IMPACT OF PEER EDUCATION TRAINING PROGRAMME ON ANTI –RETROVIRAL MEDICATION ADHERENCE AMONG PLWHA: A QUASI-EXPERIMENTAL STUDY

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ABSTRACT

Background: Advancing global issue is Sub-optimal antiretroviral adherence. This study aim to improve medication adherence and appointment keeping through training of Peer-Educators, to arouse their concern and awareness necessary for ARV medication adherence. **Methodology:** A One-Group Pre- and Post-Test was adopted on Peer Education Training programme with control in Taraba, Nigeria. Questionnaire was validated and used to collect data from 60 PLWHA following ethical permission and informed consent. Descriptive inferential statistics were analysed. One-tailed independent sample T-test to determine impact of the intervention was done using percentage-change and Cohen's Effect Size with 5% level of significance. Validity and reliability of Instrument tested with Cronbach Alpha, 0.795. **Results:** respondents mean age was 35.38 ± 7.061, majority were married (66.7%), females (63.3%) self –employed (41.6%), Mumuye (25%), Christians (71.7%) with lower educational attainments (28.3%). For Control, predisposing factors on 137-point scale scored $\overline{X}$ = 78.10(2.11) ±11.92 and $\overline{X}$ = 83.10(1.16) ± **7**.23; Reinforcing on 15-points scale, $\overline{X}$ = 8.74(2.05) ±2.66 and $\overline{X}$ = 8.99(0.36) ±3.03; Enabling on 15-points scale, $\overline{X}$ = 7.32(0.76) ±**3.05** and $\overline{X}$ = 7.90(0.51) and Self-Reported Adherence on 24-points scale, $\overline{X}$ = 17.55(0.72) ±2.90 and $\overline{X}$ = 17.99(0.09) ±5.00 at baseline and post intervention respectively. Experimental group at baseline reported predisposing factors on 137-points scale, $\overline{X}$ = 70.00(2.07) ±15.15 and $\overline{X}$ = 88.10(6.10); Reinforcing factors on 15-points scale, $\overline{X}$ = 8.17(0.29) ±3.10 and $\overline{X}$ = 10.33(0.94) ±1.96; Enabling factors on 15-points scale, $\overline{X}$ = 6.99(1.14) ±2.24 and $\overline{X}$ = 8.80(1.14) ±2.55 and Self-reported Adherence on 24-points scale, $\overline{X}$ = 15.98(0.87) ±3.93 and $\overline{X}$ = 20.10(0.33) ±3.33 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.

KEYWORDS: Demography, Adherence, Predisposing, Reinforcing, Enabling.

BACKGROUND TO THE STUDY

Over Eighty four million people are infected with HIV with over 40 million deaths from the disease (WHO, 2023) and those currently living with the disease are thirty-eight million. Many people with active TB also get infevcted with the disease each year and nearly 2 billion people are infected with TB (CDC, 2017, WHO, 2023).

Millions of these numbers are still dying from AIDS-related causes since the beginning of the epidemic (Who, 2017). According to World Health Organization (WHO), over 70 million people have been infected with HIV virus with an average of 36 million deaths since 1981 when the first cases was reported with 1.6 million HIV-related deaths in 2012. The Sub-Saharan region remains the most severely affected and accounts for 69% of the

total number of people living with HIV globally (Fettig, Swaminathan, Murrill & Kaplan, 2014 and Who, 2017). One out of every twenty adults tend to be living with the disease in this region (Who, 2017). The first case of HIV was among some gay men in some regions of the United States of America reported first in 1981 (Denis and Becker, 2006), which has affected all people of different sexual, ethnic, geographic, and racial orientation since then, and has spread to all parts of the globe. Nigeria reported her first case of HIV in 1986 (Happy Boss, 2017) afterwhich, the prevalence rose sharply and then declined again, arriving at a national prevalence rate of 4.1% as at 2010 and in 2015, 3.10 (FMH, 2015) (With a rate of 0.9% among people ages 15-49). Nigeria account for the second largest population of people living with HIV worldwide (Oluwaveeboy, 2014) having an estimated 210,000 deaths from AIDS as reported in 2011 and 160, 000 (2016) (UNAIDS, 2017).

The burden of the disease has created much worries and disastrously impacted across the globe (CDC, 2017). However, the advent of antiretroviral medications has transformed the disease management so that mortality from HIV infection has fallen within a period of 10 years by about 50% - 80% resulting in a drop in the burden of HIV and AIDs (Gonzalo, García Goñi, and Muñoz-Fernández, 2009). Preventive and therapeutic benefits from antiretroviral therapy have been demonstrated by Researchers (Hyle and Dryden-Peterson, 2017, UNAIDS, 2016, and Bendavid, Holmes, Bhattacharya and Miller, 2012). The researchers emphasized adherence to treatment as important role in achieving positive clinical outcomes and bringing to halt, the progression to AIDS (Chiegil, 2017). Grave consequences follow poor ARVs adherence locally and globally so that Poor adherence to antiretroviral therapy was a major predictor of progression to AIDS and death in a study of Gonzalo, et al (2009), Resistance strains of the virus develop when there is poor adherence to medication and the medications will eventually lose its potency. Arguments from researchers also say the best outcome ARVs medication adherence provide is standardized to be the use of not less than 95% of ARVs at a given period of medication refills as prescribed (Ho, Bryson, and Rumsfeld, 2009) and McKenney, Munroe, and Wright, Jr., 1992).

A growing challenge in Nigeria today is suboptimal ARVs adherence as studies have linked poor adherence levels of ARV medications to various factors; non-adherence has been linked to educational status (Abo-Deif, Elsawi, Selim, and NasrAllah, 2015, and Antonogeorgos, Panagiotakos, Grigoropoulou, 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 travelling away from home to non-adherence to ARVs (Suleiman and Momo. 2016 and Nachega, Uthman, Peltzer, Richardson, Mills, Amekudzi and Ouédraogo 2014). Positive pregnant women attending Antenatal clinic have also been reported to be Non adherence to Anti-retroviral therapy (Matsui, 2012) or ARV medication is being linked to regular adherence counseling (Uusküla, Laisaar, Raag, Lemsalu, Lõhmus, Rüütel and Amico, 2017), the use of an adherence aid (pill box) (Hayes, Hunt, Adami and Kaye, 2006), Patient's educational level, marital status and occupation, which in turn has been found to be significantly associated with adherence to ARVs in Northern Nigeria (Nachega et al, 2014). A rivers state study in southern Nigeria reveal 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). A Nigeria study using text messages and adherence counseling improved HAART adherence in Nigeria to 76.9% when compared with 55.8% of the control group (Maduka, Tobin-West, 2012), though this is still short of the standard cut off of ≥ 95% (Suleiman and Momo. 2016, Ho, et al, 2009 and McKenney, et al, 1992).

Similarly, an Ilorin study reported a low adherence level of 73.3% and low level of education, adverse effect of antiretroviral medication and stigmatization as major reasons for non-adherence (Bello, 2011). In Osun, Nigeria, those who were given free drugs and offered regular adherence counseling achieved high adherence (Afolabi, Ijadunola, Fatusi, and Olasode, 2009) and an average adherence of 91% achieved in south eastern Nigeria study with the use of an adherence aid (pill box) (Akahara, Nwolisa, Odinaka, & Okolo, 2017 and Onyeonoro, Ebenebe, Ibeh, Nwamoh, Ukegbu, Emelumadu, 2013).

Major factors that contributed to non-adherence behavior included being busy at work or school, stigmatization and travelling away from home, forgetfulness, fasting, not having the medication with them, running out of the medication, being busy with other things, sleeping through the dose time (Lal, Kant, Dewan, & Rai, 2010). Marital status and occupation, Patient's educational level were found to be significantly associated with adherence to ARVs, others include being female, single, and having higher educational status, under 35 years, were significantly associated with non-adherence (Silva, Dourado, Brito, Silva, 2015). Limited research work has attempted the use of cognitive- behavioral theories in exploring ARVs adherence in Nigeria, its use could provide significant explanation to 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 Peer

Education Model to influence their skills and competences in motivational counselling 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 includes, to:

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 impact of the Peer Education Training program on Antiretroviral Medication Adherence amongst participants in this study.

METHODOLOGY

Research Design
This is Peer-Education intervention with Quasi-Experimental Research design (a one-Group Pre- and Post-Test Peer-Education intervention programme with control) this followed need assessment of the population.

Population
The study Population was the entire PLWHA who have been attending ante-natal clinics and are believed to have been receiving various health talks regarding the effective use of their medication regimens.

Description of Study Area
This study was conducted in the northern Taraba, from April, 2018 to March, 2019. Taraba State have three geo-political zones, Jalingo being the capital city. Prio to 1976, Taraba was divided into Muri, Mambilla and Wukari. The creation of Taraba State on 27th August 1991, gave it a new name of Northern, Central and Southern Taraba with over 80 ethnic groups spread across. Each of these tribes across the regions historically have their distinct and cultural heritage (Appendix/ Annex 7).

Northern Taraba have six Local Government Areas (LGAs) with five General Hospitals/ Referral Hospitals, one in each Local Government Area capital cities. On the contrary, Jalingo, the State Capital has two tertiary Hospitals, Specialist Hospital, Jalingo and Federal Medical Centre, Jalingo, Each of these Hospitals cater for the PLWHA.

Sample for this study was drown from four Hospitals such as Specialist Hospital, Jalingo, General Hospital Zing, First Referral Hospital, Sunkani, 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 geo-political region in Taraba State of the Federal Republic of Nigeria. Jalingo lies on coordinates $8^0$54'N $11^0$22'E. Specialist Hospital, Jalingo caters for approximately 118,000 population (2006 Census), who are mostly civil servants, peasant farmers and peti-traders. It also caters for 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 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 for 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 for 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 2006 census. Gassol is bounded North by 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 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 supports, social supports, 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
Sample Size: The sample size formula for comparison of two (2) independent group proportion was used.
$$N = (Z_\alpha + Z_\beta)^2 \text{ x p } (1-p)$$

D^2

Where, Z_α =1.96 and Z_β=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;
Minimum 'N' per health district = $(1.96 + 1.28)^2$ x 45 (1-0.45)
45(1-0.45)
= 10.5

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.
$N = (Z_\alpha + Z_\beta)^2$ x p $(1 - p)$
D^2

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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.

Sampling/ Sampling technique: A multi-stage and systematic random sampling protocol was 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 a period of 6 months to cover communities selected. Generally, a two-phase random sampling involving simple random sampling and systematic random sampling technique were adopted in the study. Initially, the three Geopolitical regions were selected by random sampling yielding the Northern Taraba as 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 sought for 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 the 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.

3.5 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.

3.6 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 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 of 53 questions of predisposing factors in HIV adherence which was considered on 137-point reference scale and divided into 3 sub-sections of Knowledge (information), perceptions and Attitude. B1 and B2 has 5 and 6 questions respectively with "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 a 11-point scale and the scope or adequacy of contents of Health counsel and messages delivered to PLWHA at the clinics measured on 6 points reference scale. Sub-sections B3 to B5 measured variables on ordinal (likert) scale response pattern ranging from "strongly agree" to "strongly disagree". Perceptions about HIV consists of 26 questions, considered on 105 points reference scale and included 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 measuring perceived benefits with 6 items measured on a 18 point scale; B4.2, measuring perceived threats on 30-points reference scale (with 5 items measured on 15 point scale for perceived severity of symptoms associated with AIDS and 5 items measured on 15 point scale for 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 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 24-point scale.

Procedure for data collection
Fifteen participants were derived from two Health Facilities to yield thirty and considered as control group. Another similar group was derived from another two Health Facilities, fifteen each to derive thirty participants and named intervention group. Initially, six research/programme assistants (called Peer Educators) were trained to become well acquainted with the rationale of the project materials to be employed,

outcome expected and research ethics. This was followed by a development of peer education training manual using information derived from the needs assessment conducted and structured in modular form.

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

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

Data was collected in two phases, baseline data 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 was 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 converted to percentage of the maximum scores on scale and rated in quartiles. For example, a mean score of 13.8 for intervention group and control for predisposing factors consisting of knowledge about HIV infectivity and treatment outcomes, on maximum scale of 14 was computed as $\frac{13.8}{14}$ X $\frac{100}{1}$ = 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 "Yes" or "No" response pattern on a reference scale of 11-points. 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 was used to measure this on "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 virus from the blood", etc).

Information Adequacy or **Scope of contents of Health Counsel and Messages** *about HIV Treatment*: **this consisted of 6 items on reference scale of 6-points. The** indicator was related to counsels delivered about ART adherence, Infant feeding options, HIV prevention and risk reduction options (eg, "we were not told about risk reduction options", "counselling 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 such as *Perceived Confidence about usefulness of information received, Perceive*

Benefits, Perceived Threats, Perceived Barriers, and Perceived Self-Efficacy. It consists of 26 items with response pattern, "Agree" to "disagree". The 5 parts or sub-variables of perception are as follows: perceived benefits which has 6 items measured on a scale of 18 and whose indicators were related to what PLWHAs perceive as beneficial from adherence behaviour 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 the scale of 30 points and investigating:

Perceived Severity of symptoms associated with AIDS. It consists of 5 items measured on 15 points scale and investigating the level to which PLWHAs perceive HIV symptoms as serious problem, such as "Symptoms of AIDS cause serious problems to life", "Having 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 perceived barrier. Indicators for this was related to the factors that serve as constraints to the adherence behaviour 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 was 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 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 is 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 rating scale of 0-3, measured on a 21-point scale, measuring the attitude of mothers towards Health information. Example 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 rating scale of 0-3 and measured on a 30-point scale.

The first sub-variable, **reinforcing factors** has 5 items measured on 15-point scale. Indicators for this relates to the emotional and appraisal supports 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", "Support group(s) assist me in providing medication subsidy reducing cost of treatment".

Medication Adherence and Appointment-Keeping Behaviour: For this variable, rating scale of 0-3 was used on 8 items with 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 behaviour 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. In order 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 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 in 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 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 was applied and test of hypotheses was presented and level of significance of ≤ 0.05 was considered statistically significant. The application of 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 analysis 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 contents related to the problem under review. A measuring scale was also developed to ensure accuracy of the data collected. Constructs from a suitable model, the precede model (Lawrence and Green, 1974) was used to unveil the variables for designing the instrument. Reliability was ensured by pre-testing and by test, 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 every day vocabularies. The researcher also eliminated duplicate questions. However, the major challenge was a possible disguise in 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 in accordance with 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 the express access to the clinics and to the participants studied.

RESULTS

Demographic Characteristics of Respondents
The study enrolled 22 (36.7%) males and 38 (63.3%) Females (N= 60), who responded to the questionnaires. The ages of the respondents ranged between 17 years to

55 years with a mean score of 36.38 and standard deviation of 7.04, most of whom were married (66.7%) and of Christian faith (71.7%). The educational status of the respondents ranged from non-formal to higher education with majority being of the lower educational attainments (28.3%). The Mumuye ethnic group constituted majority of the respondents (25%), mostly, the self-employed (41.6%) as found on table 1.

Sixty five participants were considered and screened for the study but 5 were excluded for living in far distances. Sixty were confirmed eligible for the study, who were therefore studied, all of who completed the follow-up and analyzed.

Table 4.1: Frequency distribution of demographic characteristics of respondents in this study.

Variables	***(N = 60)	
	N	(%)
Sex		
Male	22	36.7
Female	38	63.3
Marital Status		
Single	18	30
Married	40	66.7
Separated	2	3.3
Religion		
Christian	43	71.7
Islam	17	28.3
Education		
Non-Formal	6	10
Primary	11	18.3
Secondary	18	30
Higher	25	41.6
Ethnicity		
Mumuye	15	25
Tiv	9	15
Fulani	7	11.7
Hausa	9	15
Jenjo	5	8.3
Others	15	25
Occupation		
Self-employed	25	41.6
Civil Servant	21	35
Applicant	6	10
Housewife	4	6.7
Student	4	6.7

*** Respondents in this study

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 $\overline{X} = 78.10(2.11) \pm 11.92$ at baseline and $\overline{X} = 83.10(1.16) \pm 7.23$ at post intervention period with significant positive changes (Mean Difference = 3.65%) having insignificant 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 $\overline{X} = 6.0(0.22) \pm 1.18$ at baseline and $\overline{X} = 8.0(0.30) \pm 1.66$ at post intervention period. This showed a positive change of 18.2% with 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 $\overline{X} = 70.33(1.08) \pm 8.30$ at baseline while at post intervention period, it scored 75.23(1.27) ± 7.05 yielding a change of 4.4% positively. This showed that the level of Perception about HIV insignificantly 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 $\overline{X} = 10.17(0.50) \pm 1.12$ at baseline which increased by 17% at post intervention to 13.73(0.59) ±3.20 with significant difference (See table 2 for this information).

Table 4.15 Level of change for Measures of Predisposing Factors involved in Medication Adherence in HIV/AIDS Treatment at Post-Intervention for Control.

VARIABLES	Reference Scale	Baseline N=30		Post-Intervention N=30		% Change
		$\overline{X}(SE)$	±SD	$\overline{X}$ (SE)	±SD	
PREDISPOSING FACTORS	137	78.10(2.11)	11.92	83.10(1.16)	7.23	3.65
Conscious Awareness and Knowledge about HIV and Treatment	11	6.0(0.22)	1.18	8.0(0.30)	1.66	18.2
Information Adequacy about HIV Treatment	6	4.3(0.17)	0.95	5.4(0.20)	1.11	18.3
Knowledge about HIV	5	3.0 (0.20)	1.07	4.9(1.02)	0.53	38
Perceptions about HIV Treatment	105	70.33(1.08)	8.30	75.23(1.27)	7.05	4.4
Perceived Confidence about usefulness of information received	27	19.77(0.65)	3.12	18.23(0.44)	4.01	-5.7
Perceive Benefits	18	9.30(0.48)	2.04	12.60(1.12)	1.07	18.3
Perceived Threat	30	16.33(0.51)	3.31	20.2 3(0.65)	3.54	13
Perceived Barriers	15	8.70(0.54)	2.96	7.73(0.48)	1.74	-6.5
Perceived Self-Efficacy	15	10.57(0.55)	3.01	10.60(0.36)	1.06	0.2
Attitudinal Disposition	21	10.17(0.50)	1.12	13.73(0.59)	3.20	17

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

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 $\overline{X} = 70.00(2.07) \pm 15.15$ at baseline and $(\overline{X} = 88.10(6.10) \pm 1.27$ at post intervention period with significant positive changes yielding a difference of 13.2% 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 $(\overline{X} = 6.49(1.01) \pm 1.23)$ at baseline and $\overline{X} = 8.43(2.12) \pm 1.24$ 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 17.6%. 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 $\overline{X} = 60.73(2.09) \pm 11.12$ at

baseline and 71.90(1.00) ±3.57 at post intervention with significant difference of 10.6%. 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 $\overline{X} = 11.63(1.94) \pm 1.99$ at baseline which increased at post intervention to 15.00(0.71) ±2.18 with significant positive difference of 16%. This information is found on table 3.

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	Reference Scale	Baseline N=30		Post-Intervention N=30		% Change
		$\overline{X}(SE)$	±SD	$\overline{X}$ (SE)	±SD	
PREDISPOSING FACTORS	137	70.00(2.07)	15.15	88.10(6.10)	1.27	13.2
Conscious Awareness and Knowledge about HIV and Treatment	11	6.49(1.01)	1.23	8.43(2.12)	1.24	17.6
Information Adequacy about HIV Treatment	6	4.07(1.20)	1.31	5.99(0.13)	1.09	32
Knowledge about HIV	5	3.97(0.18)	0.71	4.97(0.15)	0.09	20
Perceptions about HIV Treatment	105	60.73(2.09)	11.12	71.90(1.00)	3.57	10.6
Perceived Confidence about usefulness of information received	27	20.50(1.19)	3.06	23.01(0.50)	2.71	9.3
Perceive Benefits	18	7.80(2.30)	2.72	13.33(0.30)	1.72	30.7
Perceived Threat	30	16.00(2.75)	4.99	22.57(0.86)	4.01	21.9
Perceived Barriers	15	9.60(0.41)	3.51	6.70(2.32)	1.26	-19.3
Perceived Self-Efficacy	15	11.79(0.46)	0.56	11.07(1.34)	1.27	-5.5
Attitudinal Disposition	21	11.63(1.94)	1.99	15.00(0.71)	2.18	16

*Percentage change recorded between baseline and post-intervention scores

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.

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 8.74(2.05) ± 2.66 at baseline which increased marginally at post intervention to 8.99(0.36) ± 3.03 without significant difference yielding a positive change of 1.7%. **The level of** Enabling Factors in ART Medication, on a maximum scale of 15 reported a mean score of 7.32(0.76) ± 3.05 at baseline and 7.90(0.51) ± 1.79 at post intervention with a slight change of 0.58% (having no significant difference). Self-Reported Adherence with reference scale of 24 points reported a mean score of 17.55(0.72) ± 2.90 at baseline and marginally increased to 17.99(0.09) ± 5.00 at post intervention with a positive change of 1.83%. 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.

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 8.17(0.29) ± 3.10 at baseline which increased marginally at post intervention to 10.33(0.94) ± 1.96 with positive difference of 14.4%. **The level of** Enabling Factors in ART Medication, on reference scale of 15 reported a mean score of 6.99(1.14) ± 2.24 at baseline and 8.80(1.14) ± 2.55 at post intervention with positive difference of 12.1%. Self-Reported Adherence with maximum score of 24 points reported a mean score of 15.98 (0.87) ± 3.93 at baseline and significantly increased to 20.10(0.33) ± 3.33 at post intervention. This revealed that the Adherence to HIV-Information and Medication instructions, including appointment keeping raised significantly with a positive difference of 17.2% at post intervention evaluation. This information is found on table 5.

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	Reference Scale	Baseline N=30		Post-Intervention N=30		% Change
		$\overline{X}(SE)$	±SD	$\overline{X}$ (SE)	±SD	
Reinforcing Factors	15	8.74(2.05)	2.66	8.99(0.36)	3.03	1.7
Enabling Factors	15	7.32(0.76)	3.05	7.90(0.51)	1.79	0.58
Self-Reported Medication-Adherence Client retention (SRMACR)	24	17.55(0.72)	2.90	17.99(0.09)	5.00	1.83

*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	Reference Scale	Control Group N=30		Experimental Group N=30		% Change
		$\overline{X}(SE)$	±SD	$\overline{X}$ (SE)	±SD	
Reinforcing Factors	15	8.17(0.29)	3.10	10.33(0.94)	1.96	14.4
Enabling Factors	15	6.99(1.14)	2.24	8.80(1.14)	2.55	12.1
Self-Reported Medication-Adherence and Client retention (SRMA)	24	15.98(0.87)	3.93	20.10(0.33)	3.33	17.2

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

DISCUSION OF RESULTS

A wide range of age categories were represented in the study with age range of 17 – 55. This shows that respondents were of age of accountability and so could give responsible responses and corresponds with the report of the Federal Ministry of Health (2015), reporting HIV national prevalence rate among people aged 15-49. Respondents are also of accountability age and holds responsibilities for themselves and dependents. Female gender constituted a majority (63.3%); who though were married and self-employed; some were either divorced or separated, accounting for their vulnerability socio-economically and emotionally. Females also portray better health seeking behavior and tend to contact Health Care System better, especially, during pregnancy for Ante-natal care (ANC) and Post-natal care visits. Females also take up caring responsibilities-accompanying the sick to the hospital and so gain the privilege of accessing medical check-ups as they tend to get concerned over their body and health.

Poverty rate and unemployment levels are also high, accounting for over 40% of respondents which may be a factor impacting much on the lives of the PLWHA and may be limiting their level of HIV information comprehension and consequently, sub-optimal adherence. The literacy status of respondents was relatively low, especially, for the female gender (about 20% had non-formal and primary education) and their perceived sub-servient social status is felt to account for a larger infection rate among them.

The Mumuye ethnic group (25%) accounted for high population of the respondents and this was felt to be attributed to their high socio-cultural lifestyle which people consider as highly vulnerable. Taraba health services also enjoy subsidy program on health care and free ART given by the National Action Committee on AIDS (NACA). This health care support attracts patients from the neighboring States and Local Government Areas.

The Christian faith constitutes majority of the participants, which may result from the pre-dominance of the Christian population in study area (71.7%). However, the religious linkages of the respondents could be valuable support mobilization resource for strengthening collaboration between the Health facility and staff, PLWHA, Families, Government, NGOs and social supports/ self-support facilities that will drive forward the sharing of HIV-Information, facilitating comprehension and Adherence supports.

Predisposing Factors responsible for HIV-Medication Adherence in this study supported the findings of Green (1999), when he reported that personal level factors can influence health-related behaviors (adherence), by encouraging or inhibiting the adherence behavior from occurring, for example, information or knowledge, perceptions, and attitudes, increases peer educators' were trained with consequent improvement in adherence behavior. Gibson, Mary, Esther, Andrew, Amos, mani, Godfather, Chacha, Doris, & Godlisten (2018) reported respondents low level of knowledge of risk factors, prevention strategies and their associated complications, similar to this study where the Level of Consciousness Awareness and Knowledge as sub-variable of predisposing factor in HIV-Medication Adherence at post intervention period yielded a significantly positive difference in the level of Consciousness Awareness and Knowledge about HIV Infectivity and Treatment Outcomes.

The of information in Health Counseling delivered to PLWHAs increased significantly which supports Chiegil & Atulomah (2015) study concluding 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 the importance of information as necessary ingredients for behavior skills. The provision of adequate information to the PLWHA, will increase the likelihood of adopting healthy behavior. Similarly, a Thailand study by Ministry of Public Health (2000), as reported by about 3/4th of the clients admitted receiving adequate information from the counselors. Hoarding of information from the clients as done in many routine clinics will reduce knowledge and awareness about treatment regimens and result in suboptimal adherence.

Participants' perceptions of Adherence to HIV medication at post intervention increased significantly in this study resulting from the Peer Education training program. A Ghana study reported perception of risk of HIV as generally low with likely predisposition to risk behaviors, and health risks (Eugene, Akwasi and Kofi,

2016). Nurses should therefore, increase their efforts to campaign for the peer education (PE) programs that would help to increase the perceived risks of HIV and should include factors affecting perception.

Johs, Kellar-Guenther, Jankowski, Neff and Erlandson (2019) reported that those who adheres to treatment regimen emphasized positive reinforcement and social supports including raised self-efficacy following adherence interventions. However, for Non-adherers, there was emphasis on constraints to health behavior and lack of motivation, self-efficacy as well as a negative perception of the intending behavior culture. Those who did not adherer identified the need for activities that are behavior-appropriate as a feature of an ideal adherence environment and time, cost and health-related challenges identified as barriers to intending behavior by both groups. Similarly, a constraint falls significantly following the intervention. This barrier situation to medication adherence is after the similitude of the findings of Dawood (2015) who reported significant level of barriers in Adolescent HIV treatment. However, this PE training program significantly diminished constraints to HIV treatment and adherence so that a raised level of barrier will less likely favor the practice of health behavior.

Perceived Self-Efficacy to practice Medication Adherence might have achieved coincidental fall, or limited time for the study couldn't accord participants enough time self-efficacy building. In other words, surrounding factors (socio-cultural, social support, etc) could interfere with belief of respondents' on their ability to optimally adhere to treatment regimen. Contrary to this, Jamie and Leslie (2014) in a study of self-efficacy and adherence reported that Participants with higher self-efficacy were less likely to practice behaviors that are health depreciating ($P = .031$), and were less likely to fail medication adherence. However, though self-efficacy diminished in this study, there was a considerable improvement in all other parameters for adherence.

Attitudinal Disposition of PLWHAs experienced significant impact of PE intervention on the participants at post intervention towards HIV treatment, Appointment keeping and Health Counsel and Messages Delivered at HIV Clinics. This aspect of good attitude observed in this study is similar to the findings of some Nigeria studies reported by Azuka & Uche (2012) and Kasumu & Balogun (2014). In this study, a positive attitude towards ART exist, even though this was a usual study of clinic condition and so still reported a sub-optimal adherence level.

Dizaji, Rastgarimehr, Shafieyan, Mansourian, Hoseini, Arzaghi, Qorbani, Rezapoor, Asayesh, Charkazi, and Ansari (2015) reported similar results in the level of Reinforcing and Enabling Factors in ART Medication. Following an educational intervention, study achieved a significant increase in the mean scores for reinforcement and enabling factors (p- value >0.001); In taking self-care actions in the patient, Predisposing, enabling and reinforcement factors were all affected so that wide shift in enabling and reinforcing factors for the experimental group at post intervention represents an impact of the PE intervention studies.

Self-Reported Adherence was considered in terms of taking HIV medicines every day and exactly as prescribed, keeping all medical appointments and sticking firmly to HIV treatment regimens including starting HIV treatment (AIDSinfo, 2019). Adherence to Medication instructions, HIV-Information and appointment keeping had a significant positive improvement for the experimental group at post intervention. This shows that the impact of the PE training intervention was significant on the participants during the study. This is not different from the what Green (1999) reported about predisposing factors as potentially capable of impacting on adherence and other health behaviors, by either facilitating or inhibiting adherence behavior. Haya, Baojin, Douglas, Nicolas and William (2009) also reported similar observations raised by green that adherence improvement is an aggregate result of corresponding improvements in predisposing factors following an intervention: in this study, 75.0% of respondents who previously adhered partially became adherent, and 38.7% of previously non-adherent became adherent. Enriquez and McKinsey (2011) and Ugwu and Eneh (2013) however observed that lots of HIV-infected persons in developed countries face a lot of difficulties and challenges in the maintenance of optimal levels of adherence and recommended intervention programs to boost their adherence levels.

Study shows a significant difference (P<0.0001) with significant change in percentage of 12% at post intervention which correlates with empirical studies that reported a positive and significant correlation between social support and treatment adherence among participants. A meta-analysis by Tricia and Robin (2013) reviewed a number of empirical studies and reported an adherence level of 27% increase following a PE support. DiMatteo (2004) also found patients' health as benefiting from social support and does so by counteracting the effects of stress, modifying affective states, raising behavioral skills and improving health behaviors.

There was also a significant difference in Reinforcing factors for medication adherence (P= 0.869 which is p<0.05) between the control and experimental groups reporting a significant change in (14.4%), suggestive of a significant difference in average scores for reinforcing factors for adherence behavior for control group from mean scores for experimental group at post intervention. This means that the PE intervention caused some changes in reinforcing factors for medication adherence. Dizaji, et al (2015) conducted a similar study and found that the mean scores increased for reinforcement factors and enabling factors significantly (p- value >0.001). This

change was found to be as a result of the educational intervention that was implemented in the study.

Perceptions about HIV was tested and found to change by percentage of 10.6% at post intervention. There are some other studies that reported self-efficacy of participants with increased impact who proved less likely to practice depreciating health behaviors ($P = .031$), with increased likelihood of adherence behavior. In this study, there was a significannt demonstration of positive changes for all other adherence parameters.

Participants Medication adherence increased widely in HIV treatment with percentage change of 17.2% at post intervention which means that the PE intervention produced a greater impact on medication adherence behavior for the intervention group. Contrary to this finding, Enriquez & McKinsey (2011) and Ugwu & Eneh (2013) reported many challenges faced by HIV-infected persons in developed countries that militated against the maintenance of optimal adherence with consequent recommendations of some intervention programs for adherence improvement. A comparative measurement of the resultant changes from the intervention revealed that the control condition scored much lower and mostly a mean differences that is not significant for all outcome variables (adherence). The highest mean differences reported was that of the experimental group for all adherence outcomes. This study reported findings that were measured after the similitude of Haya, et al (2009), that 75.0% of participants previously partially adherent at post-intervention became adherent and 38.7% of those that did not adhere now adhered. Edwin, Caroline, Koen, Frederikle (2014) demonstrated similar result where interventions for peer adherence impacted not just on the patients alone but also demonstrated a positive immunological restoration in families that were functioning well.

Lessons Learnt/ Contribution of study to knowledge/ policies
This study has demonstrated the importance of peer education in the treatment and prevention of HIV in the way that will produce expected behavior. Study demonstrates evidence that PE intervention is major predictor of adherence to HIV treatment. HIV-information (considered as modifying factor in HIV and AIDS prevention programs) facilitates self-efficacy, which in turn strengthen adherence.

Those who work in HIV Counseling and health education should note the importance of giving adequate information about the likely consequences of non-adherence behavior and the benefits of optimum adherence. This will strengthen self-efficacy and then, adherence. The information should however, be disseminated using a framework for addressing various factors that are either constraints or facilitators of the

behavior, such as predisposing, reinforcing and enabling factors.

Community and public health interventions should incorporate community involvement/ participation to strengthen self-efficacy, and adherence.

Data collection Instrument for this study can serve as useful tool when conducting similar study and findings can be used as reference guide for professionals involved in counseling PLWHA and other peer education programs. Findings to this study can also be useful guide to policy makers and in drawing up training and counseling modules for fostering adherence.

With this, health education and counseling services will be improved, and intended behavior modified. It can serve as guide to counselors and health professionals in strategic information delivery for behavior change and modifications

CONCLUSION
This study addressed the challenge posed by non-adherence behaviors in HIV treatment. It is therefore, recommended that motivational counseling should be implemented in all HIV programs to facilitate arousal of adherence readiness in HIV counseling sessions. It can be concluded that when targeted theory-grounded Peer education interventions are strategically directed, effective results will ensure than the use of the usual clinic-based program for the management of HIV/ AIDS.

Recommendation
Many recommendations are drawn from the results of this study and include:
- Health workers and counselors should provide the correct and adequate HIV- and AIDS-related information to their clients.
- Health Educationists should not Isolate HIV- and AIDS-related information from strong motivational ingredients, capable of building behavior skills necessary for expected behavior.
- Health professionals should build strong and trusting relationship with Health facilities and the community members in order to ensure continuity/ sustainability and openness in Motivation-communication regarding HIV- and AIDS-related information.
- Health workers should strengthen peer education approach in the care of HIV- and AIDS-related patients.
- 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 HIV-peer education system and adherence.

Limitations of Study

This study experience recall and social desirability bias from respondents and the absence of Pills count might have influenced the objectivity of the respondents. There was no financial support too.

Generalizability: Despite the recall and social desirability bias from respondents and the absence of Pills, the responses given are 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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