reliable (Cronbach Alpha 0.795), although it was noted that some scales could be improved.

Ethical Issues

This study was conducted by ethical research guidelines and in compliance with the legal requirements for the study. Ethical clearance was obtained from the University of Central Nicaragua Ethical Committee, and from relevant authorities such as implied informed consent/ permission from the Taraba State Ministry of Health (MOH). The MOH instructed the various Hospitals to grant the researcher express access to the clinics and the participants studied.

4 Results:

Demographic Characteristics of Respondents

The study enrolled 20 (33.3%) males and 40 (66.7%) Females (N= 60), who responded to the questionnaires. The ages of the respondents ranged from 16 years to 59 years with a mean score of 35.38 and a standard deviation of 9.061, most of whom were married (37.61%) and of Christian faith (71.7%). The educational status of the respondents ranged from non-formal to higher education with the majority being of the lower educational attainments (56.6%). The Mumuye ethnic group constituted the majority of the respondents (28.3%), mostly, the self-employed (41.7%) as found in table 4.1.

Seventy participants were considered and screened for the study but 8 were excluded for

living at a far distance. Sixty-two were confirmed eligible for the study, while two declined the study and were excluded. Sixty participants were therefore studied, all of who completed the follow-up and analyzed.

Frequency distribution of demographic characteristics of respondents in this study.

5 Results for control Group

Results showed that the level of predisposing factors in HIV-Medication Adherence measured on a scale of 137 points reference scale, scored $\bar{X} = 82.17 (2.18) \pm 11.92$ at baseline and $\bar{X} = 86.50 (1.69) \pm 9.23$ at post intervention period with marginal positive changes (Mean Difference = 3%) having no significant difference. The Level of Consciousness Awareness and Knowledge as sub-variable of predisposing factor in HIV-Medication Adherence in the control group on a Reference Scale of 11-point revealed that participants scored $\bar{X} = 8.67 (0.22) \pm 1.18$ at baseline and $\bar{X} = 8.53 (0.30) \pm 1.66$ at post intervention period. This showed a negligible negative change of 1% with no significant difference in the level of Consciousness Awareness and Knowledge about HIV Infectivity and Treatment Outcomes reported as received by PLWHA. Perceptions about HIV medication Adherence was considered on 105-point scale and involved five sub-variables of perception of confidence about usefulness and applicability of health counsel and messages delivered to PLWHAs in clinics; perceived benefits, perceived threat, perceived barrier and perceived self-efficacy about HIV medication Adherence skills. Results showed that the level of perceptions about HIV reported a mean score of $\bar{X} = 60.33 (1.88) \pm 10.30$ at baseline while at post intervention period, it scored $65.23 (1.29) \pm 7.05$ yielding a change of 5% positively. This showed that the level of Perception about HIV significantly changed positively.

Attitudinal Disposition of PLWHAs towards HIV treatment, Appointment keeping and Health Counsel and Messages Delivered at HIV Clinics was measured on a reference scale of 21-points. Respondents reported the level of Attitudinal Disposition giving a mean score of $\bar{X} = 13.17 (0.57) \pm 3.12$ at baseline which reduced with 2% at post intervention to $12.73 (0.59) \pm 3.20$ with no significant difference (See table 4.16 for this information).

5Level of change for Measures of Predisposing Factors involved in Medication

Adherence in HIV/AIDS Treatment at Post-Intervention for Control.

Results for Experimental Group

Results showed that the level of predisposing factors in HIV-Medication Adherence measured on a scale of 137 points reference scale, scored $\bar{X} = 80.90 (2.77) \pm 15.15$ at baseline and $(\bar{X} = 97.13 (8.12) \pm 1.48$ at post intervention period with significant positive changes yielding a difference of 12% for experimental group in this study. The Level of Consciousness Awareness and Knowledge as sub-variable of predisposing factor in HIV-Medication Adherence in the experimental group on a Reference Scale of 11-point revealed that participants scored $(\bar{X} = 8.53 (0.25) \pm 1.38)$ at baseline and $\bar{X} = 10.43 (0.26) \pm 1.43$ at post intervention period. This yielded a significant difference positively in the level of Consciousness Awareness and Knowledge about HIV Infectivity and Treatment Outcomes with up to 17.3%. Perceptions about HIV medication Adherence was considered on 105-point scale and involved five sub-variables of perception of confidence about usefulness and applicability of health counsel and messages delivered to PLWHAs in clinics; perceived benefits, perceived threat, perceived barrier and perceived self-efficacy about HIV medication Adherence skills. Results showed that at baseline, the level of perception reported a mean score of $\bar{X} = 59.73 (2.40) \pm 13.16$ at baseline and $71.90 (1.00) \pm 5.47$ at post intervention with significant difference of 12%. This showed that the level of Perception about HIV significantly changed positively.

Attitudinal Disposition of PLWHAs towards HIV treatment, Appointment keeping and Health Counsel and Messages Delivered at HIV Clinics was measured on a reference scale of 21-points. Respondents reported the level of Attitudinal Disposition of $\bar{X} = 12.63 (0.54) \pm 2.98$ at baseline which increased at post intervention to $14.80 (0.47) \pm 2.57$ with significant positive difference of 10.3%. This information is found on tables 4.17 and fig. 3.

The level of change in Reinforcing and Enabling factors and self-reported adherence to medication and instructions within HIV-Medication Adherence between baseline and post intervention for all groups amongst participants in this study.

Table 1. Frequency distribution of demographic characteristics of respondents in this study

Variables	*** (N = 60)	(%)
Sex		
• Male	20	33.3
• Female	40	66.7
Marital Status		
• Single	20	33.3
• Married	37	61.7
• Separated	3	5.0
Religion		
• Christian	43	71.7
• Islam	17	28.3
Education		
• Non-Formal	9	15.0
• Primary	8	13.3
• Secondary	17	28.3
• Higher	26	43.3
Ethnicity		
• Mumuye	17	28.3
• Tiv	7	11.7
• Fulani	7	11.7
• Hausa	9	15
• Jenjo	5	8.3
• Others	15	25.0
Occupation		
• Self-employed	25	41.7
• Civil Servant	20	33.3
• Applicant	6	10.0
• Housewife	5	8.3
• Student	4	6.7

*** Respondents in this study

6 Results for Control at Post Intervention

The level of Reinforcing and Enabling Factors in ART Medication were considered as two variables of 5 items each. The level of Reinforcing Factors in ART Medication on a scale of 15 points reported a mean score of 9.00 (0.65) ± 3.56 at baseline which reduced marginally at post intervention to 8.87 (0.69) ± 3.78 without significant difference yielding a negative change of 0.8%. The level of Enabling Factors in ART Medication, on a maximum scale of 15 reported a mean score of 8.23 (0.46) ± 2.50 at baseline and 8.00 (0.51) ± 2.77 at post intervention with negative change of 2% (having no significant difference). Self-Reported Adherence with reference scale of 24 points reported a mean score of

16.23 (0.82) ± 4.49 at baseline and marginally increased to 17.87 (0.91) ± 4.99 at post intervention with a positive change of 7%. This revealed that the Adherence to HIV-Information and Medication instructions, including appointment keeping had no significant difference in the scores. This information is found on table 4.13 and fig. 4.

7 Results for Experimental Group at Post Intervention

The level of Reinforcing and Enabling Factors in ART Medication were considered as two variables of 5 items each. The level of Reinforcing Factors in ART Medication on a scale of 15 points reported a mean score of 8.87 (0.47) ± 2.50 at baseline which increased marginally at post intervention to 9.33

Table 2. Level of change for Measures of Predisposing Factors involved in Medication Adherence in HIV/AIDS Treatment at Post-Intervention for Control.

VARIABLES	Scale	Baseline N=30		Post-Intervention N=30		% Change
		$\bar{X}(SE)$	$\pm SD$	$\bar{X}(SE)$	$\pm SD$	
Level of change for Measures of Predisposing Factors involved in Medication	137	82.17(2.18)	11.92	86.50(1.69)	9.23	3
Conscious Awareness and Knowledge about HIV and Treatment	11	8.67(0.22)	1.18	8.53(0.30)	1.66	-1
Information Adequacy about HIV Treatment	6	5.00(0.17)	0.95	4.80(0.20)	1.10	-3
Knowledge about HIV	5	3.67(0.20)	1.09	3.73(0.15)	0.83	1
Perceptions about HIV Treatment	105	60.33(1.88)	10.30	65.23(1.29)	7.05	5
Perceived Confidence about usefulness of information received	27	18.87(0.75)	4.13	17.20(0.74)	4.07	-6
Perceive Benefits	18	6.87(0.48)	2.64	12.46(0.52)	2.87	31
Perceived Threat	30	15.33(0.61)	3.34	18.23(0.65)	3.54	10
Perceived Barriers	15	8.70(0.54)	2.96	7.73(0.48)	2.64	-7
Perceived Self-Efficacy	15	10.57(0.55)	3.01	9.60(0.36)	1.96	-7
Attitudinal Disposition	21	13.17(0.57)	3.12	12.73(0.59)	3.20	-2

*Impact Evaluation review changes recorded between baseline and post-intervention scores and their corresponding level of significance.

(0.48) \pm 2.60 with positive difference of 3.3%. The level of Enabling Factors in ART Medication, on reference scale of 15 reported a mean score of 7.23 (0.41) \pm 2.24 at baseline and 7.40(0.41) \pm 2.25 at post intervention with marginal positive difference of 1.1%. Self-Reported Adherence with maximum score of 24 points reported a mean score of 15.98 (0.57) \pm 4.39 at baseline and significantly increased to 22.13 (0.43) \pm 2.37 at post intervention. This revealed that the Adherence to HIV-Information and Medication instructions, including appointment keeping raised significantly with a positive difference of 26% at post intervention evaluation. This information is found on table 4.

Discussion of results:

Demographic Characteristics of PLWHAs in the Selected Secondary Hospitals in Taraba State?

Results showed that a wide range of age categories was represented in the study with an age range of 16 – 59. This shows that respondents were of the age of accountability and so could give responsible responses and corresponds with the findings of the Federal Ministry of Health (2015) who reported HIV national prevalence rate among people aged 15-49. This group of respondents have mostly reached ages of accountability and now holds responsibilities for themselves and other dependents under them. More of the participants were also of Females gender (66.7%); most of whom even though we were married and self-employed, were either unmarried or separated. These are felt to be increasing their vulnerability socio-economically and emotionally. Other reasons for the over-representation of the female gender are felt to be due to their better health-seeking be-

Table 3. Demonstrates Level of change Recorded for Measures of Predisposing Factors involved in Medication Adherence in HIV/AIDS Treatment at Post-Intervention for Experimental Group.

VARIABLES	Scale	Baseline N=30		Post-Intervention N=30		% Change
		$\bar{X}(SE)$	$\pm SD$	$\bar{X}(SE)$	$\pm SD$	
PREDISPOSING FACTORS	137	80.90(2.77)	15.15	97.13(8.12)	1.48	12
Conscious Awareness and Knowledge about HIV and Treatment	11	8.53(0.25)	1.38	10.43(0.26)	1.43	17.3
Information Adequacy about HIV Treatment	6	4.87(0.20)	1.11	5.73(0.13)	0.69	15
Knowledge about HIV	5	3.67(0.18)	0.99	4.70(0.15)	0.79	21
Perceptions about HIV Treatment	105	59.73(2.40)	13.16	71.90(1.00)	5.47	12
Perceived Confidence about usefulness of information received	27	19.50(0.92)	5.06	22.03(0.40)	2.31	9.4
Perceive Benefits	18	6.80(0.39)	2.12	13.73(0.30)	1.62	39
Perceived Threat	30	14.00(0.75)	4.09	20.57(0.56)	3.05	22
Perceived Barriers	15	8.67(0.47)	2.56	6.30(0.34)	1.86	-16
Perceived Self-Efficacy	15	10.77(0.46)	2.56	9.27(0.33)	1.82	-10
Attitudinal Disposition	21	12.63(0.54)	2.98	14.80(0.47)	2.57	10.3

Table 4. Level of change for Measures of Reinforcing, Enabling factors and Self-Reported Medication Adherence in HIV/AIDS Treatment at Post-Intervention for Control.

VARIABLES	Scale	Baseline N=30		Post-Intervention N=30		% Change
		$\bar{X}(SE)$	$\pm SD$	$\bar{X}(SE)$	$\pm SD$	
Reinforcing Factors	15	9.00(0.65)	3.56	8.87(0.69)	3.78	-0.8
Enabling Factors	15	8.23(0.46)	2.50	8.00(0.51)	2.77	-2
Self-Reported Medication-Adherence Client retention (SRMACR)	24	16.23(0.82)	4.49	17.87(0.91)	4.99	7

*Impact Evaluation review changes recorded between baseline and post-intervention scores and their corresponding level of significance

Table 5. Demonstrates Percentage change recorded for Measures of Reinforcing, Enabling factors and Self-Reported Medication Adherence in HIV/AIDS Treatment at Post-Intervention for Experimental Group.

VARIABLES	Scale	Control Group N=30		Experimental Group N=30		% Change
		$\bar{X}(SE)$	$\pm SD$	$\bar{X}(SE)$	$\pm SD$	
Reinforcing Factors	15	8.87(0.47)	2.50	9.33(0.48)	2.60	3.3
Enabling Factors	15	7.23(0.41)	2.24	7.40(0.41)	2.25	1.1
Self-Reported Medication-Adherence and Client retention (SRMA)	24	15.98(0.57)	4.39	22.13(0.43)	2.37	26

*Impact Evaluation review changes recorded between baseline and post-intervention scores and their corresponding level of significance.

havior, they tend to have better contact with the Health Care System especially, during pregnancy when they visit the health facility for Ante-natal care (ANC) and Post-natal care. The Female gender takes up caring responsibilities; they take the sick to the health facility and resultantly use the opportunity to check up on their health status. In short, women are always concerned about themselves; especially their physical outlook and so seek care more frequently than men do.

The high rate of poverty and unemployment levels, accounting for over 50% of respondents may be a factor, which tends to have a high impact on the lives of the PLWHA and may limit their comprehension of HIV-related information and hence sub-optimal adherence. The relatively low literacy status of most of the respondents, especially of the female gender (over 30% are non-formal and primary holders) and their perceived subservient social status is felt to account for a larger infection rate amongst them.

The high population of the Mumuye ethnic group (28.3%) as the majority of the respondents was felt to be attributed to their culturally high social lifestyle of high vulnerability. It could also be due to the subsidy program Taraba health services enjoy and the free ART given by the National Action Committee on AIDS (NACA), which draws patients from the neighboring LGAs and States.

The majority of the participants were reported to be of Christian faith which could be because the study area is a predominantly Christian (71.7%) state. However, the linkages of the respondents to the church as reported by a majority could be valuable support mobilization resource vehicle for collaborative linkages between the Health workers, PLWHA, Families, Government, NGOs, and other self-support facilities that will foster HIV-Information sharing, comprehension and thus support Adherence (Tables 1).

Research Question 1: What is the level of Predisposing Factors involved in Medication Adherence and Appointment Keeping in HIV/AIDS Treatment at the Baseline for all groups in this study?

Predisposing factors are important determinants in medication adherence and possess the potential to improve adherence behaviors (Green, 1999). In this study, the level of predisposing factors in HIV-Medication Adherence and appointment keeping ranged from low to average levels for all groups and

may be responsible for the continual sub-optimal adherence and treatment failures following the usual traditional intervention strategies. These factors were considered as given by Green in terms of the level of Conscious Awareness and Knowledge about HIV Infectivity and Treatment Outcomes reported as received by PLWHA. The findings of the Thailand Ministry of Public Health (2000), who reported that inadequate information from their counselors reaches the clients is similar to findings of this study where knowledge and awareness about treatment regimens become inadequate in many routine clinics under control conditions, thereby resulting in suboptimal adherence. The level of Perception of HIV was generally above-average levels. Self-Efficacy involved in HIV treatment and Attitudinal Disposition ranged from low to average levels. Findings in this study are in line with a study by Gibson, Mary, Esther, Andrew, Amos, mani, Godfather, Chacha, Doris, and Godlisten (2018) who reported that respondents were found to have a low level of predisposing factors such as knowledge on the risk factors, prevention strategies, and their associated complications, perceptions and attitudes.

Research Question 2: What is the level of Predisposing Factors for HIV-Medication Adherence and Appointment Keeping at Post Intervention for all Groups in this Study?

The level of predisposing factors such as Consciousness Awareness and Knowledge about HIV Infectivity and Treatment Outcomes reported as received by PLWHA ranged from low to average levels (See table 4). Reasons for this could be the prevailing shortage of staff and long hours of labor in these health facilities so that they have no valuable time to intervene on these predisposing determinants. The poor staff salaries and poor funding of these health facilities could also lead to poor motivation of both the staff and the clients and resultantly affect adherence negatively. This finding is similar to the report of Dawood (2015) who found low levels of predisposing factors with high barriers in Adolescent HIV treatment.

The level of Perception of HIV was generally above average levels which are similar to the results of a Nigerian study in a usual clinic condition by Azuka & Uche (2012) and Kasumu & Balogun (2014) reporting sub-optimal adherence to the same factors. Respondents' Attitudinal Disposition ranged from low to above-average levels, with high Bar-

riers to Medication Adherence. (See table 4.4 for this information). Similarly, Glennon (2018) noted with concern, the rise in hospitalizations from poor medication adherence and reported raise in motivational problems, side effects, non-expert advice, costs, and financial factors amongst others. The poor perception and high barriers to medication adherence are felt to be responsible for the reduced patients' efforts in achieving optimum adherence.

Post Intervention, however, the level of predisposing factors in HIV-Medication Adherence improved well above average levels. The level of Consciousness Awareness and Knowledge about HIV Infectivity and Treatment Outcomes reported as received by PLWHA were very high. This was a consequence of the health education training program

The level of Perception of HIV was generally above-average levels. The level of Perception of Confidence about the Usefulness and Applicability of Health Counsel and Messages Delivered to PLWHA in Clinics was high. Marin, Santos, Moro Ados (2016) had similar findings in their study where patients reported having difficulty adhering to the use of medication as a result of their lifestyle perceptions, justifying forgetfulness, use of many drugs, the presence of signs and symptoms, and changes in daily routine as reasons for non-compliance. Attitudinal Disposition was at above-average levels which correspond to a survey of 200 pregnant women living with HIV (Minja, Cichowitz, Knettel, Mahande, Kisigo, Knippler, Ngocho, Mmbaga, Watt, 2019). In this survey, the overall, attitudes towards ART were stable over time and positive towards ART medication adherence. This showed that the perception of the respondents positively changed at the end of the peer education training program. A similar finding was reported in Nigeria studies by Azuka & Uche (2012) and Ksumu & Balogun (2014) which summed up showed a positive level of predisposing factors in medication adherence.

Research Question 4: What is the level of Reinforcing, Enabling Factors, and Self-Reported Medication-Adherence in ART Medication involved in HIV/AIDS Treatment at the Baseline for all groups in this study?

Results for the Experimental Group at baseline produced no different scores, yielding levels of Reinforcing Factors in ART Medication an above average score. The level of Enabling Factors in ART Medication, however, is at an average level. Adher-

ence to HIV-Information and Medication instructions, including appointment keeping is at intermediate levels (above average) for the experimental group at baseline (See table 3 for this information). However, this rate does not correspond with the arguments of Ho, Bryson, and Rumsfeld (2009) and McKenney, Munroe, and Wright, Jr (1992) who have argued that for the best outcome from ARVs, the standard medication adherence should be not less than 95% of prescribed ARVs at a given period of medication refills.

Research Question 5: What is the level of Reinforcing and Enabling factors and Self-Reported Medication-Adherence and Appointment-Keeping involved in HIV/AIDS Treatment at Post-Intervention for all Groups in the study?

Results showed that there were increased levels of reinforcing factors to medication Adherence post-intervention. The level of Enabling Factors in ART Medication also increased after the intervention with a raise above the control condition. This shows that the peer education training program improved the enabling and reinforcing factors towards achieving adherence behavior. In a similar Liberian study by Rogers, Jabateh, Beste, Wagenaar, McBain, Palazuelos, Wickett, Oswald, Napier, Toomey-Garbo (2018), reinforcing and enabling factors were found to increase ART treatment coverage by 3.8 percentage points ($p = 0.03$), with patient retention improving 63.9% to 86.1% ($p < 0.001$). Adherence to HIV-Information and Medication instructions, including appointment keeping, however, resultantly revealed a very high level. A similar study reported by Dizaji, Rastgarimehr, Shafieyan, Mansourian, Hoseini, Arzaghi, Qorbani, Rezapoor, Asayesh, Charkazi, and Ansari (2015) on the level of Reinforcing and Enabling Factors in ART Medication reported similar results with this study, with increased mean scores for reinforcing and enabling factors in health behaviors. However, when the computation of the adherence rate was done, the result reported a 92% adherence rate for this study, a rise of 32% at post-intervention from 60% baseline. Research work done on rivers in southern Nigeria in 2016 revealed a low adherence level of 71.2% (Kanu, Maduka, Okefor (2017), the low level of adherence has also been reported in other places like Kano (Lawan, Amole, Gambo-Jahun, EneAbute (2015). Although an intervention study using text messages and adherence coun-

seling to improve HAART adherence in a tertiary hospital in Nigeria improved adherence to 76.9% when compared with 55.8% of the control group (Maduka, Tobin-West, 2012). However, all these improvements still fall short of the recommended standard cut-off of $\geq 95\%$ (Suleiman and Momo. 2016, Ho, *et al.*, 2009 McKenney, *et al.*, 1992).

Research Question 6: What is the Comparison of Predisposing Factors involved in Medication Adherence in HIV/AIDS Treatment at Post-Intervention for all groups in this study

Results for Control at Post Intervention showed that the level of predisposing factors in HIV-Medication Adherence in the post-intervention period reported marginal changes having no significant difference. The Level of Consciousness Awareness and Knowledge as sub-variables of predisposing factors in HIV-Medication Adherence in the control group showed no significant difference. The level of Perception about HIV significantly changed positively. The level of Perception of Confidence, Usefulness, and Applicability of Health Counsel and Messages Delivered to PLWHA in Clinics had marginal changes with no significant figures. Attitudinal Disposition of PLWHAs towards HIV treatment, Appointment keeping, and Health Counsel and Messages Delivered at HIV Clinics which reduced at post-intervention. All parameters reported no significant difference between the baseline and the post-intervention conditions for the control group.

Results for the Experimental Group at Post Intervention show that HIV-Medication Adherence had significant changes yielding a difference for the experimental group in this study. The Level of Consciousness Awareness and Knowledge yielded a significant difference in the level of Consciousness Awareness and Knowledge about HIV Infectivity and Treatment Outcomes.

Perceptions about HIV medication Adherence at post-intervention significantly changed positively. Attitudinal Disposition of PLWHAs towards HIV treatment, Appointment keeping, and Health Counsel and Messages Delivered at HIV Clinics increased post-intervention with a significant difference. These findings are not in isolation from other Nigerian studies. Studies in Nigeria have linked poor adherence levels to ARV medications to various factors; non-adherence has been linked to educational status (Abo Deif, Elswawi, Selim, and NasrAllah, 2015, Antonogeorgos, Panagiotakos, Grig-

oropoulou, Papadimitriou, Anthracopoulos Nicolaidou and Priftis, 2013), gender (Lauffenburger, Robinson, Oramasionwu, and Fang, (2014) and Berg, Demas, Howard, Schoenbaum, Gourevitch and Arnsten, 2004), Socio-Economic Status (Falagas, Zarkadoulia, Pliatsika and Panos, 2008) adverse effect of ARV medication and stigmatization (Ingrid Katz, Ryu, Onuegbu, Psaros, Weiser, Bangsberg, and Tsai, 2013, and Talam, Gatongi, Rotich and Kimaiyo, 2008). In addition, research has associated employment status, being busy at work or school, forgetfulness, fasting, and traveling away from home with non-adherence to ARVs (Suleiman and Momo. 2016 Nachega, Uthman, Peltzer, Richardson, Mills, Amekudzi and Ouédraogo 2014). Non-adherence among retroviral-positive pregnant women attending clinics has also been reported (Matsui, 2012). Adherence to ARV medication has however been linked to regular adherence counselin, the use of an adherence aid (pillbox) (BMJ, 2008 and Hayes, Hunt, Adami and Kaye, 2006). A patient's educational level, marital status, and occupation are significantly associated with adherence to ARVs in a study conducted in Northern Nigeria (Nachega *et al.*, 2014).

Research Question 7: What is the Comparison of Reinforcing, Enabling Factors, and Self-Reported Medication Adherence in HIV/AIDS Treatment at Post-Intervention for all groups in this study?

Results for Control at Post Intervention

The level of Reinforcing Factors in ART Medication at baseline reduced marginally post-intervention without significant difference. The level of Enabling Factors in ART Medication also showed no significant difference post-intervention. This revealed that the Adherence to HIV-Information and Medication instructions, including appointment keeping had no significant difference in the scores. This information is found in table 4.9 and fig. 3. Adherence rate computation showed 60% at baseline for all groups. In this study, the adherence prevalence rate was 60% at baseline, 35% lower than the recommended standard rate.

Results for the Experimental Group at Post Intervention, however, reveal that the level of Reinforcing Factors in ART Medication increased post-intervention. The level of Enabling Factors in ART Medication had a positive difference too, while Self-Reported Adherence significantly increased post-intervention. This revealed that the Adherence to

HIV-Information and Medication instructions, including appointment keeping raised significantly at post-intervention evaluation. This information is found in Tables 4.10 and 4.11 and fig. 3. When the Adherence rate was computed for the experimental group, it yielded a 92% prevalence rate, near an ideal recommended standard of 95%, and an increase of 32% from 60% at baseline. This study yielded similar results to reports from other studies. A study of rivers state in southern Nigeria in 2016 revealed a low adherence level of 71.2% (Kanu, Maduka, Okefor (2017), the low level of adherence has also been reported in other places like Kano (Lawan, Amole, GamboJahun, EneAbute (2015). Although an intervention study using text messages and adherence counseling to improve HAART adherence in a tertiary hospital in Nigeria improved adherence to 76.9% when compared with 55.8% of the control group (Maduka, Tobin-West, 2012), this improvement still falls short of the standard cut off of $\geq 95\%$ (Suleiman and Momo. 2016, Ho, *et al*, 2009 and McKenney, *et al*, 1992).

Research Question 8: What is the level of change in predisposing factors within HIV-Medication Adherence between baseline and post-intervention for all groups amongst PLWHA attending Selected Secondary Hospitals in Taraba State?

Predisposing Factors associated with HIV-Medication Adherence in this study proved Green (1999) right when he wrote that predisposing factors possess the potential capable of influence health-related behaviors such as adherence behaviors and that this happens by either encouraging the adherence behavior or by inhibiting it from occurring. He further gave examples of predisposing factors to include information or knowledge, perceptions, and attitudes, which after the training of the peer educators' elicited an increase in these parameters and consequently, improved adherence. In a study by Gibson, Mary, Esther, Andrew, Amos, mani, Godfather, Chacha, Doris, and Godlisten (2018) respondents were found to have a low level of knowledge of the risk factors, prevention strategies, and their associated complications. This was not different from the findings of this study as the Level of Consciousness Awareness and Knowledge as a sub-variable of a predisposing factor in HIV-Medication Adherence during the post-intervention period yielded a significant positive difference in the level of

Consciousness Awareness and Knowledge about HIV Infectivity and Treatment Outcomes.

The significant increase in the level of Adequacy of information in Health Counselling delivered to PLWHAs support the findings of a study by Chiegil & Atulomah (2015) which reported that the right information has to be given adequately to the PLWHA to raise their knowledge and awareness about HIV treatment. Fisher, Fisher, and Harman (2003) also highlighted that information was a necessary ingredient for strengthening or building behavior skills. If adequate information is provided to the PLWHA, they will be well-equipped and more likely to adopt a healthy behavior. This is not also different from the results of a Thailand study by the Ministry of Public Health (2000), where it was reported by about 3/4th of the clients to have received adequate information from their counselors. When information is withheld from the clients as done in many routine clinics, knowledge, and awareness about treatment regimens become inadequate thereby resulting in suboptimal adherence.

Perceptions about HIV medication Adherence at post-intervention increased significantly in this study. This difference is a result of the PE training program received by the participants. A similar study in Ghana reported that respondents' perception of the risk of HIV was generally low which might cause them to engage in risky behaviors, likely to endanger their health (Eugene, Akwasi, and Kofi, 2016). This calls for renewed efforts to put in place campaigns such as the peer education training that would help to increase the perceived risks of HIV, the PE training program should include modules on factors that affect the perception of risks in designing HIV and AIDS campaigns to ensure positive behavioral change. (Afr J Reprod Health 2016; 20[1]: 62-70). In a study of barriers and benefits of health behavior, Johs, Kellar-Guenther, Jankowski, Neff, and Erlandson (2019) reported that adherers emphasized positive reinforcement, positive social support, and increased self-efficacy as benefits of the adherence interventions. Non-adherers however, emphasized barriers to healthy behavior including lack of motivation, lack of self-efficacy, and a negative perception of the intending behavior culture. Non-adherers identified the need for behavior-appropriate activities as a feature of an ideal adherence environment. Both groups identified time, cost, and health-related challenges as barriers to intending behavior. In line with this,

barriers reduced significantly after the intervention in this study. The situation about barriers to medication adherence matches with the findings of Dawood (2015) who found a high barrier in Adolescent HIV treatment, however, as seen above, this PE training reduced barriers to HIV treatment and adherence significantly. If the barrier is high, practicing healthy behavior will be less likely. Perceived Self-Efficacy to practice Medication Adherence could have dropped by coincidence or could be because there was limited time for the study and participants could need more time to build self-efficacy. It could also mean that some surrounding factors (socio-cultural, social support, etc) could exist, which could interfere with respondents' belief in their ability to succeed in the HIV treatment situation. In contrast to these findings, a study of self-efficacy and adherence by Jamie and Leslie (2014) reported that Participants with higher self-efficacy were less likely to practice health depreciating behaviors ($P = .031$), and were more likely to adhere to treatment. This study, however, though had a deep self-efficacy, all other parameters for adherence improved considerably. Attitudinal Disposition of PLWHAs towards HIV treatment, Appointment keeping, and Health Counsel and Messages Delivered at HIV Clinics showed a significant impact of the PE intervention on the participants post-intervention, and the aspect of a good attitude is similar to the findings of some Nigeria studies by Azuka & Uche (2012) and Kasumu & Balogun (2014) who showed a positive attitude towards ART though their studies were carried out in usual clinic condition and so still yielded sub-optimal adherence.

Research Question 9: What is the level of change in reinforcing and enabling factors within HIV-Medication Adherence between baseline and post-intervention for all groups amongst PLWHA attending Selected Secondary Hospitals in Taraba State?

The level of Reinforcing and Enabling Factors in ART Medication in a similar study reported by Dizaji, Rastgarimehr, Shafieyan, Mansourian, Hoseini, Arzaghi, Qorbani, Rezapoor, Asayesh, Charkazi, and Ansari (2015) Showed similar results with this study. It reported that after an educational intervention, the mean scores for the reinforcement factors and enabling factors increased significantly (p -value >0.001); Predisposing, enabling, and reinforcement factors were all affected in taking self-care behavior

in the patient. For this study, the wide change in enabling and reinforcing factors for the experimental group post-intervention represents an impact of the PE intervention studies.

Research Question 10: What is the level of change in self-reported adherence to medication and instructions between baseline and post-intervention for all groups amongst PLWHA attending Selected Secondary Hospitals in Taraba State?

Self-Reported Adherence in this context was defined in terms of sticking firmly to HIV treatment including starting HIV treatment, keeping all medical appointments, and taking HIV medicines every day and exactly as prescribed AIDSinfo (2019). In line with this, it was revealed that the Adherence to HIV-Information and Medication instructions, including appointment keeping had a wide and significant positive change in scores for the experimental group post-intervention. This represents the impact of the PE training intervention delivered to the peer educators during the study. Findings correlate with the writings of Green (1999) when he reported that predisposing factors possess the potential capable of influencing health-related behaviors such as adherence behaviors and that this happens by either encouraging the adherence behavior or by inhibiting it from occurring. In line with green, this raise in adherence is felt to be an aggregate result of the corresponding raise in predisposing factors. Haya, Baojin, Douglas, Nicolas, and William (2009) also reported similar observations following an intervention: 75.0% of previously partially adherent became adherent, and 38.7% of previously non-adherent became adherent. From the foregoing, Enriquez and McKinsey (2011) and Ugwu and Eneh (2013) observed that many HIV-infected persons in developed countries face a lot of difficulties and challenges maintaining adequate levels of adherence and recommended intervention programs to boost their adherence levels.

Research Question 11: What is the magnitude of the impact of the Integrated Home-Based Care Programme on Antiretroviral Medication Adherence amongst participants in this study?

Predisposing factors revealed a significant difference ($P < 0.0001$) with a wide percentage change of 12% post-intervention. This finding is in line with empirical studies illustrating positive and significant relationships between social support and

treatment adherence among patients. Tricia and Robin (2013) undertook a meta-analytic review of several empirical studies and found that adherence was 27% higher with practical PE support. Other studies consolidate this by reporting that patients' health can benefit from social support which works by buffering stress, changing affective states, increasing self-efficacy, and influencing change in negative health behaviors (DiMatteo, 2004).

Reinforcing factors for medication adherence showed a significant difference ($P= 0.869$ which is $p<0.05$) between the control and experimental with a wide percentage difference of 3.3%. These values thus suggest that mean scores for reinforcing factors involved in medication adherence for control are significantly different from mean scores reported for the experimental group post-intervention. This can be interpreted that the Integrated Home-Based Care Programme intervention had more influence on the reinforcing factors for medication adherence. A similar study by Dizaji, *et al* (2015) reported a significant increase in mean scores for the reinforcement factors and enabling factors (p -value >0.001) after an educational intervention. Perceptions about HIV had a percentage change of 12% post-intervention. Studies showing the impact of self-efficacy reported that participants with higher self-efficacy were less likely to practice health depreciating behaviors ($P = .031$), and were more likely to adhere to treatment. This study, however, demonstrated considerable improvement in all other parameters for adherence.

Medication adherence in HIV Treatment of participants in this study yielded a wide percentage difference of 26% post-intervention. This result showed that the Integrated Home-Based Care intervention on the experimental group produced a greater impact on medication adherence behavior. Enriquez and McKinsey (2011) and Ugwu and Eneh (2013) observed that many HIV-infected persons in developed countries face a lot of difficulties and challenges maintaining adequate levels of adherence and recommended intervention programs to boost their adherence levels. However, considering the baseline and post-intervention data, on comparing the changes that occurred as a result of the intervention, it was observed that the control condition (being the normal clinic condition) reported much lower and mostly insignificant mean differences for all parameters (variables) of adherence outcomes. The experimental group recorded the highest mean

differences for all adherence outcomes. A similar study by Haya, *et al* (2009) observed that at post-intervention, 75.0% of participants previously partially adherent became adherent, and 38.7% of previously non-adherent became adherent. Similarly, a study by Edwin, Caroline, Koen, Frederikle (2014) demonstrated that peer adherence intervention does not just have an effect on the patients alone but also positively facilitates immunological restoration in well-functioning families. Strategically targeted theory-grounded interventions using theories like the Health Belief Model (Hochbaum, 1958), the theory of reasoned action (Ajzen, & Fishbein, 1969), and the theory of planned behavior (Ajzen, 1991) have been successful, all of which the preceding model (Green and Kauter, 1991) applies. Another example of cognitive-behavioral theory, the Information, Motivation, and Behavioral Skill (IMB) was employed in the study to provide a better understanding of a pathway that would enhance medication adherence in HIV and AIDS treatment. The IMB (Information, Motivation and Behavioral Skill) construct measured ARV's awareness, ARVs adherence motivation, self-efficacy, and reported medication adherence. The IMB model was initially used by Fisher, Fisher, Misovich, Kimble & Malloy (1996) in a research that was targeted at reducing the incidence of AIDS-risk behavior, which demonstrated that after an intervention that made use of the IMB model, participants showed significant increments in their preventive AIDS-risk behavior (Fisher, *et al*, 1996).

Lessons Learnt/ Contribution of study to knowledge/ policies

This study has provided new insight into the dynamics of HIV-Information in the context of treatment and prevention in the way that will produce expected behavior. In this study, evidence demonstrates that PE intervention is the major predictor of behavior adherence. HIV information facilitates behavior adherence and may be regarded as the modifying factor in HIV and AIDS prevention programs.

HIV Counseling and health education programs should take into account that adequate information about the likely consequences of non-adherence behavior and the benefits of optimum adherence is very vital in building Behavioral skills. However, the mode of presenting information should be embedded in a framework that will address various factors that are either constraints or

facilitators of the behavior, such as predisposing, reinforcing, and enabling factors.

Community interventions such as Information sharing should, therefore, not be isolated from community involvement/ participation. These together strengthen self-efficacy, and then readiness to adhere.

Peer education programs enable the client to perceive themselves as able to adhere to the instructions (self-efficacy) and provide a feeling of urgency to act as their fellow peers or see themselves as responsible for their health. Health Education should be a planned process of learning experiences needing a lot of preparations, designs, and learning activities rather than just a lecture or an unplanned talk or information on hearers (WHO, 2015).

It is also essential to be aware that other variables, such as fear, lack of knowledge, social supports, etc, which in the broad sense are referred to as predisposing, reinforcing, and enabling factors can form a great barrier between behavior skills and adherence practices. It is, therefore, important to note that HIV-Information should not only be about how to prevent the spread of HIV (with, for example, condom use) but also about the next line of action for a person whose status is HIV positive (which must include adherence information).

An instrument for this study can be a useful tool in a similar study and the findings are a reference guide for professionals involved in counseling PLWHA and other peer education programs. Findings can also be a useful guide in preparing training and counseling materials and strategies that will foster and/ or strengthen adherence.

This will improve health education and counseling services, and empower and/ or strengthen compliance to the intended behavior. It is a beneficial guide to counselors, health professionals, and their students' trainees and instructors in strategic information management of clients' information delivery, to engineer behavior change and modifications. All these will then promote a good and conducive work environment, serving as motivators both to the counselors and the counselees.

8 Conclusion

This study addressed the problem of non-adherence as it continues to remain a challenge in HIV treatment despite information provided to

the clients. Therefore, it is recommended that motivational counseling that facilitates comprehension and arouses readiness should be adopted in HIV counseling sessions to ensure adherence. From forgoing, it can be concluded that a strategically targeted theory-grounded Integrated Home-Based Care Programme intervention program will be more effective than the usual clinic-based program for the management of HIV/ AIDS.

Recommendation

Many recommendations are drawn from the results of this study and are as follow

- Well-wishers should sponsor a replication of this study throughout the region as the benefit from the study needs to be shared with others in the same condition.
- Health workers and organizations should be aware of their role in the sharing of correct and adequate HIV- and AIDS-related information.
- Health Educationists should not Isolate HIV- and AIDS-related information from strong motivational ingredients, capable of building behavior skills necessary for expected behavior.
- Government, Stakeholders, and NGOs should embrace full community involvement and collaboration especially, with HIV-positive patients and their families, with a holistic approach to HIV programs, addressing basic health information, including life skills such as coping with social, economic, and emotional strains.
- Health professionals should build a trusting relationship with community members to ensure continuity/ sustainability and openness in Motivation-communication regarding HIV- and AIDS-related information.
- Health workers should strengthen peer education and Home-based care in other to motivationally share HIV- and AIDS-related information. This will consider cross-cultural sensitivity and diversity as well as communication skills, thereby strengthening adherence.
- Stakeholders in the community should collaboratively work with non-governmental organizations; Community based organizations and faith-based organizations, specifically in the area of resources identification and mobilization for HIV-positive patients. This will give Clients a feeling of responsibility for their care and so improve adherence.
- Researchers should consider further research on cross-cultural appropriateness of the HIV-peer education system and adherence.

9 Limitations of Study

There might have been recall and social desirability bias from respondents and the absence of Pills count might have influenced the objectivity of the respondents. Lack of financial support from employers and philanthropists was another major limitation of this study, however, the report from this research was firsthand information from **PLWHA**.

Interpretation:

It is not gainsaying that the traditional clinic-based programs no longer meets the demands of PLWHA., hence a theory-grounded Integrated Home-Based Care Programme intervention program is considered more effective for the management of HIV/ AIDS.

Generalizability:

Despite the recall and social desirability bias from respondents and the absence of Pills, the responses given are a true reflection of the situation with PLWHA in Taraba State, more importantly; the sample data was drawn from PLWHA in Taraba State, Nigeria.

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