FACTORS ASSOCIATED WITH ADHERENCE TO ANTIRETROVIRAL THERAPY AMONG PEOPLE LIVING WITH HIV/AIDS ATTENDING FEDERAL MEDICAL CENTRE, GUSAU, ZAMFARA STATE

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NIGERIA

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A THESIS SUBMITTED TO POST GRADUATE SCHOOL, AHMADU BELLO UNIVERSITY ZARIA, IN PARTIAL FULFILMENT OF THE REQUIREMENT FOR THE AWARD OF MASTER OF PUBLIC HEALTH (FIELD EPIDEMIOLOGY) DEGREE

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DECEMBER, 2014.

CERTIFICATION

I certify that the work for this dissertation entitled "Factors associated with adherence to antiretroviral therapy among people living with HIV/AIDS attending Federal Medical Center, Gusau, Zamfara State, Nigeria" by Aliyu Nuruddeen meets the regulation governing the award of the degree of Masters of Public health (Field Epidemiology) of Ahmadu Bello University, Zaria and is approved for its contribution to knowledge and literary presentation.

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ATTESTATION

I declare that the work in the thesis entitled "Factors associated with adherence to antiretroviral therapy among people living with HIV/AIDS attending Federal Medical Center, Gusau, Zamfara State, Nigeria" was performed by me in the Department of Community Medicine, Ahmadu Bello University, Zaria under the supervision of Prof. Kabir Sabitu and Dr. Aisha Abubakar.

The information derived from the literature has been duly acknowledged in the text and a list of references provided. No part of this dissertation was previously presented for another degree or diploma at any university.

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Name of Student	Signature	Date

DEDICATION

This work is dedicated to my beloved parents for the proper upbringing, care and support they rendered to me; it is also dedicated to my entire family who gave me moral support during the two years of this study.

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Majesty, exaltation and Glory belong to Allah alone, the lord of all that exists, who taught man what he knew not. May his choicest salat and peace be upon our noble prophet Muhammad and upon his households and companions till eternity.

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LIST OF ACRONYMS

AIDS	Acquired Immune Deficiency Syndrome
ART	Antiretroviral Therapy
ARV	Antiretroviral Drugs
CDC	Center for Disease Control and Prevention
CI	Confidence Interval
FGD	Focus Group Discussion
FMC	Federal Medical Centre
GFTAM	Global Fund to Fight AIDS, Tuberculosis and Malaria
HAART	Highly Active Antiretroviral Therapy
HCT	HIV Counseling and Testing
HIV	Human Immunodeficiency Virus
MH	Mantel Haenszel
MOH	Ministry of Health
OR	Odds Ratio
PEPFAR	President`s Emergency Plan for AIDS Relief
PLHIV	People Living With HIV
UNAIDS	Joint United Nations Programme on HIV/AIDS
USAID	United States Agency for International Development
WHO	World Health Organization

SUMMARY

The human immune deficiency virus (HIV)/ AIDS remains a worldwide public health challenge. Globally, there were approximately 35.0 million people living with HIV at the end of 2013. And about 39 million people have died of the disease so far. Sub-Saharan Africa has less than 15% of global population but accounts for nearly 70% of people living with HIV (PLWHIV) worldwide.[1] Nigeria, accounts for 10% of PLWHIV globally. Nigeria has an estimated 3.3 million PLWHIV with about a million eligible for antiretroviral therapy (ART). Antiretroviral therapy (ART) success depends on sustainable high rates of adherence to ART. The general objective of the study was to determine factors influencing adherence to antiretroviral therapy among people living with HIV/AIDS attending ARV clinic at Federal Medical Centre Gusau, Zamfara State.

The study was conducted in Federal Medical Center, Gusau, Zamfara State, using cross-sectional design. Study population included HIV/AIDS Patients aged 15 years and above attending the ARV clinic in FMC Gusau. A total of 183 patients were sampled using Systematic random sampling technique. Both qualitative and quantitative method (mixed methods) of data collection was used. Semi-structured questionnaire was administered by trained research assistants. Data was analyzed using Epi-Info software version 3.4.3. Knowledge was assessed using knowledge score and unsatisfactory knowledge was set at score of < 5. Univariate, bivariate and multiple logistic regression analyses were conducted.

The majority of the respondents were females (77.1%) with mean (±SD) age of 34.2 ±8.7 years. The mean knowledge score (±SD) was 5.6 ±1.3 where 85.3% had satisfactory knowledge. 15.3% of the respondents had less than 95% adherence level. The independent factors associated with non-adherence to ART included: Forgetfulness (OR 13.7; 95% C.I:

4.7 – 39.9), as patients who forgot to take their drugs were 13.7 fold more likely to be non-adherent. Fear of stigma/ Disclosure of HIV status (OR 42.0; 95% C.I: 4.8 – 365.5), as individuals who had fear of stigma were 42.0 fold more likely to be non-adherent. Felt better or healthy (OR 11.8; 95% C.I: 1.0 – 135.4), as individuals who missed their drugs because they felt better were 11.8 folds more likely to be non-adherent, and Inability to pay for transport to clinic (OR 11.8; 95% C.I: 1.0 – 135.4).

This study showed that the majority of the respondents are females, at their reproductive age group with low educational status and unemployed. Majority had satisfactory knowledge on HIV/AIDS and ART. The level of adherence to ART among PLWHIV at FMC Gusau was high. Fear of stigma/ Disclosure of HIV status, inability to pay for transport to clinic, forgetfulness and felt better or healthy are independent risk factors that are associated with non-adherence. The study recommended that Public health department of Zamfara state MOH and ZAMSACA should sponsor public enlightenment on HIV/AIDS through the media which may help reduce stigma and encourage voluntary HIV status disclosure. And Reminders such as alarm and stickers (plain) should be used by patients to remind them when their medication is due.

Key words: HIV/AIDS, Adherence, Antiretroviral therapy, Nigeria

CHAPTER ONE

INTRODUCTION

1.1 Background

The human immune deficiency virus (HIV) infection epidemic continues to spread in the population making HIV one of the most important public health crises in the world. Globally, 35.0 million people were living with HIV at the end of 2013. An estimated 0.8% of adult aged 15-49 years worldwide were living with HIV, although the burden of the epidemic continues to vary considerably between countries and regions.[1] Sub-Saharan Africa remains most severely affected with nearly one in every 20 adults (4.9%) living with HIV and accounting for nearly 70% of the people living with HIV world wide.[1]

Many African countries are experiencing generalized epidemic (national HIV prevalence of more than 1%). But, among those countries with generalized epidemics, a combination of behavior changes, including reductions in numbers of sexual partners, increased condom use, and delayed age of first sex, have reduced new infections (incidence).[2] HIV incidence in urban Zimbabwe fell from an extremely high peak of almost 6% in 1991 to less than 1% in 2010.[2] The vast majority of people newly infected with HIV in sub-Saharan Africa are infected during unprotected heterosexual intercourse (including paid sex). Having unprotected sex with multiple partners remains the greatest risk factor for HIV in this region. Large proportions of people living with HIV are in long-term relationships—62% in Kenya and 78% in Malawi. And there are two approaches to reduce the epidemic: preventing new HIV infections and providing antiretroviral treatment to people who need it.[2]

Nigeria, with about 2% of the world's population, accounts for about 10% of people living with HIV (PLWHIV) globally with an estimated 3.3 million PLWHIV[3]. Of these,

about a million are eligible for antiretroviral therapy (ART). The government with support of several partners such as global health initiatives, e.g., the United States (US) President`s Emergency Plan For AIDS Relief (PEPFAR) and the Global Fund to Fight AIDS, Tuberculosis and Malaria (GFTAM) has rapidly scaled up ART enrollment and has steadily increased number of patients initiated on ART from 90,008 in 2006[4] to an estimated 300,000 at the end of 2009.[5] Antiretroviral (ARV) drugs have to be taken as a lifelong therapy and their success relies on continual adherence to the medication regimen.[6] A rate of adherence of approximately 95% is required to avoid rapid development of drug resistance and treatment failure.[7]

Treatment adherence is defined as the extent to which a person currently takes prescribed medication. It is widely agreed that in order to achieve an undetectable viral load and prevent the development of drug resistance, a person on ARV drugs need to take at least 95% of prescribed doses on time.[8,9] There is no gold standard to measure adherence, commonly used method includes: patient self-report, pill count, pharmacy refill records, drug level monitoring, and physician assessment. Patient self report is the most common method of adherence assessment.[6,8,9,10] Patient self-report has proven reliable since the estimation of CD4 cell count and viral load in some of the studies[11] correlated well with the high adherence to drug therapy achieved. Drug level monitoring and electronic drug monitoring methods of measurement are not commonly used in adherence studies in developing countries because they are expensive, technically difficult, and require laboratory testing and training of personnel. Even studies in advanced countries in North America and Europe where these methods are utilized more often, studies still shows a large dependence on patient self report[6]. Adherence has shown to be a major predictor of

viral suppression of HIV replication, emergence of drug resistance, disease progression and death. Adherence monitoring and evaluation of ART are therefore, essential public health surveillance tools in the prevention of HIV in high, middle, and low income countries.[6]

1.2 Problem Statement

The human immune deficiency virus (HIV) infection epidemic continues to spread in the population making HIV one of the most important public health crises. Nigeria is home to the second highest number of people living with HIV in the world, accounting for about 10% of people living with HIV (PLWHIV) globally with an estimated 3.3 million PLWHIV.[3, 17] of these, about a million need antiretroviral therapy (ART). Approximately 220,000 people die from AIDS in Nigeria in 2009.[15] The number of people living with HIV continue to increase, AIDS-related illness remain one of the leading causes of death globally and are projected to continue as significant global cause of premature mortality in the coming decades.[3] A rate of adherence of approximately 95% is required to avoid rapid development of drug resistance and treatment failure. Sub-Saharan Africa remains the worst affected region, with over 68% of all adults infected with HIV lived in the region. Nigeria is one of the countries most affected in the region, with a national prevalence of 4.1% while the HIV prevalence in Zamfara State is 2.1% in 2010.[45]

It is widely agreed that in order to achieve an undetectable viral load, prevent the development of drug resistance and treatment failure, a person on ARV drugs need to take at least 95% of prescribed doses on time. Treatment discontinuation raises some of the same concerns about drug resistance that incomplete adherence does and, even worse, negates much of the benefit sought by those implementing treatment programs. Patients with clinical AIDS who discontinue ART will likely die within a relatively short time.

with AIDS claiming so many lives, Nigeria life expectancy has declined significantly in 2010, and the overall life expectancy was only 52 years.[15] The commonest reasons for missing doses were forgetfulness, traveling far away from home, being too busy, and unclear dosage instructions Other reasons for missing doses were patients` education of HIV and ART, marital problems, Socio-demographic characteristics, HIV status disclosure, substance abuse and drug side-effects, missing of clinic day due to lack of transport fare.[8] Strategies used to increase ART adherence include: use of social support intervention, reminders, availability of ART services, home based care and patients education. Successful treatment response was observed to be significantly higher among patients with an assigned community health worker, and participation in a support group also had a significant positive effect on the selected virological and immunological measures. Complete case analysis revealed that the proportion of participants with optimal adherence increased from 85% to 91% patients during the intervention period with mobile phone reminders. Despite measures put in place to achieve optimal adherence, a significant proportion of patients do not reach high level of adherence.[8]

Because local context can have a great bearing on how patient can behave with regard to adherence and findings from this research will contribute to the overall knowledge base of key factors leading to non-adherence to ART within a local context, as PLWHIV/AIDS accessing ART services at Federal Medical Center, Gusau may have contextual factors such as culture, belief, personality and health seeking behavior. Determination of factors that are associated with adherence to antiretroviral therapy are good opportunity to identify potential obstacles to achieving optimal adherence to antiretroviral therapy and key findings will help policy makers and program managers address the challenges of non-adherence to treatment.

1.3 Justification

Appropriate use of antiretroviral therapy has improved the health of many human immunodeficiency virus (HIV) infected individuals who otherwise might have died. Notably, the efficacy of any treatment depends on sustained high levels of adherence to ART. Non-adherence to ART lead to partial virological suppression and emergence of resistant viral strains. In view of the above, there is an urgent need to identify those significant factors associated with non-adherence to ART to mitigate the consequences highlighted above. Fortunately, research probing into factors constraining adherence have been conducted in several part of the globe. However, because local context can have a great bearing on how patient can behave with regard to adherence, a more rigorous research is imperative especially among regions which have not been investigated. Zamfara State constitutes a region with a dearth of knowledge and findings on specific bottlenecks to ART adherence. Data reviewed on HIV/AIDS patients at FMC Gusau from 2009 to 2012 has shown that the trend of ART defaulters in Federal Medical Centre is on the increase, in 2011 alone, 140 patients (12%) defaulted on treatment out of 1200 patients on treatment.

As a result of the alarming and enormity of the consequences associated with ART non adherence, it is therefore both timely and necessary that this research is conducted in Zamfara State in order to have local data on factors associated with adherence to ART. Findings from this research will contribute to the overall knowledge base of key factors leading to non-adherence to ART within a local context.

1.4 Research Questions

1. What are the socio-demographic characteristics of people living with HIV/AIDS attending antiretroviral (ARV) clinic in Federal Medical Centre Gusau?
2. What is the level of knowledge of HIV/AIDS among PLWHIV/AIDS attending ARV clinic in Federal Medical Centre Gusau?
3. What is the level of adherence to therapy among PLWHIV/AIDS at Federal Medical Centre, Gusau?
4. What are the factors associated with adherence to antiretroviral therapy among PLWHIV/AIDS attending ARV clinic in Federal Medical Centre Gusau?

1.5 General and Specific Objectives

1.5.1 General objective

To determine factors influencing adherence to antiretroviral therapy among people living with HIV/AIDS attending ARV clinic at Federal Medical Centre Gusau, Zamfara State.

1.5.2 Specific objectives

1. To determine socio-demographic characteristics of people living with HIV/AIDS at Federal Medical Centre, Gusau.
2. To assess the knowledge of HIV/AIDS among people living with HIV/AIDS at Federal Medical Center, Gusau.
3. To determine level of adherence to ART among people living with HIV/AIDS at Federal Medical Centre, Gusau.
4. To determine provider-related factors that are associated with adherence to antiretroviral therapy among PLWHIV/AIDS at Federal Medical Center, Gusau.

5. To identify patient-related factors associated with adherence to antiretroviral therapy among people living with HIV/AIDS at Federal Medical Center, Gusau.

1.6 Scope of the Study

The scope of this research was to study factors that are associated with adherence to ART among PLWHIV at FMC Gusau. The study involves HIV/AIDS Patients aged 15 years and above attending ARV clinic at FMC Gusau during the study period. The study was hospital based and was limited around the areas of the stated specific objectives, and only one dimension of adherence was assessed.

CHAPTER TWO

LITERATURE REVIEW

2.1 Historical perspective

Adherence to combination antiretroviral therapy has a strong impact on virologic response and emergence of viral resistance. The euphoria that followed initial successes with combination antiretroviral therapy for HIV infection has begun to fade. Although combination therapy with HAART has dramatically prolonged and improved the quality of life of HIV-infected persons, the development of resistance to antiretroviral medications threatens the sustainability of these gains.[58]

The terms "adherence" and "compliance" are often used interchangeably. "Compliance" had traditionally been used to describe a patient's ability to take medications as prescribed, but recently this term has fallen into disfavor. Some have suggested that *compliance* connotes a paternalistic relationship between the physician and patient and that the *noncompliant* patient performs deviant behavior or exhibits weakness of character. "Adherence" better represents the more complex web among patient, provider, and medication and reflects the fact that following a medication regimen is not necessarily a simple choice. Non-adherence to medication regimens has been appreciated since antiquity. Hippocrates warned that physicians "should keep aware of the fact that patients often lie when they state that they have taken certain medicines.

Our understanding of adherence to HAART is truly in its infancy. Our current state may be analogous to our understanding of AIDS pathogenesis nearly 2 decades ago. Before interventions aimed at combating AIDS could be developed, the infectious agent had to be identified, the pathogenesis described, and the natural history characterized. Likewise,

an important step toward developing effective interventions that improve adherence to HAART will be based partly on our understanding of the forces behind non-adherence to complex antiretroviral regimens.[58]

2.2 Definitions

2.2.1 Adherence to ART

Adherence is a term used to describe the patients' behavior of taking drugs correctly based on mutual agreement between the patient and health care provider: it involves taking the right drugs, the right dose, the right frequency and at the right time.[56] Adherence also means a patient attending all scheduled clinic visits.[56] Adherence to ART is an essential component of individual and programmatic treatment success. Higher levels of drug adherence are associated with improved virological, immunological and clinical outcomes. Adherence level of ≥ 95% is necessary in order to maximize the benefits of ART. Adherence is crucial for delaying or avoiding the development of drug resistance and ensuring maximum durability of the first-line ARV regimen. Highly Active Antiretroviral Therapy (HAART) is the gold standard in the management of HIV/AIDS. HAART is the combination of three or more drugs from at least two different classes of antiretroviral (ARV) therapy belonging to nucleoside analogue reverse transcriptase inhibitors, non-nucleoside reverse transcriptase inhibitors and protease inhibitors.[56]

Adherence is dynamic, changing over time with significant proportions of patients not reaching good/ high level of adherence. The commonest reasons for missing doses reported by the studied patients were forgetfulness, followed by traveling away from home, then being too busy, and unclear dosage instructions among others. This implies that the majority of non-adherent patients need medication adherence devices such as

reminders, calendars, and strategies such as patient education and counseling.[8] Other reasons for missing doses were , marital problems, drug side-effects, missing of clinic day due to lack of transport fare and hospitalization, Other variables which were associated with adherence include age, sex, employment, knowledge of HIV infection and antiretroviral drugs, HIV status disclosure, alcohol intake, daily frequency of medication intake, and pill burden.[8]

2.2.2 Determination of adherence

Adherence was self-reported and patient was said to be adherent if he or she took at least 95% of the prescribed doses of ARV medications over the preceding 30 days before the interview.[36] Adherence was computed as the actual number of doses taken divided by the number of doses prescribed over a four week period and expressed as a percentage; those with at least 95% were classified as adherent while those with less than 95% were classified as non-adherent.

2.3 Measurement of Adherence

There is no gold standard for adherence measurement. Different methods exist for measuring adherence ranging from direct method such as biologic markers and body fluid assays and indirect method which is the most commonly used, this include: self reports, pill count, pharmacy refill records, electronic drug monitoring and physician assessment each of which has advantages and disadvantages. While a combination of these methods may be employed, patient self report is the most widely used.[42]

2.3.1 Self reporting

Self reporting is one of the most common methods to measure adherence. Patient reports the number of pills taken to provider, who records this rate against the patient's medical

history. Various different forms exist, such as medication diaries, self-administered questionnaire, and patient-provider interviews. It has a low staff and respondent burden. It is also inexpensive and flexible, and takes little time. It has the disadvantage of having recall bias and also patients may Patients may exaggerate the number of pills taken and general adherence behavior.[57]

2.3.2 Pill count

Pill counts involve counting the number of pills or tablets that remain in the patients' bottles or vials. The patient comes to the clinic with pill containers and the clinicians physically count the left over pills. The return of excess pills provides tangible evidence of non adherence. This method has disadvantage that patient may not actually be taking the pills and might even be throwing them away. Time consuming: requires a nurse or health official from the provider clinic or heath center to count the pills also does not provide an accurate perspective of the patient's medication-taking behavior.[57]

2.3.3 Pharmacy refill records

Health care provider reviews the patient's pharmacy records to determine levels of patient adherence. The Health care provider will have objective information on the rates of refilling prescriptions that can be used to assess whether a patient is adhering to the drug regimen or not. Doses are either by directly observed treatment recorded accordingly, or certain quantities of ARVs are dispensed to each individual patient. This method can only be assured to be 100% correct when all doses are observed and properly recorded by health provider.[57]

2.3.4 Electronic drug monitoring

The patient is provided with an electronic device that records the timing of the medication-taking behavior. The most widely used appears to be the Medication Event Monitoring System (MEMS), which is an electronic device placed in the cover of the pill bottle that records each time the bottle is opened as a dosing event. Another example is the Disease Management Assistance System that, in addition to providing verbal reminders, also records dosing time.[57] This method is expensive and not likely to be feasible in resource-constrained settings. In the case of MEMS, the possibility of receiving inaccurate readings exists because the pill bottle may be opened on occasions when the medication is not taken; however, MEMS will record this occurrence as a dosing event.[57]

2.4 Conceptual frame work

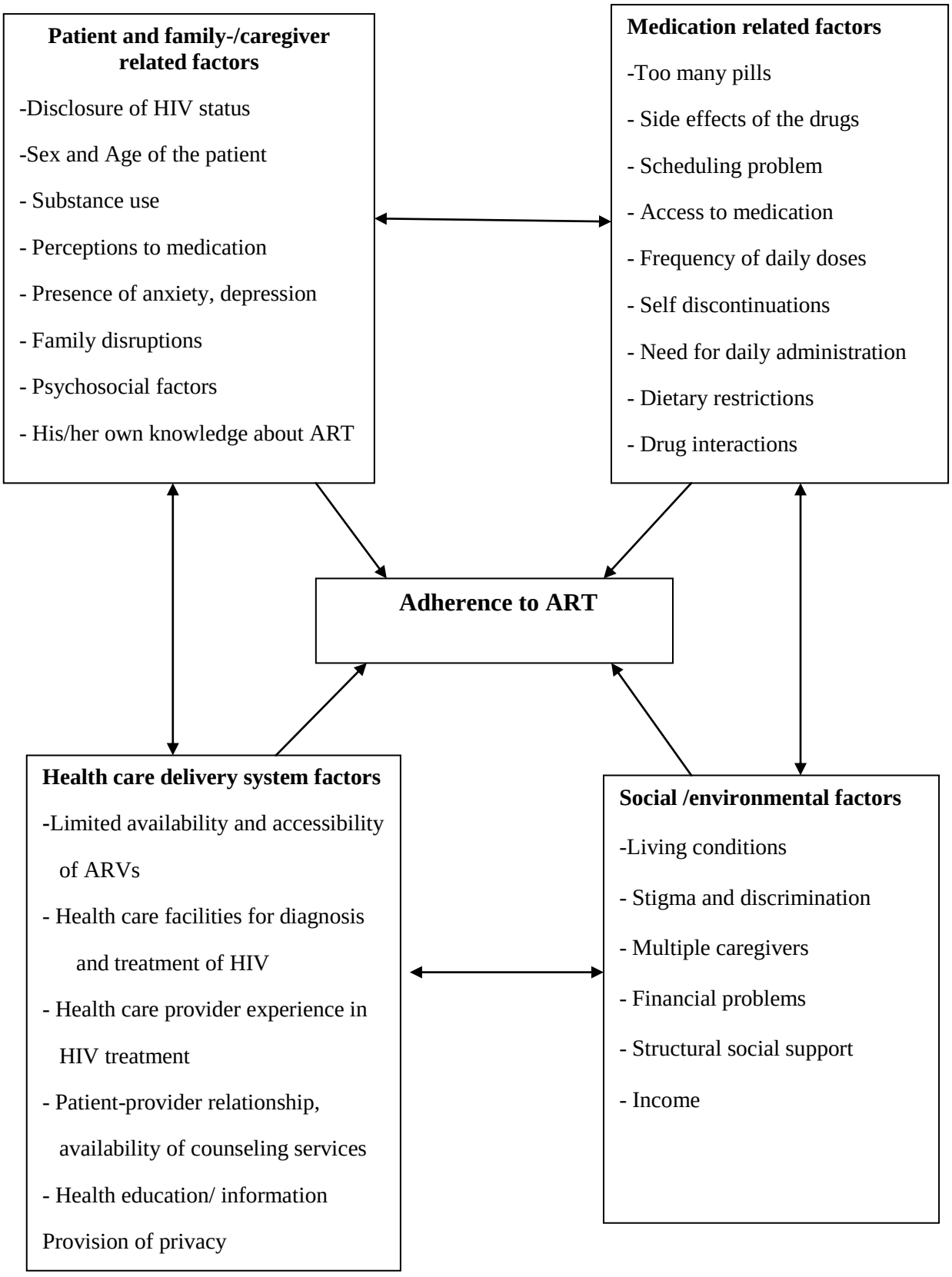


Figure 1: Conceptual frame work of adherence to ART.[42]

2.5 Socio-Demographic Characteristics of HIV/AIDS Patients and Adherence to Art

2.5.1 Adherence to ART and age

Age of the patient was statistically associated with adherence to therapy, this was shown by Wakibi et al. in a study conducted in Nairobi, Kenya which showed that younger respondents below the mean age (39.7years) were more likely not to adhere to Highly active antiretroviral therapy (HAART).[30] This is similar to a study by Falang et al.[8] and it implies that as the mean age of the patient increases, adherence also increases. Adherence to medication is higher in older patient while low adherence correlates with younger age.[8, 22] this is consistent with the findings of a study conducted in Aminu Kano Teaching Hospital, Kano by Iliyasu et al. that age variable had no significant influence on adherence to antiretroviral therapy. [32]

2.5.2 Adherence to ART and sex

There are inequalities in the care of HIV infected women and Men. Women are less likely to receive care from ART specialty provider. Among persons treated with HAART, women initiate this therapy later than men[33] and have a lower likelihood of achieving an undetectable level of HIV RNA. The consequence of poor response to treatment is grave. However, this finding is consistent with the findings of a study conducted in Southeast Asia by Wasti et al. (2012) that being female was significantly associated with non adherence to antiretroviral therapy.[36] Also, in a study conducted in Keffi, Nigeria by Pennap et al. 2013 reported that more females missed their medication (65.7%) than their male counterparts (34.3%) and among those that had 100% adherence,.[47] However, This is contrary to report by Agu et al. (2012) that sex was not found to have any association with medication adherence.[48]

2.5.3 Adherence to ART and educational level

Patients with post secondary education or other unspecified education were more likely to adhere compared to individuals with no primary or some primary education.[17] It was also reported by Golin et al. that lower educational achievement is associated with lower adherence; the finding that lower educational level is associated with worse adherence is consistent with the fact that understanding of treatment recommendations is necessary for adherence.[34] Possible barriers to adherence have been identified in rural Guetamala setting by Lopez et al. the most important being low education levels of patients, inability of care providers to communicate effectively with patients, and the typically large distance between patient`s residence and HIV treatment centers.[24] A study conducted in Benin City, Nigeria showed that low educated people, low income earners and the unemployed had lower adherence levels than the other patients. Although high level of education cannot be directly linked to higher knowledge of HIV/AIDS, better educated people generally have greater access to information and are more likely to make better-informed decisions. They generally have better jobs and greater access to money to regularly procure their medications and support healthier and productive lives.[39] This is inconsistent with the findings of Agu et al. 2003 that education and employment status were found not to have any association with medication adherence.[48]

2.5.4 Adherence to ART and poverty

Partly because the introduction of ART in poor settings is recent, and partly because biomedical research rarely examines the social context in which patients live, there is a dearth of information on the direct effect of poverty on ART adherence. Most studies conducted in poor settings overlook how direct and indirect economic burdens borne by patients affect their ability to access a steady supply of antiretroviral and take them on

time. Such burdens may include the cost of missing work, the cost of elder or child care during medical visits, the cost of transportation to a health center, the cost of user fees, or the cost of tests and supplies. Although these costs may seem minimal to health professionals and decision makers, bearing these costs often translates into difficult household decisions about who eats, who works, or who goes to school. Taking medications in a timely manner may also require the challenging tasks of obtaining food and safe water, or of readjusting food intake to fit the drug-regimen schedule. Even in the context of free drugs, the cost of transportation to obtain ARVs was reason given for non-adherence. [49] Despite the difficulties in overcoming these obstacles, the inability of a person living in poverty to obtain and take medications after initiating therapy is often labeled "noncompliance" or "non-adherence"—as has often occurred with tuberculosis patients ignoring social and economic causes or failures on the part of public-health interventions to address those causes.[35]

2.6 Knowledge of HIV/AIDS and ART

A patient`s level of knowledge about HIV and ART as well as awareness that poor adherence produces adverse outcomes has a positive impact on medication adherence. This is reported by Campbell JI et al. 2010.[24] In an attempt to eradicate HIV, there is a need to educate people, most especially the youths who are very sexually active. Also United Nations Population Fund confirmed that young people are at the centre of the HIV/AIDS epidemic in terms of rates of infection, vulnerability and of the 1.5 billion young people worldwide, 11.8 million are estimated to be living with HIV. It is also reported that every day between 5,000-6,0000 young people (ages 15-24) contract HIV and that many of them still lack comprehensive and correct knowledge about to prevent the infection.[31] It is expected that when one has the knowledge of HIV/AIDS, the

accompanying behavior would be logical. In relation to HIV/AIDS; the possibility that the possession of adequate and correct knowledge is highly correlated to preventive efforts is a strong motivating factor in most educational projects since it is assumed that knowledge will help to overcome fear, denial and also contribute to behavior modification and adherence to ART. According to National AIDS Reproductive Health Survey (NARHS), accurate knowledge on basic information on HIV/AIDS which is the pre-requisite for taking preventive and care actions was generally low. This was also reported in a qualitative study conducted by Monica et al. that inadequate knowledge and /or negative beliefs about HIV/AIDS and ARV effectiveness were barriers to ARV adherence.[25] Similarly, studies conducted by Falang et al (2012)[8] in Jos and Olowookere et al (2008)[54] all showed that good knowledge of HIV infection and antiretroviral therapy is associated with adherence to HAART.

2.7 Level of Adherence to HAART

The level of adherence to ART has been reported to affect the outcome of treatment in patients on ARV drugs. ARV drugs must be taken for a patient's lifetime, and high levels of adherence are required to maintain the functionality of the individual's immune system and to slow the emergence of resistant strains. However, significant proportions of HIV infected individuals do not reach high levels of adherence and this can lead to devastating public health problems.

Average estimates of ARV non-adherence in the US range from 50-70%.[18] while it was found to be 85.5% in Nepal, South east Asia[36], and Meta analysis of African studies on adherence to ART in Sub-Saharan Africa in 12,116 patients indicated a pool estimate of 77% with good adherence.[19] Adherence was also found to be 81.2% in Addis Ababa (capital city of Ethiopia)[9], but lower in most developed countries, where adherence rates

ranged from 50%-70%.[9] adherence was found out to be 89.8% in Togo.[41] A study conducted by Chijiok et al. found the adherence in Niger Delta region of Nigeria to be 49.2% .[20] While adherence was 62.6% in Makurdi, Benue State[21]and 62.8% in Keffi, Nasarawa State.[47] But in a research conducted by Falang et al. 2010, in Jos University Teaching Hospital adherence was found to be 87.9%.[8] While it was 70.8% in Illorin in a study conducted by Alakija et al.[53]

2.8 Healthcare Provider Related Factors that are Associated with Adherence

Provider-related factors such as poor patient-healthcare provider relationship can affect the patient`s overall satisfaction and trust in the providers. The quality of these relationships is significantly associated with better adherence.[51, 52] Also; a qualitative study conducted by Malta M. et al. shows that Physician-Patient communication has a particularly powerful effect on patient adherence to medication regimen.[25] Similarly voluntary adherence counselors (VAC) at the clinic also played an important role in providing support to patients especially for adherence to medication.[53] The frequent ARV drug stock outs at several facilities in Nigeria have raised series of concerns about the sustainability of the National ARV programme and issues of non-adherence. For some time in 2004 and 2005, the ARV treatment programme suffered major setback when it was hit by a shortage of drugs. Stock outs and the attendant consequences of system induced non-adherence will promote development of drug resistance, worsening of health status of patients and also increases the risk of transmission of resistant strains. Running out of medicines and inability to purchase more due to non availability and inaccessibility to medications and financial constraints were associated with non-adherence to treatment.[49, 32]

2.9 Patient Related Factors that are Associated with Adherence

Patient-related factors can pose significant barriers to optimum ART adherence and may be more difficult to tackle than medication-related factors. The physician has less control over the patient's behavior, the decisions that the patient makes with regard to intake of medication, and the patient's perception of the need to take the medication and the resulting outcomes.

2.9.1 Adherence to ART and forgetfulness

Forgetfulness is one of the most commonly reported reasons for non-adherence to antiretroviral drugs; this is reported in a study on patient and regimen characteristics associated with self reported non-adherence to antiretroviral therapy by Sullivan P. et al. that the most commonly reported reason for missed antiretroviral therapy doses was forgetting to take medications.[23] This is consistent with a study conducted at the University Teaching Hospital, Enugu Southeast Nigeria which demonstrated significant association between forgetfulness and non-adherence to ART.[49] Various studies on medication adherence reported that forgetting to take a dose is a major reason that people missed their medication. [8, 41, 50] ART adherence was higher for people who had been on treatment for a longer period of time.[10, 28] Food insecurity, financial constraints, and forgetfulness were barriers to adherence as reported by Musumari et al.[29]

2.9.2 Adherence to ART and HIV status disclosure

Disclosure is a process, one that is positively linked to counseling, care and support. Disclosure of HIV status to sexual partners is an important prevention goal emphasized by the World Health Organization (WHO) and the Centers for Disease Control and Prevention (CDC). Disclosure offers a number of important benefits to the infected individual and to the general public. In addition, HIV status disclosure may lead to

improved access to HIV prevention and treatment programmes, increased opportunities for risk reduction and increased opportunities to plan for the future.

A person's ability to effectively prevent HIV transmission and acquisition is supported by knowledge of personal and partner HIV sero-status. Counseling and testing for HIV combined with disclosure of HIV sero-status to sexual partners can enable people living with HIV/AIDS (PLWHA) to seek appropriate care and treatment. Additionally, it can allow both PLWHA and uninfected persons to make informed choices about their sexual behavior[37]. Despite public health benefits of disclosure, there are a number of potential risks, including loss of economic support, blame, abandonment, physical and emotional abuse, discrimination and disruption of family relationships. These risks may lead to choose not to share their HIV test results with their friends, family and sexual partners. Report also showed that disclosure has significant impact on adherence to medical regimens. In a study conducted by Tassema et al.[9] showed that unwillingness to disclose HIV status was significantly associated with non adherence to ART, disclosure was considered as barrier that prevents patients from wanting to start and adhere to ART.

Good adherence was associated with disclosure of HIV status to spouse or family member.[23, 29, 30, 50] The protective effect of disclosure on non-adherence is the first finding from a large treatment program in Nigeria[17] and speaks the importance of stigma as barrier to effective life-long treatment adherence. Similar finding was reported in a study conducted in Lagos by Ekama et al.[38]

2.9.3 Adherence to ART and stigma (or fear of stigma)

Fear of someone knowing ones HIV status is another contributor to non-adherence. Different forms and types of HIV related stigma exist such as self stigma (self blame or

condemnation), perceived stigma (fear of stigma associated with disclosing HIV status) and enacted stigma (gossip, rejection, discrimination) and these were barriers to adherence. Qualitative findings of a study by Wasti et al. revealed that stigma (or fear of stigma) was identified by the majority of interviewees as impeding adherence behavior particularly among women.[36] This is consistent with a findings of Uzochukwu et al.2013 reported that fear of someone knowing taking ARV drugs was one of the reasons given for not taking ARV drugs.[49] Stigma and the fear of disclosure cause patients to skip doses if privacy is unavailable at a scheduled dosing time.[26]

2.9.4 Adherence to ART and dosing frequency and number of pills

Frequency of drug intake was associated with good adherence, twice daily frequency of drug intake was more associated with good adherence than thrice daily frequency.[8] Similarly, this was reported by Wasti and colleagues that increasing number of pills (more than three tablets) per day is associated with non-adherence to highly active antiretroviral therapy.[36] Also in a study by Uzochukwu and colleagues reported that patients complained of too many and too large tablets as contributors to non-adherence.[49] However this is inconsistent with the findings of Agu et al. (2013) that ART regimens were not associated with adherence.[48]

2.9.5 Adherence to ART and side effects

Like most medicines, antiretroviral drugs can cause side effects. These unwanted effects are often mild, but sometimes they are more serious and can have a major impact on health or quality of life. On rare occasions, side effects can be life threatening. Once started, antiretroviral treatment must be taken every day for life. Every missed dose increases the risk that the drugs will stop working. It is therefore vital that people receiving antiretroviral treatment get all the help they need to minimize the impact of side

effects. Often there are several ways to lessen the harm, either by treating the side effects or by switching to alternative antiretroviral drugs. Antiretroviral drugs differ in how commonly they cause particular side effects. For example, efavirenz is the drug most associated with psychiatric symptoms, while protease inhibitors are more likely to raise levels of cholesterol and triglycerides. Zidovudine, stavudine; many PIs are associated with Diabetes mellitus. Abacavir (brand name: Ziagen), didanosine, indinavir (brand name: Crixivan), lopinavir/ritonavir (brand name: Kaletra) are associated with increased risk of heart disease. Side effects vary from person to person and it is impossible to predict exactly how each individual will be affected. Some people take antiretroviral treatment for years with few problems, while others find the same drugs intolerable.

These adverse side effects vary from mild to severe and acute to chronic, which can prevent adherence, patients who had side effects were more likely to be non adherent, this has been revealed in a study conducted by Wasti et al [36] that patients who had side effects were more likely to be non-adherent to ART, other studies in Nepal, South Asia[23], India[27] Rwanda[10] and Nigeria[17] have all shown side effects to be associated with decreased adherence to antiretroviral therapy. However, this is inconsistent with a study conducted by Afolabi et al in Ife –Ijesa zone of Osun State, Nigeria on Determinants of adherence to ARV among PLWHIV/AIDs that experience of adverse effects was found not to be a significant correlate of adherence level.[40] Stavudine containing regimens are no longer recommended in resource-rich countries because of toxicity and side effects but are still widely used in Nigeria (approximately 20% of all first line regimens prescribed in 2008 and 2009) and other resource- limited countries because of availability supplied by donors.

CHAPTER THREE

METHODOLOGY

3.1 Study Area

Zamfara State which is located in the north-western region of the country with an estimated population of about 3,677,789 based on the 2006 population census with 14 local administrative areas which are also categorized into three senatorial zones viz: Zamfara East, Zamfara west and Zamfara Central zones respectively. The population in this area is predominantly Muslim and of the Hausa tribe with a mixture of other tribes living harmoniously together. Their major source of livelihood is subsistence farming with an associated high level of poverty measured at 76.4% of the population. Likewise, 31.9% is in the lowest quintile with only 7.6% belonging to the highest quintile.[44] The HIV prevalence in the state is 2.1% which is lower than the National figure (4.1%).[45] The state has a low literacy level of 34% in males and 13% in females. Likewise, poor comprehensive knowledge of HIV (6% in males and 13% in females).[45] The proportion of wards in the state with a health facility that at least offers HIV counseling and testing is 15.6%, while only three centers (Federal Medical Center Gusau, General Hospital Kaura Namoda and General Hospital Mafara) in the whole state provide HIV treatment for patients.[45]

Federal Medical Center (FMC) Gusau is the main referral center for Zamfara State which also acts as the main treatment center for people living with HIV/AIDS in Zamfara central Zone. FMC Gusau was established in 1999 and has 300 bed capacities with 15 clinical departments. It has 12 consultants, 20 visiting consultants, 74 medical officers and 12 interns as at 30/01/2013. The center renders specialist services in medicine, surgery, obstetrics, gynecology, pediatrics and other medical specialties.

HIV Counseling and Testing (HCT) center started in 2008 and from inception to 31/01/2013, the programme has enrolled 29,777 HIV positives that are on pre-ART while 1,200 are on antiretroviral therapy. The center conducts a clinic session twice a week and patients receive pre-treatment adherence education/counseling sessions. They are also expected to visit the center once a month for ARV drugs refill. HIV care and treatment services were supported by Global HIV/AIDS Initiative Nigeria (GHAIN) project and provided at no cost to the patients.

3.2 Study Design

A cross-sectional study design was employed in this study to determine factors that are associated with adherence to ART.

3.3 Study Population

The study population involves HIV/AIDS patients aged 15 years and above attending ARV clinic in FMC Gusau during the study period (November - December 2013) based on the following selection criteria:

3.3.1 Inclusion criteria

1. All HIV/AIDS patients who have been on ART for at least 30 days.
2. Age 15 years and above

3.3.2 Exclusion criteria

HIV/AIDS Patients who are critically ill and thus unable to respond

3.4 Sample Size Determination

Sample size for the study was calculated based on the formula below.

$$n = \frac{Z^2pq}{d^2}^{46}$$

n = Minimum sample size

Z = The standard normal deviate (1.96 at 95% confidence level)

p = Prevalence of adherence to antiretroviral therapy=87.9% = 0.879[8]

q = Complementary probability = 1-P = 0.121

d = Level of accuracy desired or sampling error =0.05

$$n = \frac{(1.96)^2 x 0.879 x 0.121}{(0.05)^2}$$

n = 164

Adding 10% for non- response

n = n/(1-NR)

Where n = sample size, NR= Non response

n = 164 / (1-10%)

n = 183

3.5 Sampling Technique

Systematic random sampling technique was used, samples were selected using the number of clinic attendees in the register as the sampling frame, an interval or fraction was generated which was used in the selection, for example, based on the calculated sample size of 183, we administered the questionnaire within four weeks and ARV clinic

runs twice in a week (8 clinics within 4 weeks), so, we sampled 23 respondents per clinic day. for example, clinic attendees in the register were assigned numbers from 1-N(80), then a sampling interval was determined by dividing the study population and size of sample 23, that is, 80/23=4. The first sample was chosen randomly by balloting between 1 and 4, and then subsequently every 4th patient was selected.

Sampling of FGD participants: Convenience Sampling was used in participant selection. And a homogenous group of people were used in each group of the discussion. A moderator and note taker were involved and also a tape recorder was used to assist in capturing information. Transcribed FGDs were translated to English language.

3.6 Study Instrument

A semi-structured interviewer- administered questionnaire was used. The instrument generated data on socio-demographic characteristics of respondents, knowledge on HIV/AIDS among the respondents and factors associated with adherence to HAART. Questionnaire was pre-tested and validated for accuracy. Questionnaire was translated to local language and then back-translated to English to ensure original meaning was retained.

3.7 Data Collection Methods

Quantitative and qualitative method of data collection was employed.

3.7.1 Quantitative method

An interviewer administered questionnaire was used. Questionnaire was semi-structured and adapted.[47] Questionnaire was pre-tested and validated for accuracy. Data was collected by four trained research assistants. The data collected include: socio demographic characteristics of the respondents, knowledge on HIV/AIDS among the respondents, patient-provider related factors and factors associated with adherence to antiretroviral therapy. Training and supervision of research assistants/ interviewers was done.

3.7.2 Qualitative method

Three Focus Group Discussions (FGDs) and two key informant interviews were conducted. The FGDs were carried out with approximately 6 - 8 persons per group; the FGDs were conducted for 45minutes to one hour. FGD guide was used in guiding the discussions. Two key informant interviews were conducted. The key informants were pharmacists of the ARV clinic. Questions asked were factors that are associated with the ARV drugs such as availability and supply of ARV drugs, quantity and quality of ARV storage facilities and drug out of stock.

3.8 Data Management

Epi- info software version 3.5.3, CDC Atlanta was used in processing the data. Consistency checks, editing and cleaning was performed, and frequencies were run to check for outliers, missing or double entry. Data dictionary was formed. The result was displayed in tables, graphical forms to show socio demographic characteristics of the respondents, knowledge of HIV/AIDS and ART, level/ proportion of adherence to HAART and other factors associated with adherence to antiretroviral therapy.

Processing and data analysis of FGD: Key statements, ideas and attitudes expressed for each topic of discussion were listed. Systematic comparison between groups based on problem diagram/objectives was done. Major findings were reported as narratives.

3.8.1 Definition

Adherence was self-reported and patient was said to be adherent if he or she took at least 95% of the prescribed doses of ARV medications over the preceding 30 days before the interview.[36] Adherence was computed as the actual number of doses taken divided by the number of doses prescribed over a four week period and expressed as a percentage; those

with at least 95% were classified as adherent while those with less than 95% were classified as non-adherent.

3.8.2 Grading of knowledge of respondents

Knowledge of respondents was graded. Ten questions were used in grading, for each correct response, one point was scored, and zero for wrong response. Maximum score was 10 and minimum score was three.[54]

Knowledge grade

0 to 4 points: Unsatisfactory knowledge

5 to 10 points: Satisfactory knowledge

3.8.3 Measurement of variables

Exposure variables: The exposure variables are socio-demographic characteristics of the respondents, level of knowledge of respondents on HIV/AIDS, side effects of ARV, forgetfulness, fear of stigma, too ill, felt better, HIV status disclosure and duration of therapy.

Outcome variables: The outcome variables are adherent status of the respondents which was either adherent or non-adherent. Adherence was computed as the actual number of doses taken divided by the number of doses prescribed over a 30 days period and expressed as a percentage.

3.8.4 Data analysis

Data was analyzed using Epi-info software version 3.5.3, (CDC, Atlanta).and Microsoft Office Excel 2007. Statistical associations and level of significance was measured by calculating odds ratio (OR), 95% confidence level. Univariate analysis; frequencies and

proportions were calculated. Association between dependent and independent variables were analyzed (bivariate analysis) and all variables that were associated with adherence in the bivariate analysis were included in multivariate logistic regressions model to control for confounders, at p value ≤ 0.05. The best predictors of good adherence were determined.

3.9 Ethical Consideration

Ethical approval was obtained from the Research and Ethics Committee of Federal Medical Center, Gusau. Zamfara state. Informed consent was sought from the respondents before administering questionnaire. Participation was strictly voluntary and respondents were free to or not to participate in the study. Identity of participants was not included in the questionnaire and data collected was only used for the purpose of research.

3.10 Limitations

- As with any interview study, the data was subject to recall bias. Although an effort was made to limit recall of medication to 30 days before the interview, it was possible that subjects over- or underestimated their adherence to ART.
- Non-use of virological and immunological laboratory investigation to corroborate self-reports in assessing adherence. However, the use of focus group discussions helped in revealing information that would not have been elicited by Quantitative instrument.
- Only one dimension of adherence was assessed.

CHAPTER FOUR

RESULTS

A total of 183 people living with HIV/AIDS on HAART participated in the study. The results are shown below in the forms of tables and charts in line with specific objectives of the study. The results are based on socio-demographic characteristics of the respondents, knowledge of HIV/AIDS, level of adherence to HAART, Healthcare provider related factors and patient factors that are associated with adherence.

4.1 Socio-Demographic Characteristics of Respondents, FMC Gusau

Table 1: Socio-demographic characteristics of respondents at FMC Gusau, Zamfara State

Variable	Frequency	Proportion (%)
Age group (years)		
15-24	16	8.74
25-34	82	44.81
35-44	55	30.05
45-54	27	14.75
≥55	3	1.64
Sex		
Male	42	22.95
Female	141	77.05
Marital status		
Single	21	11.48
Married	118	64.48
Divorced/separated	44	24.04
Educational level		
No formal education	61	33.33
Primary	36	19.67
Secondary	61	33.33

The above table shows demographic characteristics of the respondents; majority of the participants were in the age group 25 to 34 years (44.81%), followed by 30.05% in the age group 35 to 44 years. The mean age of respondents was 34.2 years (SD±8.7). 77.1% of the participants were females. Of the respondents, 118 (64.48%) were married. Sixty-one (33.33%) had no formal education while only 25 (13.66%) had tertiary education.

Table 2: Other socio-demographic characteristics of respondents at FMC Gusau

Variable	Frequency	Proportion (%)
Tribe		
Hausa/Fulani	139	76
Igbo	24	13
Yoruba	18	10
Others (Nufe & Tibi)	2	1
Occupation		
None	95	51.95
Trader	20	10.94
Business	19	10.38
Farmer	13	7.10
Civil servant	12	12.02
Student	14	7.65
Monthly income		
<₦6000	130	71
₦6000 - ₦18000	45	24.6
₦18000 - ₦36000	6	3.28
>₦36000	2	1.09

The table above shows other demographic characteristics of the respondents, majority; 139 (75.96%) are Hausa/Fulani by tribe, more than half (51%) of the respondents had no occupation as of the time of interview and 71% (71%) earn less than ₦6000 per month.

4.2: Knowledge of HIV/AIDS among the respondents

Table 3: Distribution of correct knowledge of HIV/AIDS among the respondents, FMC Gusau, Zamfara State

Correct knowledge	Frequency	Proportion (%)
HIV transmission		
Unprotected sexual intercourse	180	98.4
Blood transfusion/injection	176	96.3
Contaminated blood letting instruments	165	90.2
From mother to her unborn baby	57	31.1
From mother to child during breastfeeding	104	56.8
Knowledge on cure for HIV/AIDS	86	47
Knowledge of ABC of HIV prevention	13	7.1
Abstinence	6	3.3
Be faithful	5	2.7
Condom use	6	3.3
Use of antiretroviral drugs		
Curing	8	44
Reducing pain	47	25.7
Reducing progression of HIV	128	69.9

The above table shows correct knowledge of HIV/AIDS on HIV transmission, cure for HIV/AIDS, knowledge of HIV/AIDS prevention and use of antiretroviral drugs.

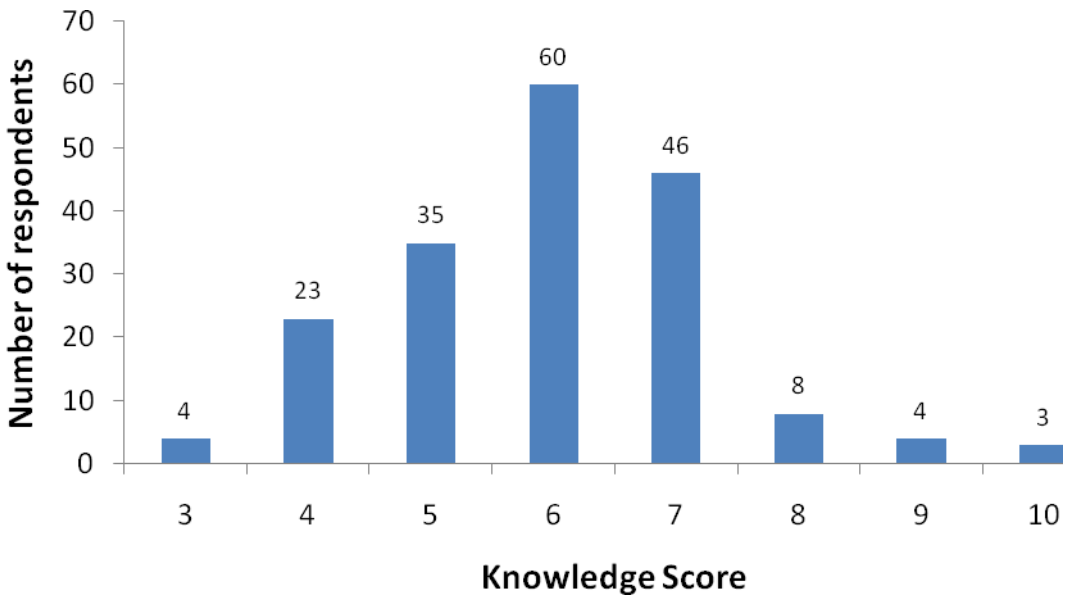


Figure 2: Grading of Knowledge of respondents on HIV/AIDS at FMC Gusau, Zamfara State

Figure 1: Bar chart showing grading of knowledge of respondents on HIV/AIDS, the level of knowledge was judged to be satisfactory (score of ≥ 5) in 156 (85.25%) of the respondents, the mean score was 6.0 (SD±1.3). The minimum and maximum score was 3.0 and 10.0 respectively. 156 (85.25%) had satisfactory knowledge (score of ≥ 5) while 27 (14.75%) had unsatisfactory knowledge (score of < 5).

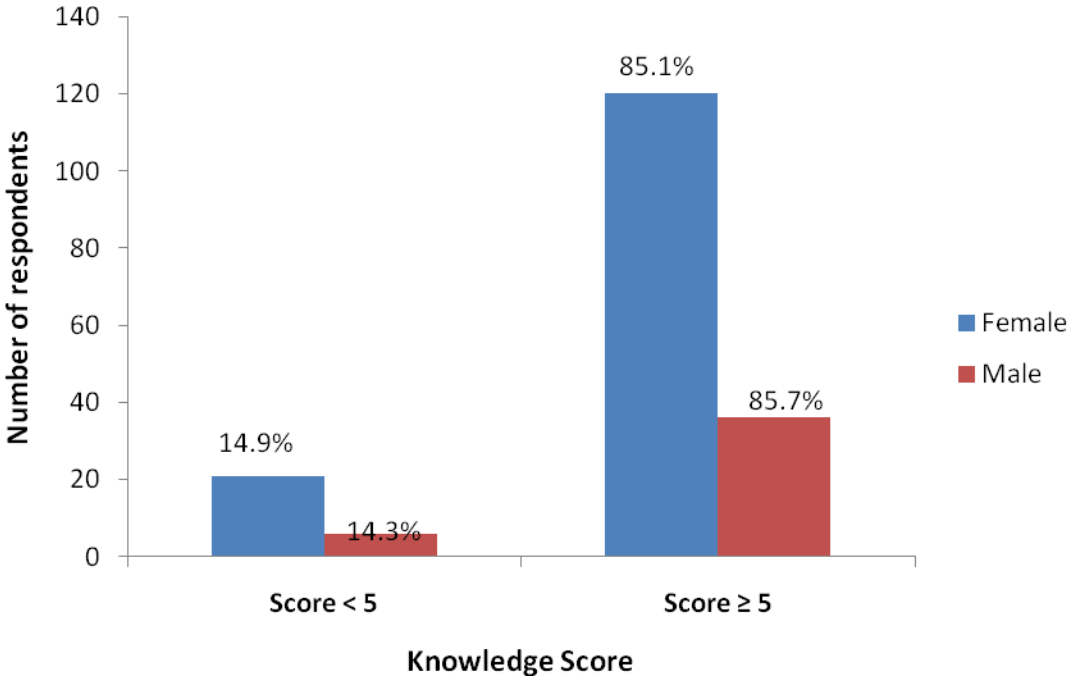


Figure 3: Grading of Knowledge by sex of the respondents on HIV/AIDS at FMC Gusau

The figure above shows that; 14.9% of females had score of less than 5 (unsatisfactory knowledge of HIV/AIDS), while 14.3% of males had score of less than 5.

4.3 Level of Adherence to Treatment

Table 4: Level of adherence to HAART at FMC Gusau, Zamfara State

Variable	Frequency (n= 183)	Proportion (%)
Level of adherence		
< 95%	28	15.3
≥ 95%	155	84.7
Proportion of people adhering to HAART		
Ever missed (skipped)	40	21.9
Never missed	143	78.1

The above table shows that 155 (84.7%) of the respondents had ≥ 95% adherence to HAART, and of the respondents, 40 (21.9%) had ever missed their medication, while 143 (78.1%) had never missed their medication, that is, they have 100% adherence.

4.4: Provider Related Factors

Table 5: Provider related factors that are associated with adherence to HAART, FMC Gusau, Zamfara State

Factors	Frequency	Proportion (%)
Told about the importance of adherence`	178	97.3
Told about side effects of ARVs	154	84.2
Received counseling during treatment	183	100.0
Believed counseling is useful	182	99.5
Privacy maintained during consultation	183	100.0
Believed that ARVs have positive effects	180	98.4
Relationship with healthcare providers		
Fair	12	6.6
Good	123	67.2
Very Good	48	26.2

Of the respondents, 178 (97.3%) were told about the importance of adhering to HAART, 154 (84.2%) were told about side effects of ARVs, 183 (100%) received counseling during treatment, 182(99.5%) believed that counseling is useful for patients on treatment, 183 (100.0%) asserted that privacy was maintained during consultation, 180 (98.4%) believed that ARV have positive effect, and 123 (67.2%) stated that relationship with Healthcare providers was Good.

Table 6: Adherence by socio-demographic factors that are associated with adherence to HAART, FMC Gusau, Zamfara State

Variable	Non-adherent (%) (n=28)	Adherent (n=155)	OR (95% C.I)
Sex:			
Male	7 (25.00)	35 (22.58)	1.14 (0.45-2.91)
Female	21 (75.00)	120 (77.42)	
Age group (years)			
> 40 years	15 (53.57)	42 (27.10)	**3.10 (1.4-7.07)**
< 40 years	13 (46.43)	113 (72.90)	
Marital status			
Single/Divorced	10 (35.71)	55 (35.48)	1.01 (0.44-2.34)
Married	18 (64.29)	100 (64.52)	
Educational level			
Lower than secondary	20 (71.43)	77 (49.68)	**2.53 (1.05-6.10)**
Secondary and above	8 (28.57)	78 (50.32)	
Occupation:			
Unemployed	14 (50.00)	95 (61.29)	1.60 (0.70-3.60)
Employed	14 (50.00)	60 (38.71)	
Monthly income:			
< 6000	18 (64.29)	112 (72.26)	1.44 (0.62-3.38)
> 6000	10 (35.71)	43 (27.74)	
Inability to pay for transport to clinic			
Yes	2 (7.14)	1 (9.65)	**11.84 (1.84-135.40)**
No	26 (92.86)	154 (99.35)	
Knowledge of HIV/AIDS			
Unsatisfactory knowledge	9 (32.14)	18 (11.61)	3.6 (1.42-9.17)
Satisfactory knowledge	19 (67.86)	137 (88.39)	

The above table shows that non-adherence is significantly associated with age ≥40years (OR 3.1; 95% C.I: 1.40 – 7.07), education level lower than secondary (OR 2.53; 95% C.I: 1.05 - 6.10), and inability to pay for transport to clinic (OR 11.84; 95% C.I: 1.04 – 135.40), while there is no statistically significant association between non-adherence and marital status, Occupation, monthly income and Knowledge of HIV/AIDS.

Table 7: Bivariate analysis of patient-related factors associated with adherence to HAART

Variable	Non-adherent (%) (n=28)	Adherent (n=155)	OR (95% C.I)
Forgetfulness			
Yes	11 (39.29)	7 (4.52)	**13.68 (4.68-39.98)**
No	17 (60.71)	148 (95.48)	
Fear of stigma/Disclosure of HIV status			
Yes	6 (21.43)	1 (0.65)	**42.0 (4.82-365.52)**
No	22 (78.57)	154 (99.35)	
Felt better or healthy			
Yes	2 (7.14)	1 (0.65)	**11.84 (1.03-135.39)**
No	26 (92.86)	154 (99.35)	
Too ill			
Yes	4 (14.29)	2 (1.29)	**12.75 (2.21-73.45)**
No	24 (85.71)	153 (98.71)	
Side effect			
Yes	2 (7.14)	2 (1.29)	5.90 (0.79-43.64)
No	26 (92.86)	153 (98.71)	
Too many pills			
Yes	1 (3.57)	0 (0.00)	Undefined
No	27 (96.43)	155 (100.0	
HIV status disclosure			
Did not disclosed	4 (14.29)	53 (34.19)	0.32 (0.11-1.0
Disclosed	24 (85.71)	102 (65.81)	
Duration of ART			
< 12 months	2 (35.71)	47 (30.32)	0.78 (0.34-1.82)
> 12 months	18 (64.29)	108 (69.68)	

OR: Odds ratio, CI: confidence interval

Non-adherence is significantly associated with Forgetfulness (OR 13.68; 95% C.I: 4.68 – 39.98), Fear of stigma/ Disclosure (OR 42.0; 95% C.I: 4.82 – 365.52), Felt better (OR 11.84; 95% C.I: 1.03 – 135.39), Too ill or being too sick to retrieve the medication from Hospital (OR 12.75; 95% C.I: 2.21 – 73.45), while side effects, HIV Status disclosure and Duration of ART did not appear to have significant effect on non-adherence to HAART.

Table 8: Bivariate analysis of Healthcare provider related factors, FMC Gusau, Zamfara State

Variable	Non-adherent (%) (n=28)	Adherent (n=155)	OR (95% C.I)
Told about importance of adherence			
No	1 (3.6)	4 (2.6)	1.4 (0.15-13.0
Yes	27 (96.4)	151 (97.4)	
Told about side effect of ARVs			
No	5 (17.9)	24 (15.5)	1.19 (0.41-3.43)
Yes			
Believed counseling is useful			
No	0 (0)	1 (0.6)	Undefined
Yes	28 (100.0)	154 (99.4)	
Believed that ARVs have positive effects			
No	0 (0)	3 (1.9)	Undefined
Yes	28 (100.0)	152 (98.1)	
Relationship with healthcare providers			
Fair	3 (10.7)	9 (5.8)	2.0 (0.50-7.69)
Good	25 (89.3)	146 (94.2)	

The above table shows that being told about the importance of adhering to HAART, told about side effects of ARVs and relationship with healthcare providers were associated with adherence to HAART but were not statistically significant.

Table 9: Stratified analysis of risk factor variables by sex of the respondents, FMC Gusau, Zamfara State

Variable	**Forgetfulness**	**Low educational level**	**Age 40+**
Male OR (95%CI)	5.67(0.31-103.46)	2.91 (0.55-15.28)	2.65 (0.45-15.52)
Female OR (95%CI)	17.27 (5.27-56.57)	2.62 (0.90-7.61)	3.45 (1.32-9.05)
Crude OR (95% CI)	13.68 (4.68-39.98)	2.53 (1.05-6.10)	3.10 (1.36-7.10)
Adjusted OR (MH) 95% CI)	14.56 (4.91-43.18)	2.69 (1.09-6.62)	3.22 (1.37-7.55)
Inference	**Effect modification**	**Similar but possible confounding**	**Effect modification**

OR= Odds ratio, CI= Confidence interval, MH= Mantel Haenszel

Table 9 above shows stratified analysis of some risk factors that are associated with non-adherence to HAART by sex of the respondents to control for confounding and show effect modification. It shows that forgetfulness and age 40+ in females are significant risk factors for non-adherence to HAART. However, low educational level is confounded by sex (because the crude OR does not fall within the two strata).

Table 10: Unconditional logistic regression of factors associated with adherence to HAART at FMC, Gusau

Variable	Adjusted OR	95% CI	P-Value
Fear of stigma/ Disclosure	126.47	12.06-1326.75	0.39
Being too ill	37.80	5.00-287.25	0.0004
Felt better or healthy	31.94	1.86-547.93	0.0169
Inability to pay for transport to clinic	31.84	2.15-472.23	0.0119
forgetfulness	30.40	7.61-121.48	0.000
Unsatisfactory knowledge of HIV/AIDS	2.28	0.52-10.03	0.2742
Education lower than secondary	2.18	0.61-7.80	0.2
Age ≥ 40 years	0.59	0.18-1.97	0.3891

The above table shows adjusted Odds ratios of factors that were associated with adherence to HAART. After controlling for confounding, it appears that fear of stigma/ disclosure of HIV status, being too ill, inability to pay for transport to clinic, forgetfulness, and felt better or healthy remain independent factors that are associated with adherence to highly active antiretroviral therapy.

4.5 RESULTS OF FGD AND KII

The results of the FGDs and K.I.I complemented the study and shed further light on its findings. The thematic contents analysis suggested some factors that influence adherence to ART.

Patient related factors:

Forgetfulness: This is one of the reported reasons for non-adherence to ART, for example, one female participant discussed that: *"Yes, I forgot my drugs when my child was sick, I left it for almost four days."* While a male participant discussed that "at *times i forget because I am a human being."*

Stigma and discrimination: social or family stigmatization and fear of consequences of revealing HIV infection status is associated with poor adherence. Most of the participants have fear of stigma which influence adherence behavior especially among women for example, *"I take my drugs in private not in public, because of people and stigmatization"* (Female discussant- P5), while a male discussant said *"I take my drugs in private, i do not want people to know because of stigmatization."*

Disclosure of HIV status: Due to fear of being victimized and or rejected by family members, some PLWHIV were fearful of involuntary disclosure of their status, for example, "*None of my family members knows except me"* (P5. Male). *"I disclose only to my husband and sister."* (P6. Female).

Challenge in collecting drugs: access to medication at treatment centers is of great concern and one of the predictors of non-adherence, some of the discussants narrated that lack of transport fare is one of the challenges in collecting drugs, for example,

"Sometimes I do not have money to go to the hospital and to buy other drugs." (P2. Male).

Knowledge of ARVs: A patient level of knowledge about HIV and ART has a positive impact on medication adherence.[24] Getting relieved from sickness, prevention and cure was the commonly mentioned use of ARVs. For example, "*I take ARV drugs for prevention, before i started drugs I am week, but now very strong in doing my bricklayer work, i can carry nine inches block now."* (P5. Male). While concerning duration of ARVs (for how long would the ARV drugs be taken); majority mentioned that they will continue to take ARV drugs until when the doctor ask them to stop, while a male discussant states that " *The believe is that I will continue to take my drugs till the end of my life."*

On the significance of ARV drugs on improving health condition, most of the participant believed that ARV drugs are significant in improving their health. Conversely, a male discussant (P1) states that *"It is not significant and my health is not improving if not, i am supposed to be okay by now."* On missing of drugs or decision not to take medications, respondents answered in chorus; *"None of us decided not to take the drugs but often missed once or twice."*

Provider related factors: Almost all the respondents mentioned to have a cordial relationship with health care providers and all are satisfied with the quality of care being given to clients. For comments/ suggestions on healthcare providers and the facility generally, the respondents requested for extension of drugs refill or follow up to more than one month, while one female respondent pleaded; *"I want the government or the health facility to stop segregation of consulting room for us and also assist us."*

Drug related factors: Two pharmacists (key informants) were interviewed on drug related factors that are associated with adherence to ART.

Supply of ARV drugs: The informants mentioned that they have a constant supply of ARV drugs in the health facility. The store is okay and well ventilated. The quality of drugs is good and the quantity is okay.

ARV drugs and out of stock: A system induced non-adherence will promote development of drug resistance, worsening of health status of patients and also increases the risk of transmission of resistant strains. Running out of medicines due to non availability and in accessibility to medications were associated with non-adherence. The informants states that; *"To best of my knowledge we have never experience out of stocks of ARV drugs."*

ARV drugs and side effects: The key informants state that "*we do receive reports of side effects from patients like skin rashes, drowsiness, diarrhea and anemia for those that use zidovudine."* On what the informants think is responsible for non-adherence to ART*;" the informant states that there is no proper counseling to the patients and once they get better they abscond from the clinic, also lack of transportation fare could be responsible for non-adherence too, because most a times patients receive no support and the level of stigmatization is high. "*

On what the key informant think can be done to improve adherence to ART; respondent states that "*the issue of counseling should be improved and adhered to, once they have proper counseling at the unit, we at pharmacy will complement, then it is going to be effective."*

CHAPTER FIVE

DISCUSSIONS

Our study found out that the level of adherence to ART at FMC Gusau was found out to be high. And patient related factors associated with non-adherence included: fear of stigma/ disclosure of HIV status, being too ill, inabilities to pay for transport to clinic, forgetfulness, and felt better or healthy were associated with non-adherence. While Provider related factors were not found to be associated with adherence.

The level of adherence to ART has been reported to affect the outcome of treatment in patients on ARV drugs. This study showed an overall proportion of patients with good adherence to ART of 84.7%, which is close to the findings of Falang et al in Jos University Teaching Hospital.[8] but our finding is significantly higher than that found in a similar studies in Makurdi, Benue State[21], Keffi, Nasarawa State,[47] and Ilorin, Kwara state.[53] Similarly our reported adherence is higher than that observed by Uzochkwu et al (2009) in south east Nigeria.[49] and in Addis Ababa, Ethiopia.[9] However our reported adherence is close to the findings of studies by Wasti et al (2012) in Nepal[36] Likewise, high adherence was reported in Togo.[41] The various levels of adherence in different places might have been as a result of the fact that there is no gold standard in the measurement of adherence. For example different studies used different period of recall time to determine adherence. Despite concerns however, that self reporting , the technique used in this study, may be prone to patient`s overestimation of adherence, it has been shown in several studies to demonstrate a strong association to virologic, immunologic and clinical outcomes in HIV treatment.[11] Self reported adherence has also been shown to correlate with plasma concentration of antiretroviral drugs.[53] Furthermore, the usefulness of other methods such as electronic monitoring, pill counts, pharmacy refill

records, and direct observation is limited because they are expensive, technically difficult or impractical for routine use in clinical settings.[6]

This study shows that 141 (77.05%) of the respondents were females, the sex ratio was 0.3, which was similar to that observed by Potchoo et al. (2010)[41] however, it was lower than that observed by other studies.[8, 48, 53] Most of the participants were in the age group 25 to 34 years (44.81%), followed by 35 to 44 years, this was similar to the study by Pennap et al (2013) in keffi, Nasrawa State.[47] The mean age of the respondents was close to that observed by Agu et al in Sokoto.[48] but similar to the findings of Uzochukwu et al in Enugu[49] and Wasti et al in Nepal.[36] However, our observation was lower than what has been reported by Olowookere et al (2012) in Ibadan,[54] Potchoo et al in Togo.[41] and Golin et al (2002).[34] About two-third of the respondents were married and one-third of the respondents had no formal education, this was higher than what was observed by Falang et al (2012) in Jos[8], and by Pennap et al (2013) in Keffi.[47] However, this was close to the findings of Iliyasu et al (2005) in kano.[32] Hausa/ Fulani being majority in the study area constituted more than four-fifth ($4/5^{th}$) of the respondents. More than two-third of the respondents earns less than ₦ 6000 per month, this finding is similar to that observed by Uzochukwu et al in Enugu.[49]

A patient`s level of knowledge about HIV/AIDS and ART has a positive impact on medication adherence. It is assumed that knowledge will help to overcome fear, denial and also contribute to behavior modification and adherence to ART. In this study, non-adherent individuals were approximately four times more likely to have unsatisfactory knowledge of HIV/AIDS. Among the respondents, 14.75% have unsatisfactory knowledge (score less than 5) of which 33.33% were the non-adherents, compared with 66.67% among the adherent patients. This study has shown that more than four-fifth of

the respondents knew that HIV can be transmitted through unprotected sexual intercourse, blood transfusion/injection, contaminated blood letting instruments, while less than one-third of the respondents knew that HIV can be transmitted from mother to her unborn baby and more than half knew that HIV can be transmitted from mother child during breastfeeding, also less than half of the respondents knew that there is no cure for HIV/AIDS. About one-tenth ($1/10^{th}$) of the respondents have satisfactory knowledge of HIV/AIDS prevention; while more than two-thirds ($2/3^{rd}$) knew the use of antiretroviral drugs. Previous studies[54] have shown that the level of knowledge about modes of HIV/AIDS transmission affects the attitudes about HIV/AIDS transmission. This lack of satisfactory knowledge about HIV/AIDS is a concern not just for the people living with HIV/AIDS but for the entire population. Our study findings are lower than 91.6% that was reported by Falang et al (2012) in Jos university teaching Hospital.[8] but it is close to a findings of a study by Olowookere et al in University College Hospital Ibadan, [54] The differences observed might be due to education level of the respondents in our study, as more than half of the respondents have education lower than Secondary (primary and less).

Provider-related factors such as good patient-healthcare provider relationship may be an important motivating factor for taking and adhering to ART. In this study, more than four-fifth ($4/5^{th}$) of the respondents were told the importance of adhering to treatment, told about side effects of ARV drugs, received counseling during treatment, also mentioned that privacy was maintained during consultation and believed that ARVs have positive effects. Also > 90% of the respondents stated that their relationship with healthcare providers was good. This has also been found to be the case in our FGDs in which almost all the participants discussed that they have a cordial relationship with

healthcare providers and all are satisfied with the quality of care being given to clients, which correlate with better adherence. However, bivariate analysis of the above factors showed no statistically significant association with regard to adherence to HAART. However, in a study by Beach et al (2006)[51] found out that the quality of patient-provider relationship is significantly associated with adherence to HAART and having an undetectable serum HIV-1 RNA which is a strong clinical predictor of future health for patients with HIV. This is consistent with the findings of a study in Brazil by Malta et al[25] and in Cameroon by Mbuagbaw et al.[52]

This study also identified a number of patient-factors/variables which were associated with adherence. Males were more likely to be non-adherent to ART, although this was not statistically significant; this is in keeping with a study by falang et al (2012) which reported that female sex correlated with better adherence.[8] This could be due to the fact that the majority of patients in this study are females. However, this is contrary to the findings of Alakija et al in Ilorin.[53] Some studies have found associations between adherence to HAART and age.[8,30, 49, 53] However, in this study, patients aged ≥ 40years are more likely to be non-adherent to ARVs, it is not clear why those aged 40 and above are less likely to report adherence to ARV drugs, it may be possible that older age is associated with forgetfulness, also it may relate to truthfulness or frankness rather than adherence, in other words, older people may be more frank than the younger people.

In this study, patients with higher education (secondary and above) are more likely to adhere to ARV drugs, this is because it is generally assumed that educated people have an added advantage of being able to make better informed decisions on their own, also having education may facilitate communication with healthcare providers and thereby enhancing adherence. Similar findings was reported by Iliyasu et al in Kano.[32] These

findings are consistent with studies on adherence to antiretroviral therapy.[8, 36, 47, 53] However, this is contrary to a study by Uzochukwu et al in South eastern Nigeria.[49]

Forgetfulness is one of the most commonly reported reason for non-adherence to ARV drugs, this is consistent with our findings, the respondents who forgot to take their drugs are 14 times more likely to be non-adherent compared to those who did not forget. Various research on medication adherence reported similar findings.[8, 23, 32, 41, 49, 50] Furthermore, this was supported by findings of focus group discussion in which forgetfulness is one of the reported reasons of missing ARVs, for example; a discussant states that "*Yes I forgot to take my drugs when my child was sick, I left it for almost four days*". Our studies shows that individuals that missed their drugs because of side effects are six times more likely to be non-adherent, although this was not statistically significant, However, during an interview (KII) with pharmacist of the ARV clinic on antiretroviral drugs and side effects states that "*we do receive reports of side effects from patients like skin rashes, drowsiness, diarrhea and anemia for those that use zidovudine"*. This is consistent with the findings in Ife-Ijesa zone of Osun State.[40] On the other hand, studies in India[27], Nepal, South Asia[23], and Nigeria[17] have all shown side effects to be associated with non-adherence. The differences observed might be that in our study, some patients may have had episodes of side effects or reports side effects as being too ill to take their drugs, as being too ill is an independent risk factor for non-adherence in this study. Fear of stigma or disclosure cause patients to skip doses if privacy is unavailable at a scheduled dosing time. In this study, patients who missed their drugs because of fear of stigma or disclosure are more likely to be non-adherent to ARV drugs, and even after controlling for confounders, it shows that those who have fear of stigma/disclosure are 126 times more likely to be non-adherent to medication. A similar findings was reported

by Ekama et al in Lagos[38] and Uzochukwu et al.[49] and Wasti et al in Nepal.[36] Similarly, in our FGD, most of the participants have fear of stigma and disclosure especially among women, for example a female participant states that *"I take my drugs in private not in public, because of people and stigmatization"* while a male participant states on disclosure that "*None of my family members knows except me"* These observations suggest that although treatment is available, people living with HIV/AIDS might not benefit from this treatment because of stigmatization, thus, these people are likely to stay away from taking drugs or going to hospital to refill their drugs when feel stigmatized.

Other reason being reported for missing ARVs in this study were patients feeling that they are well or healthy and therefore no longer need to take their medication, and this was an independent risk factor for non-adherence in this study, this observation was similar to findings of Olowookere et al.[54] and Potchoo et al.[41] Similarly, being too ill to retrieve medication in the hospital and inability to pay for transport to clinic are other independent risk factors for non-adherence in this study. Even in the context of free drugs, the cost of transportation to obtain ARVs was a reason given for non-adherence. People who live far away from the hospital or those that were poor or economically disadvantaged may be more likely to be inconsistent in keeping follow-up to ARV clinics. A similar finding was reported by Pennap et al in Nasarawa[47], Alakija et al. in Illorin[53] Uzochukwu et al in Enugu[49] and Wasti et al in Nepal[36], This is corroborated in our FGDs in which some of the discussants narrated that lack of transport fare is one of the challenges in collecting drugs, for example, a male participant states that *"Sometimes I do not have money to go to the hospital and to buy other drugs."* Access to medication at treatment centers is of great concern and one of the predictors of non-adherence.

CHAPTER SIX

CONLUSIONS AND RECOMMENDATIONS

6.1 CONCLUSIONS

The majority of the respondents were females, at their reproductive age group with low educational status, unemployed and low income earners. The majority of the respondents had satisfactory knowledge on HIV/AIDS.

The level of adherence to ART is high, but has not reached the optimum desirable level. The patient-related factors that were associated with adherence to HAART include: fear of stigma/ Disclosure of HIV status, being too ill, inability to pay for transport to clinic, forgetfulness and felt better or healthy. However, Provider related factors were not associated with adherence.

6.2 RECOMMENDATIONS

1. Public health department of Zamfara state Ministry of health, ZAMSACA in collaboration with development partners like GHAIN to organize public enlightenment on HIV/AIDS through the media which may help reduce stigma and encourage voluntary HIV status disclosure thereby improving adherence.
2. Decentralization of treatment centers to primary healthcare facilities which are usually within the communities should be considered by the state government to alleviate lack of transport fare to treatment centers faced by some patients.
3. Federal Medical Center Gusau should conduct more research studies on adherence from time to time to measure adherence level of patients on HAART.
4. The clinicians involved in ARV clinics should be giving two months supply of drugs to patients which will reduce the number of times a patient has to attend a clinic, thereby improving adherence.

5. Reminders such as alarm and stickers (plain) should be used by patients to remind them when their medication is due and social support group should be encouraging their members during their regular meeting on the importance of adherence to treatment.
6. The Zamfara State Government should create job opportunities and skills acquisition through poverty alleviation programs in order to increase income of the people thereby alleviating poverty.

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APPENDICES

APPENDIX 1: CONSENT FORM

Department of Community Medicine, Ahmadu Bello University, Zaria

Consent form for the Respondents

I am Dr Nuruddeen Aliyu, a Cohort 4 Resident of Nigerian Field Epidemiology and Laboratory Training Programme/ Department of Community Medicine, Ahmadu Bello University, Zaria, Nigeria, undertaking a study to determine the factors that are associated with adherence to antiretroviral therapy among people living with HIV/AIDS at Federal Medical Centre, Gusau.

You are free to or not to participate in the study, participation is entirely voluntary, but we will greatly appreciate it if you will be part of this study as your participation will help in understanding the problem better and provide useful information that will assist in designing targeted public health interventions to control and prevent non-adherence to treatment in Zamfara State.

If you agree, I will ask you some questions which will last for about 20 minutes.

Consent obtained? Yes ☐ No ☐

If yes,

Signature or right thumb print of the

respondent/date…..……

Name of researcher: ……..

Signature/Date …….....

APPENDIX 2: QUESTIONNAIRE

AHMADU BELLO UNIVERSITY, ZARIA
DEPARTMENT OF COMMUNITY MEDICINE

Research on Factors associated with adherence to antiretroviral therapy among people Living with HIV/AIDS accessing care at Federal Medical Center, Gusau, Zamfara State

Questionnaire number…….

Interviewer's name…… Date…….

A. Socio-Demographic characteristics

A1. Sex: a) Male ( ) b) Female ( )

A2. Age (year): ……..

A3. Marital status: a) Single ( ) Married ( ) Divorced/Separated ( )

A4. Tribe: a) Hausa/Fulani ( ) b) Yoruba ( ) c) Igbo ( )

d) Others (please specify) …….

A5. Religion: a) Islam ( ) b) Christian ( ) c) Traditional ( )

A6. Occupation: a) None ( ) b) Farmer ( ) c) Petty trader ( )

d) Business ( ) e) Civil servant ( ) f) Student ( )

g) Others (please specify) ……

A7. Education level: a) None ( ) b) Qur`anic/ Islamiyya ( ) c) Primary ( )

d) Secondary ( ) e) Tertiary ( )

A8. How much is your monthly income? a) < #6,000 per month ( )

b) #6,000 to #18000 per month ( ) c) #18,000 to #36,000 per month

d) >#36,000 per month

B. Knowledge of HIV/AIDS and Anti-retroviral drug

B1. Have you ever heard about HIV/AIDS infection/disease? Yes ( ) No( )

B2. If yes, what is your source of information?

Radio ( ) Hospitals ( ) Billboard ( ) others (specify) ( )

B3. Which of the following ways can HIV be transmitted? (Tick correct responses)

a) Unprotected sexual intercourse( ) b) Blood transfusion/injection( )

c) Contaminated blood letting instruments( ) d) from mother to her unborn baby ( )

e) From mother to child during breast feeding ( )

B4. Is there any cure for HIV/AIDS? a) Yes ( ) b) No ( ) c) I don't know ( )

B5. Do you know ABC of HIV/AIDs prevention? Yes ( ) No ( )

B6. If yes, the ABC of HIV/AIDs prevention stands for

…… …….

……

B7. In your own view what are Anti-retroviral drugs used for?

a) Curing ( ) b) Reducing pain ( ) c) Reducing progression of HIV ( )

d) I don't know ( )

C. Level of adherence and Risk factors

Instructions to the study participant: Now I would ask questions on how you have been taking the Anti-retroviral medications in the past one-month. Please be aware that everyone misses doses in some time. Be assured that this information will neither change the way you receive Anti-retroviral medications from the HIV clinic nor your opportunity to participate in this study.

C1. Many people find it hard to remember to take every single dose, in the last

30 days, how many doses have you missed? a) 1( ) b) 2 ( ) c) 3 ( ) d) 4 ( )

e) 5 ( ) f) Above 5 ( )

C2. Name of Anti-retroviral drug (s) missed_____

C3. What are the reasons that make you miss your drugs?

i) Side effect ( ) ii) Forgot to take Anti-retroviral drugs ( )

iii) Felt better ( ) iv) Too ill ( ) v) Fear of stigma/disclosure ( )

vi) Stock was finished ( ) vii) Drunk alcohol ( ) viii) Too many pills/ pill burden ( )

ix) Other (specify)_____.

C4. What other drugs (besides Anti-retroviral) are you currently on (tick as appropriate)

i. Pain killers ( ) ii. Appetitive stimulants ( ) iii. Haematinics ( ) iv.Sleeping pills( )

v. Anti-TB drugs ( ) vi. Antibiotics (other than for TB) ( ) vii. Fungal infection treatment ( ) viii. Others specify…….....

C5. Take Drug How many times per day:_____

C6. Duration of antiretroviral therapy in months a) ≤ 12 months ( ) b) 13 – 48 months( )

c) > 48 months ( )

C7. Do you avoid friends or relatives because of your illness? No,( ) Yes,( )

C8. In the last one month did you have any family or community member who supported, (Reminded or encouraged) you to take your Anti-retroviral medications?

No, ( ) Yes, ( )

C9. If yes, who was the person who supported you? (Check one response only)

i) Spouse ( )] ii) Immediate member of family (specify) ( ) iii) Nurse( ) iv) Doctor( )

v) Social Worker/Community Health Worker ( ) vi) Friend ( )

vii)Others specify…….....

D. Health Care System factors

D1). Were you told the importance of adhering to antiretroviral therapy?

No,( ) Yes, ( )

D2). Were you told about the side effects and interactions of these drug(s) given?

No, ( ) Yes ( )

D3). Have you received any counseling during your treatment? No, ( ) Yes,( )

D4). Do you think counseling is useful for HIV patients on treatment? No,( ) Yes,( )

D5). Was privacy and confidentiality maintained during consultations? No,( ) Yes,( )

D6). How do you rate health care providers (Clinicians, nurses, pharmacists) attitude or behavior towards you? i) Very poor,( ) ii) Poor,( ) iii) Fair,( ) iii) Good,( ) iv) Very good,( )

D7). Do you think that antiretroviral drugs will have a positive effect on your health?

No ( ), Yes ( )

APPENDIX 3: CONSENT FORM FOR FOCUS GROUP DISCUSSION

Thank you so much for meeting with you today. My name is Dr Nuruddeen Aliyu. I am a postgraduate student from Ahmadu Bello University, Zaria. We are here today to discuss with you concerning the drugs you are taking i.e ARVs. This is to enable us have a better understanding of the factors associated with adherence to ART. We believe that you have experience which may be helpful to others, as PLWHA, you are the real expert, and there is a lot we can learn from you.

This is very informal; you can talk about anything you think is important for us to know, the discussion should take about an hour. We will be taping the session taking notes because we don't want to miss any of your comments. All your responses will be kept confidential. We will ensure that any information we include in our report does not identify you as a respondent. Remember you don't have to talk about anything you don't want and if there is any question you did not understand you let me know. Is there anything you would like to ask me at this time (answer any questions regarding the discussion?)

Consent obtained: YES ☐

NO ☐

Sign……..

APPENDIX 4: FOCUS GROUP DISCUSSION GUIDE

Obtain consent using the consent form (if consent is given proceed, otherwise discontinue)

Moderator: To start our discussion, i would like to ask you some information regarding yourself and your life in general.

1. How are you and your family doing generally?
2. What do you do for a living? Do you receive support (probe for type and from who, govt., family, NGOs, religious organizations)

ART HISTORY:

1. How long ago were you enrolled on ART? (Probe: How many drugs at the beginning and now)
2. Have you ever forgotten taking your drug?
3. Do you take your drug in the public? If not why?
4. Did you disclose to anybody about your drug?
5. When felt better, do you still take your drug?
6. Do you face any challenge in going to collect your drug?

PATIENT RELATED FACTORS THAT ARE ASSOCIATED WITH ADHERENCE

1. What is the use of antiretroviral drugs?
2. How often do you take your antiretroviral drugs?
3. For how long would the antiretroviral drugs be taken?
4. Do you think antiretroviral drugs are significant for improving your health?
5. Have you at any time missed or decided not to take your medications?
6. What are your comments on the drug you are taking generally?

PROVIDER RELATED FACTORS THAT ARE ASSOCIATED WITH ADHERENCE

1. How do you relate with Health care providers?
2. Are you satisfied with the quality of care being given to clients?

   (Probe: Privacy and confidentiality)
3. Have you received any counseling during your treatment?
4. What are your comments or suggestions on the health care providers in the facility generally?

Thank the respondents for their time.

APPENDIX 5: KEY INFORMANT INTERVIEW GUIDE

INTRODUCTION AND CONSENT

Thank you so much for meeting with you today. My name is Dr Nuruddeen Aliyu. I am a postgraduate student from Ahmadu Bello University, Zaria. I am here today to have an interview with you as one of the pharmacist working in this facility and to specifically here about ARV drug. This is to enable us have a better understanding of the factors associated with adherence to the drugs. I believe that you have experience which may be helpful.

This is very informal; you can talk about anything you think is important for us to know, the discussion should take about half an hour. I will be taping the session taking notes because i don't want to miss any of your comments. All your responses will be kept confidential. I ensure you that any information i include in our report does not identify you as a respondent. Remember you don't have to talk about anything you don't want and if there is any question you did not understand you let me know. Is there anything you would like to ask me at this time (answer any questions regarding the interview?

Moderator: To start our interview, i would like to ask you some information regarding yourself and your life in general.

1. How are you and your family doing generally?
2. How long have you been working in this facility?
3. What is the source of supply of the ART drug in this facility?
4. Do you have a constant supply of antiretroviral drugs?
5. What can you say about the quantity/ quality of ART storage facilities?

6. Were you at any point in time experience out of stock (O.S)?
7. Don you receive reports of side effects from ART clients?
8. What do you think is responsible for non-adherence to ART?
9. What do you think can be done to improve adherence to ART?
10. What are you suggestions on ART and adherence to ART?

Thank the respondent for the time.

APPENDIX 6a: ETHICAL APPROVAL

Federal Medical Centre Gusau, Zamfara state, Nigeria

Research and Ethics Committee

2nd July; 2013
The Project Supervisor/Investigator,

Ethics Reference No: *Please quote this ref on all correspondence*	**FMCG/AN/MPH-NFELTP/0001**
Project Title:	**FACTORS ASSOCIATED WITH ADHERENCE TO ANTI RETROVIRAL THERAPY AMONG PEOPLE LIVING WITH HIV/AIDSAT FEDERAL MEDICAL CENTRE GUSAU,ZAMFARA STATE**
Researchers Name(s):	**Aliyu Nurudeen**
Supervisor(s):	**Prof .Kabir Sabitu**

Thank you for submitting your application considering Federal Medical Centre Gusau (FMC Gusau) as a research area for your dissertation. This was considered at the Research Ethics Committee meeting on the 02/07/2013. The following documents were reviewed:

1. Ethical Application Form	NA
2. Participant Information Sheet/Table	Available
3. Consent Form	Available
4. Debriefing Form	*NA*
5. External Permissions	*NA*
6. Questionnaires	*Available*
7. Research Proposal	June -2013[Adequate]

The Centre Research Ethics Committee hereby gives approval for this study

Thanks

Convenor of the Federal Medical Centre Gusau Ethics Committee

Dr Danladi Abubakar *MBBS; FWACS* ,M.COMM .H
Email: danabu99@gmail.com

Comments/Observations

APPENDIX 6b: ETHICAL APPROVAL

Federal Medical Centre Gusau, Zamfara state, Nigeria

Research and Ethics Committee

FACTORS ASSOCIATED WITH ADHERENCE TO ANTI RETROVIRAL THERAPY AMONG PEOPLE LIVING WITH HIV/AIDSAT FEDERAL MEDICAL CENTRE GUSAU,ZAMFARA STATE

1. Research Topic and Concept: Relevant and scientifically sound
2. Authors Identification: Appropriate.
3. Certification: Proposal is certified by supervisor(s)
4. Research Proposal. Comprehensive.
5. Methodology: appropriate and well described
6. Study site. Study site and population well described and adequate information provided , sample size determination well reflected

APPENDIX 7: WORK PLAN

S/NO	ACTIVITY	START DATE	END DATE	AUG	SEP	OCT	NOV.	DEC.	JAN	WHO IS RESPONSIBLE
		01/08/13	30/01/14							
1	Development of Data collection tools			↔						RESEARCHER
2	Ethical clearance and approval				↔	↔				RESEARCHER
3	Recruitment of Research assistants					↔				RESEARCHER
4	Training of research assistants					↔				RESEARCHER
s5	PRE-TEST						↔			RSEARCH TEAM
6	QUESTIONNAIRE ADMINISTRATION						↔	↔		RESEARCH TEAM
7	DATA ENTRY AND ANALYSIS								↔	RESEARCHER
8	REPORT WRITING								↔	RESEARCHER

APPENDIX 8: GEOGRAPHICAL LOCATION OF STUDY AREA

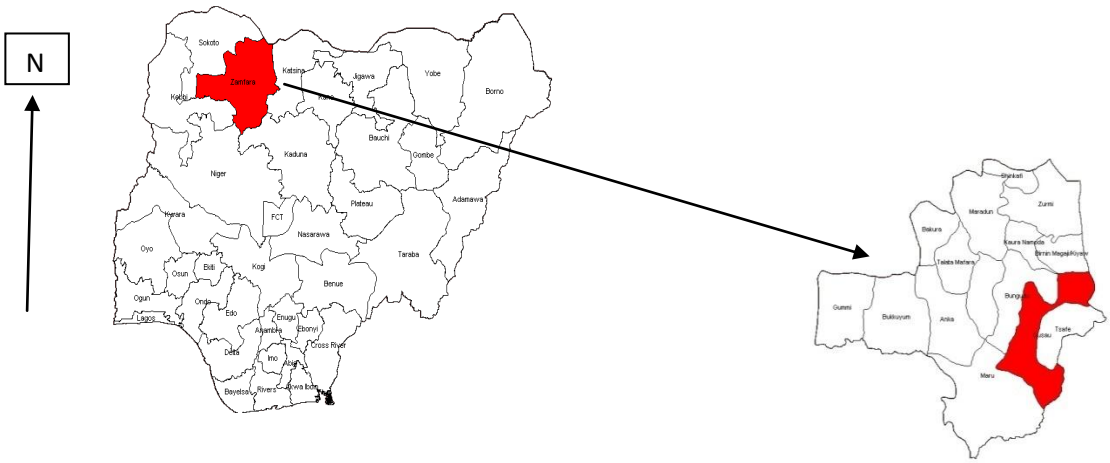


Fig. 1a

Map of Nigeria highlighting Zamfara state.

Fig. 1b

Map of Zamfara state highlighting Gusau