Determinants affecting adherence to antiretroviral therapy in patients receiving free treatment at the wellness clinic of the Bela Bela District Hospital, Limpopo Province

by

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DECLARATION

I declare that the mini-dissertation hereby submitted to the University of Limpopo, for the degree of Master of Public Health has not previously been submitted by me for a degree at this or any other university; that it is my work in design and in execution, and that all material contained herein has been duly acknowledged.

Nyantabana, Y **Date : 09 March 2015**

DEDICATION

This work is dedicated to the following persons:

My husband, **Simba Nyantabana.** Thank you sweetheart for your support, encouragement and prayers for the period I was engaged in this task,

My children, **Given, Garry, Gloria** and **Feza,** for your patience and support during my studies. It was not always easy seeing me leaving you behind.

My sister in law, **Esther Nyantabana** for your support and prayers during that moment.

May the Almighty bless you and be with you forever…

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ABSTRACT

Purpose / Aim: To find out determinants affecting adherence to antiretroviral therapy in patients receiving free treatment from the wellness clinic at Bela Bela District Hospital in Limpopo province of South Africa.

Objectives: To identify the determinants which affect the adherence to ART treatment among patients living with HIV and AIDS and to determine which of these determinants are significant predictors of adherence among HIV and AIDS patients.

Methodology: a descriptive retrospective, quantitative research.

Sampling: A population of 800 patients existing in the recording book was retrieved from the patients' records at the wellness clinic. Out of 800 a sample of 260 was derived using a simple size calculator tool.

Analysis: data were analysed by SPSS Windows Version 21.0. Descriptive statistics means and frequencies were calculated. Chi-Square tests were done in order to test the association between variables (such as age groups, gender, weight groups, regimens and WHO stages). Logistic regression was run to assess the effect of different determinants on the adherence to ART (e.g. viral load affected the adherence contrary to age, gender and others).

Results: Female (65%) was more compliant to their male counterpart (35%). Most of the patients (47.3%) in the study belonged to the age group 21 to 35 years and only (2.7%) in the age group less or equal to 20 years. Most patients were categorised into WHO stage I (31.2%). Only 9.2% of the patients were categorised into WHO Stage IV. Most of the patients in group 2 (41.3%) had a weight between 40kgs and 54kgs and group 1 (4.2%) with patients whose weight was less than 40kgs. One of the patients has no record on weight. The majority of patients (44.2%) had CD4 count, less or equal to 100. Only 2.7% had CD4 count 300 and more. After 6 months of treatment, 37% of patients had CD4 count from 300 and above; 9.7% of the patients had CD4 countless than 200.
For 136 (52.3%) of the patients in the sample the information on CD4 count at 6

months was missing. The majority of patients (72.7%) in the sample had low viral load and only (27.3%) of the patients had high viral load.

Majority of patients (48.5%) were on New 1a Regimen instead of Regimen 1a (30.8%) because of the side effects the latter has on them.

Some patients (11.2%) were on Regimen 1b, followed by patients (8.1%) on Regimen New 1b. The remaining patients were on Regimen 1c, Reg 2 and Truvada (1.6%).

Findings: The majority of patients were young females; in the age-group of 21-35 years. This is reproductive age with many challenges: earlier exposed to infection, more vulnerable than males, stigmatisation, rape, fear of isolation. Majority of patients were in the WHO stage 1 and 2. The WHO stage does not depend on the level of CD4 count. It is important to consider the weight of the patient before to initiate the treatment. More than the half patients had a CD4 count required to start with ART. After 6 months they were more adherent. Most of them were on regimen Reg (New 1a) because of less side effects.

The findings showed also different types of associations with some variables were significant determinants such as CD4 count had significant associations with gender, viral load, regimen, WHO staging, the p-value was lesser than 0.05.

Conclusion: The results showed that viral load was the only determinant affecting adherence in the current study. The number of males in this study population was lower than females from the age group of less than 20 and age group of 21 to 35, and females than males in age group 36 to 50 and 51 or more. The lower infectivity of males is linked to the state of denial and not testing for HIV. The lower number in females can be due to their positive trends to the ART in their old age. The reasons for the low number need to be investigated. Awareness campaigns should be intentioned towards males. There should be publicity about the equality of both male and female genders.

LIST OF ACRONYMS AND ABBREVIATIONS

3TC: Lamivudine

AIDS: Acquired Immunodeficiency Syndrome

ART: Antiretroviral treatment

ARV: Antiretroviral

AZT: Zidovudine

D4T: Stavudine

ddI: Didanosine

DOTS: Directly Observed Therapy, short course

EFV: Efavirenz

ELISA: Enzyme-linked immunosorbent assay

HAART: Highly Active Antiretroviral Therapy

Ha: Alternative Hypothesis

HIV: Human Immunodeficiency Virus

Ho: Null Hypothesis

MOHSS: Ministry of Health and Social Service

NNRTI: Non-nucleoside Reverse Transcriptase

NRT: Nucleoside Reverse Transcriptase

NVP: Nevirapine

OI: Opportunistic Infection

PI: Protease Inhibitor

PLWHA: People Living with HIV/AIDS

RTV: Ritonavir

STI: Sexually Transmitted Infection

TB: Tuberculosis

UNAIDS: Joint United Nations Programme on HIV/AIDS

VCT: Voluntary Counselling and Testing

VL: Viral Load

WHO: World Health Organisation

DEFINITION OF TERMS AND CONCEPTS

ACQUIRED IMMUNODEFICIENCY SYNDROME(AIDS)

A severe immunological disorder caused by the retrovirus HIV, resulting in a defect in cell-mediated immune response that is manifested by increased susceptibility to opportunistic infections and to certain rare cancers, especially Kaposi's sarcoma. It is transmitted primarily by exposure to contaminated body fluids, especially blood and semen.

ANTIRETROVIRAL (ARV)

A substance or drug that stops or suppresses the activity of retroviruses such as HIV. Mosby's Medical Dictionary, 8th edition. © 2009, Elsevier.

AVERT

AVERT is an international HIV and AIDS charity, based in the UK, working to avert HIV and AIDS worldwide, through education, treatment and care.

CD4 CELL

A major classification of T lymphocytes, referring to those that carry the CD4 antigen; most are helper cells. Also called CD4 T lymphocytes.

Mosby's Medical Dictionary, 8th edition. © 2009, Elsevier.

CD4 CELL COUNT

A measure of the number of "helper" T cells that carry the CD4 glycoprotein on their cell surface and that help B cells produce certain antibodies.
Mosby's Medical Dictionary, 8th edition. © 2009, Elsevier.

DOSE

The amount of a drug or other substance to be administered at one time.
Mosby's Medical Dictionary, 8th edition. © 2009, Elsevier.

ELISA

Abbreviation for enzyme-linked immunosorbent assay. A primary test used in screening for HIV antibodies. Mosby's Medical Dictionary, 8th edition. © 2009, Elsevier.

HEALTH CARE PROVIDER

Any individual, institution, or agency that provides health services to health care consumers. Mosby's Medical Dictionary, 8th edition. © 2009, Elsevier.

HAART

Highly active antiretroviral therapy, triple combination therapy AIDS The concurrent administration of 2 nucleoside reverse transcriptase inhibitors–e.g., AZT and 3TC, and a protease inhibitor–e.g., Indinavir in newly diagnosed HIV infection Effects ↓ HIV levels inplasma, ↓ opportunistic infections, ↓ mortality,

↑ circulating T cells.

McGraw-Hill Concise Dictionary of Modern Medicine. © 2002 by the McGraw-Hill Companies, Inc.

HUMAN IMMUNODEFICIENCY VIRUS

Human immunodeficiency virus, the virus that causes AIDS. The risk of acquiring AIDS is increased by the presence of gonorrhea or other sexually transmitted diseases. Gale Encyclopedia of Medicine. Copyright 2008 The Gale Group, Inc. All rights reserved.

IMMUNE

Having resistance to infection by a certain pathogen.
Mosby's Medical Dictionary, 8th edition. © 2009, Elsevier.

IMMUNITY

The quality of being insusceptible to or unaffected by a particular disease or condition. Mosby's Medical Dictionary, 8th edition. © 2009, Elsevier.

REGIMEN

A treatment plan that specifies dosage, schedule, duration of treatment.

McGraw-Hill Concise Dictionary of Modern Medicine. © 2002 by the McGraw-Hill Companies, Inc.

RESISTANCE

An opposition to a force, such as the resistance offered by the constriction of peripheral vessels to the blood flow in the circulatory system.
Mosby's Medical Dictionary, 8th edition. © 2009, Elsevier.

RETROVIRUSES

A family of RNA viruses containing a reverse transcriptase enzyme which allows the viruses' genetic information to become part of the genetic information of the host cell upon replication. Gale Encyclopedia of Medicine. Copyright 2008 The Gale Group, Inc. All rights reserved.

RISK FACTOR

A characteristic, condition, or behaviour that increases the possibility of disease or injury. High blood pressure, high serum cholesterol, and smoking are risk factors for heart disease.
The American Heritage® Medical Dictionary Copyright © 2007, 2004 by Houghton Mifflin Company. Published by Houghton Mifflin Company. All rights reserved.

SIDE-EFFECTS

Any result of a drug or therapy that occurs in addition to the intended effect, regardless of whether it is beneficial or undesirable Example Chemotherapy– Fatigue, N&V, anaemia, hair loss, mouth sores.
McGraw-Hill Concise Dictionary of Modern Medicine © 2002 by the McGraw-Hill Companies, Inc.

THERAPY

The treatment of any disease or a pathologic condition, such as inhalation therapy, which administers various medicines for patients suffering from diseases of the respiratory tract. Mosby's Medical Dictionary, 8th edition © 2009, Elsevier.

THYMUS

Single unpaired gland located in the mediastinum that is the primary central gland of the lymphatic system. The T cells of the cell-mediated immune response develop in this gland before migrating to the lymph nodes and spleen.
Mosby's Dental Dictionary, 2nd edition © 2008 Elsevier, Inc. All rights reserved.

VIRAL LOAD

Measurement of the amount of human immunodeficiency virus in the blood expressed as copies per milliliter. Plasma viremia is used to guide treatment decisions and monitor response to treatment.
Mosby's Medical Dictionary, 8th edition © 2009, Elsevier.

VIRUS

A tiny particle that can cause infections by duplicating itself inside a cell using the cell's own software. Antibiotics are ineffective against viruses, though antiviral drugs exist for some viruses, including chickenpox.
Gale Encyclopedia of Medicine. Copyright 2008 The Gale Group, Inc. All rights reserved.

NONNUCLEOSIDE REVERSE TRANSCRIPTASE INHIBITOR (NNRTI)

A class of antiretroviral drugs that inhibit human immunodeficiency virus replication by blocking the reverse transcriptase enzyme essential for viral replication. These drugs have a different mechanism of action and side-effect profile from other reverse transcriptase inhibitors. Mosby's Medical Dictionary, 8th edition. © 2009, Elsevier.

STUDY OUTLAY

The study is comprised of the following chapters:

- Chapter one is about the general outlay of the study which presents the problem, purpose and the objectives of the study.
- Chapter two outlines the literature review conducted in the course of developing the study theory. The review emphasizes convincing national and international views on the subject under consideration.
- Chapter three presents the research methodology employed in the study in which the study design, target population, sample and sampling process and data collection method are discussed
- Chapter four presents the study results in the form of descriptive statistics coupled with putative inferential outputs.
- Chapter five discusses the conclusion drawn from the research project together with resultant recommendation. It also emphasizes the limitations and challenges to the study.

CHAPTER 1

INTRODUCTION

1.1 INTRODUCTION

HIV/AIDS is one of the major public health problems worldwide, affecting mostly people who are at the most productive stage of life. Out of the estimated 34 million people living with HIV/AIDS globally as at the end of 2010, 68% reside in Sub-Saharan Africa (UNAIDS, 2011).

The effect of HIV infection at the individual level is the continued breakdown of the immune system of the host which ultimately results in the onset of AIDS. All infected persons are at risk of illness and death from opportunistic infections and neoplastic complications (Moss *et al*., 1989). Infection of non-infected individuals with HIV occurs mainly through the exposure to biological fluids, especially semen and blood, of the infected individuals. Globally, the principal route of transmission is unprotected heterosexual intercourse (>75%). This accounts for the increasing number of women being affected worldwide. Homosexual intercourse is the second commonest route of transmission (Cauldbeck *et al* 2009).

Antiretroviral Therapy (ART) is a term used to describe the treatment of HIV/AIDS. ART is a 'holistic' treatment, which not only involves taking ARV drugs, but understanding HIV/AIDS and ART, preparing for and complying to a course of ARV therapy, ensuring proper nutrition, psychosocial support, palliative care and caring (www.safaids.net/files/LEM%202.pdf).

The introduction of HAART has a significant decline in mortality and morbidity associated with HIV/AIDS across Europe. Mortality and morbidity have declined by suppression of viral replication, restoration and preservation of immune function, and prevention of drug resistance. In the absence of treatment and care, someone living with HIV and AIDS in Africa has little hope. The introduction of antiretroviral medications (ARVs) in 1996 was a turning point for PLWHA with access to sophisticated healthcare systems (www.safaids.net/files/LEM%202.pdf).

HAART has led to a huge reduction of HIV-related diseases and death (Nachega, Stein *et al*., 2004). This gives an opportunity to sick people to resume

their work, and parents to live longer for their children before they become orphans (Harris, Nyangulu *et al*., 2001).

However, HAART requires strict adherence for the achievement of the optimal clinical and survival benefits. Compare to other chronic diseases in which lower adherence rates allow for continued efficacy, strict compliance to HAART is necessary (Paterson, Swindells *et al*., 2000). Studies have shown a correlation between higher levels of adherence and improved virological and clinical outcomes (Harrigan *et al*., 2005). However, ensuring that PLWHA receive, and adheres to their highly active ART poses a challenge to the treatment efficacy (Granich *et al*., 2009). Nachega, Stein *et al*. (2004) stated that 95% adherence to HAART is required for adequate virological and immunological response. Currently, adherence studies that utilized boosted PIs and non-nucleoside reverse transcriptase inhibitors (NNRTIs) suggest that boosted PIs and Efavirenz (EFV) may be more forgiving of lapses in adherence because of their longer half-lives (Bangsberg *et al*., 2006).

Optimal adherence to HAART is often influenced by different factors, which include patient-related (social, demographic, economic and behavioural) factors (Chesney, 2000). Adherence is related to characteristics of the patient, the regimen, the clinical setting and the relationship of the provider and the patient (Schneider *et al*., 2004).

The wellness clinic of the Bela Bela District Hospital provides the ART free of cost as per South African national policy to eligible human immunodeficiency virus (HIV) positive people that live in its catchment population.

Concentrating on the adult patients, once eligible for ART, they are put on the adult ART regimens according to the South African National Department of Health Clinical Guidelines for the Management of HIV & AIDS in Adults and Adolescents (2010). These regimens are divided into first line treatment, second-line and salvage (www.ndoh.gov.za, 2010).

The HIV positive patients that receive ART service at the wellness clinic of the Bela Bela District hospital in Limpopo province are male and female of all age groups, and mostly of African ethnicity. Heterosexual transmission of HIV is the most common mode of transmission among the people in this area as in the rest of South Africa

and the Southern African region (UNAIDS 2009). All the ART patients receive counselling in order to ensure adherence before starting treatment.

The motivation for embarking on the study was the fact that a number of determinants both from the individuals and their conditions were standing on the way of strict adherence to ART. These determinants were identified among HIV/AIDS patients attending and receiving free treatment from the government at the Wellness Clinic of the Bela Bela District Hospital in Limpopo province.

1.2 PROBLEM STATEMENT

Poor adherence to Antiretroviral Therapy in some patients who were receiving free treatment from the government at the Wellness Clinic of the Bela Bela District Hospital has been observed. It was a great public health concern in that some patients who were on Antiretroviral Therapy (ART) decided to end the life-long treatment for unknown reasons. There were some determinants affecting adherence to ART in those patients.

1.3 RESEARCH QUESTION

Which determinants were significant predictors of adherence to ART among HIV/AIDS patients at the Wellness Clinic in Bela Bela Hospital?

1.4 HYPOTHESIS

Determinants of adherence to ARV therapy in patients receiving free treatment at the wellness clinic in the Bela-Bela district hospital were not significant predictors.

1.5 AIM OF THE STUDY

The aim of the study was to find out the determinants affecting adherence to antiretroviral therapy in patients receiving free treatment at the wellness clinic of the Bela-Bela District Hospital.

1.6 OBJECTIVES OF THE STUDY

- To identify the determinants affecting the antiretroviral treatment adherence among these patients.
- To determine which of these determinants are significant predictors of adherence among HIV and AIDS patients.

1.7 SIGNIFICANCE OF THE STUDY

Several studies have been conducted around the world about adherence but the researcher did not come across one that addresses adherence in this particular area. This study will benefit the community of Bela Bela and surroundings, as it will help to predict which patients would adhere to treatment compared to others who would not. Therefore, it will help increase the support given to the patients that fall in the poor adherent category. All in all, it will be possible to formulate strategies to improve adherence at this wellness clinic.

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1.8 SUMMARY OF THE STUDY

Socio demographic and health status variables were tested by the hypothesis to verify any statistically significant relationship between them and to determine the significant predictor to adherence.

CHAPTER 2

LITERATURE REVIEW

2.1 INTRODUCTION

A literature review is an organised written presentation of what has been published on a given topic of study. It is conducted to generate a picture of what is known about a particular situation and the knowledge gaps that may exist in it.

2.2 IMPORTANCE OF CONDUCTING A LITERATURE REVIEW

This chapter will integrate and summarize what is already known in the area of this research topic. It assisted the researcher acquire new ideas and find out what has been done in this field (Neuman, 1997) and also assisted in enriching the results. Previous studies related to this topic have been done internationally and nationally.

2.3 ISSUES RELATED TO HAART

2.3.1 Definition of HAART

The use of multiple drugs that act on different viral targets is known as highly active antiretroviral therapy (HAART). HAART decreases the patient's total burden of HIV, maintains function of the immune system, and prevents opportunistic infections that often lead to death (Moore et al., 1999).

2.3.2 Origin

Before 1987, no antiretroviral drugs were available for treatment of complications arising from HIV/AIDS except after introduction of HAART by two drugs zidovudine and lamivudine on September 26, 1997. HAART is known as a
combination of several drugs; typically three or four are taken in combination. There are currently three major classes of ARV drugs: nucleoside or nucleotide analogue reverse transcriptase inhibitors (NRTIs), non-nucleoside reverse transcriptase

inhibitors (NNRTIs) and protease inhibitors (PIs) for the caregivers of people living with HIV/AIDS (http://en.wikipedia.org/wiki/Antiretroviral).

The first line treatment regimens are as follows: All new patients needing treatment start with the combination therapy comprising - Tenofovir (TDF) + Lamuvidine (3TC) or Emtracitabine (FTC) + Efavirenz (EFV) or Nevirapine (NVP). For Tuberculosis (TB) co-infection EFV is preferred. However, NVP is preferred for women of childbearing age (and pregnant women) who are not on reliable contraception (www.ndoh.gov.za, 2010).

Since the South African National Department of Health Clinical Guidelines for the Management of HIV & AIDS in Adults and Adolescents (2010) national regimen was recently changed to use TDF instead of Stavudine (d4T), due to d4T‟side effects, there are patients that are on d4T. Therefore, if any client is on a d4t-based regimen with no side effects then the recommended regimen is d4T + 3TC + EFV or NVP. These should remain on d4T if it is well tolerated but an early switch should be instituted if the patient manifests any toxicity. It is important to substitute TDF if the patient is at high risk of toxicity (for instance, high Body Mass Index (BMI), older, Female, TB treatment). Any patients that have contraindications to TDF, such as those with kidney or renal disease, should be put on Zidovudine (AZT) + 3TC +EFV or NVP. Those that fail on a d4T or AZT-based first line regimen are put on the second line regimen of TDF + 3TC or FTC + boosted Lopinavir (LPV/r). On the other hand, those that fail on a TDF-based first line regimen are put a combine regimen of AZT + 3TC + LPV/r (www.ndoh.gov.za, 2010). Finally, any patient on treatment that fails on the second line is put on salvage therapy by an experienced HIV consultant (www.ndoh.gov.za, 2010).

2.3.3 Laboratory Testing

HIV RNA (viral load) and CD4 T lymphocyte (CD4) cell count are the two surrogate markers of antiretroviral treatment (ART) responses and HIV disease progression that have been used for decades to manage and monitor HIV infection. Viral load is a marker of response to ART. A patient's pre-ART viral load level and the magnitude of viral load decline after initiation of ART provide prognostic information about the probability of disease progression (Murray et al., 1999). The key goal of ART is to achieve and maintain durable viral suppression. Thus, the most

important use of the viral load is to monitor the effectiveness of therapy **after** initiation of ART. Measurement of CD4 count is particularly useful **before** initiation of ART. The CD4 cell count provides information on the overall immune function of an HIV-infected patient. The measurement is critical in establishing thresholds for the initiation and discontinuation of opportunistic infection (OI) prophylaxis and in assessing the urgency to initiate ART. The management of HIV-infected patients has changed substantially with the availability of newer, more potent, and less toxic antiretroviral (ARV) agents. In the United States, ART is now recommended for all HIV-infected patients regardless of their viral load or CD4 count (Guidelines for the Use of Antiretroviral Agents in HIV-1-Infected Adults and Adolescents (updated May 2014)

2.3.4 Impact of Antiretroviral Therapy

According to WHO, there are three definitions of failure: clinical failure when there is a recurrent WHO stage 4; immunologic failure when CD4 cells fall to below the pre-therapy baseline, or below 50% of the on-peak value, or is persistently < 100 cells/mm; virological failure when plasma VL >10000 copies/ml; and virological success when VL is < 400 or 50 copies/ml (depending on the type of the assay) after six months of treatment. A recent WHO guideline recommends VL to be done every six months; treatment failure is defined as persistent VL > 5000 copies/ml. Although not well defined, VL cut-off > 10000 copies/ml to define treatment failures is linked with subsequent decline in CD4 cell count and clinical progression (http://aidsinfo.nih.gov/guidelines).

There are a number of problems associated with HAART, including the development of drug resistance, the difficulties of maintaining compliant long-term adherence and drug-related toxicities (http://aidsinfo.nih.gov/guidelines), all of which may lead to virological failure, which in turn leads to immunological failure and clinical progression of HIV/AIDS (Hogg *et al.,* 1998). Non-compliance to ART is therefore a major public health concern since it leads to virological, immunological and clinical failure while increasing the risk of transmission of drug resistant virus (Maggiolo *et al*., 2007). Kredo *et al*., 2009 said that the clinical efficacy of antiretroviral therapies (ART) in suppressing the HIV and improving survival rates for those living with HIV has been well documented. However, successful antiretroviral treatment is

dependent on sustaining high rates of compliance (correct dosage, taken on time and in the correct way – either with or without food).

2.4 ADHERENCE IN HIV DISEASE

2.4.1 Adherence in HIV disease

Adherence is the single most important aspect of ART provision. As much as it is relevant to make sure that patients are adherent to medication, chronic treatment poses challenges of adherence (UNAIDS, 2009). WHO defines treatment adherence as "the extent to which a person's behaviour – taking medications, following a diet and/or executing lifestyle changes – corresponds with agreed recommendations from a health care provider". For ART, a high level of sustained adherence is necessary to suppress viral replication and improve immunological and clinical outcomes; decrease the risk of developing ARV drug resistance; and reduce the risk of transmitting HIV (WHO 2013). Therefore, adherence is a process, not a single event, and adherence support must be integrated into regular clinical follow up (Amberbir *et al*., 2008).

Adherence to treatment in patients infected with the human immunodeficiency virus (HIV) or acquired immunodeficiency syndrome (AIDS) is influenced by factors associated with the patient, the disease, the patient-physician relationship, and the therapy (Ickovics et al., 2002). According to Bastos *et al.,* 2001, adherence to ARV regimes is of great importance for individual patients and for public health in general. For people living with HIV and AIDS (PLWHA), lack of adherence to an ARV therapeutic regimen may lead to therapeutic failure, deterioration of immune system functioning, and/or the emergence of resistant HIV strains. It may result in increased rates of infectivity and possibly increased rates of the transmission of resistant HIV strains.

2.4.2 Rates of Adherence

Research reveals that a minimum of 95% adherence is necessary to achieve HIV viral suppression in patients receiving Highly Active Antiretroviral Therapy HAART (Orell *et al.,* 2003). This statement is supported in the following studies:

About 82% of the patients had adherence of more 90% in the study conducted in Brazil by Remien *et al*., (2007). Non-adherence was related to personal factors such as sexual orientation, self-efficacy, physical factors (loss of appetite) and interpersonal factors such as patient-doctor relationship.

In the study done by OW Fong *et al.* (2003), they found that the last drug adherence level assessed by self-report in Chinese patients, patients with full adherence were more likely to have undetectable (< 500 copies/mL) plasma virus level.

A cross-sectional study assessing adherence to ARV in HIV positive patients was conducted in Bangalore, India, a country where only 10% of those who need therapy are receiving it. The results showed that regular attendance for follow-up was statistically significant for 100% lifetime adherence (Cauldbeck *et al*., 2009).

Studies from both resource-rich and resource-limited settings have repeatedly shown that high levels of ART adherence are associated with better immunological and virological outcomes, decreased risk of developing an AIDS-defining illness, and improved survival (Abaasa *et al*., 2009).

In 2006, Mills *et al* performed a meta-analysis of 31 studies from North America and 27 studies from sub-Saharan Africa to compare adherence to ART in the two regions. Patient self-reports were used to assess adherence in 71% of the North American studies and in 66% of the African assessments. A pooled analysis of the North American studies showed that about 55% of the population achieved adequate levels of adherence compared to about 77% in the sub-Saharan African studies.
In a study done in Senegal (Laurent *et al*. 2002), it was found that more than 95% of their patients had adherence exceeding 80% after one month on ARVs but only 80% of this group maintained these high adherence levels after 18 months. In addition, the proportion of patients with undetectable viral load fell from 79.6% to 59.3%.
The report of Orell et al., 2003 showed that adherence is not a barrier to successful to ART in South Africa. Adherence rates of higher than 90% were recorded through self-reported adherence questionnaires and pill counts. A relatively high proportion of the participants (about 71%) achieved undetectable viral load.
Mills et al. (2006), Orell et al. (2003) and Nachega *et al*. (2004), have all shown that poor settings. They have also shown that adherence is not a barrier to successful ART in South Africa. A later study done by Nachega et al (2004) in Soweto revealed

that about 80% of the participants had adherence levels higher than 95% and about 9% of the participants recorded adherence levels of between 90%-95% respectively.

There is however studies that have shown lower level of adherence. In South Africa, besides the studies done by Orell *et al*. (2003) and Nachega *et al*. (2004), which recorded adherence levels of 93.5% and 88% respectively, Darder *et al* (2004) recorded an adherence level of 88%. Brown *et al*. (2004), recorded adherence levels of 76% whilst Ferris *et al*. (2004), recorded adherence levels of 77%.

A Study conducted in private sector patients by Weiser et al (2003) put adherence levels at 54%, (54% of patients were found to be adherent by self-report, while 56% were adherent by provider assessment). Observed agreement between patient and providers was 68%. The principal barriers to adherence included financial constraints (44%) stigma (15%), travel / migration (10%) and side effects (9 %). The study also found that on the basis of logistic regression, if costs were removed as a barrier adherence could be predicted to increase from 54% to 74 %.

Eholie *et al*. (2004), from the Ivory Coast reported that 52% of their patients were poorly adherent and that HIV was detectable even among those reporting over 90% adherence. Sub-optimal adherence has been associated with rapid disease progression, poor immunologic response, increased drug resistance, and increased risk of mortality (Kent *et al*., 2003; WHO, 2006).

2.4.3 Measurement of Adherence

According to Chesney (2006) there is no gold standard for measuring adherence. Accurate measurement of antiretroviral therapy adherence is essential for evaluating interventions aimed at improving adherence and prevents viral resistance. Measurement of medication adherence is further complicated by the diversity of available measures, which have different utility in clinical and research settings (Chesney, 2006). Commonly used methods for measuring adherence include indirect measures, such as self-reports, electronic drug monitoring, pill counts, and pharmacy refill records and direct measures, including detection of drugs or drug metabolites in plasma (Berg 2006).

Measuring adherence to medication accurately is complicated, even in well-resourced countries. The ideal measurements would be directly observing a patient taking the medication (directly observed therapy – DOT) or methods that measure the drug levels or its metabolite in the blood (Osterberg & Blaschke, 2005).

Measuring a biological marker in the blood and electronic drug monitoring through medication events monitoring systems (MEMS) are indirect measures that are precise. These methods are expensive and out of reach for most public health systems in sub-Saharan Africa. Adherence can also be measured by asking patients about their pill-taking habits (Osterberg & Blaschke, 2005). It appears to be the most sensitive of methods used to measure and monitor adherence (Walsh et al 2002) and has been referred to, by Berg *et al* 2006 as a potential 'gold standard' for adherence assessment; when used properly.

The patients self-report is a relatively simple and efficient method of measuring and monitoring adherence in a clinical setting. In this method, adherence is assessed on patients' responses to a questionnaire and/or interview, or extracts from diaries. It is an inexpensive and necessary component of adherence assessment (Bangsberg et al., 2003). The disadvantage with this method lies with recall and comprehension. To improve the accuracy of recall, different recall periods have been used.

Pill counts, pharmacy refill records and keeping of appointments are other objective methods that can be used as indirect measures of adherence (Osterberg & Blaschke, 2005; Coates, 2003). The limitation of pill counts is that patients may manipulate pill counts by dumping some pills so as to have the correct number (Bangsberg et al., 2000).

Measuring adherence by pharmacy refill records and keeping of appointments presupposes that patients will actually take the medications they collect from the pharmacy correctly. (www.hivforum.org/publications/adherence_therapybuilding.pdf).

Adherence can also be measured by determining the physiological or clinical response to therapy. Patients on HAART have experienced improvements in quality of life and fewer opportunistic infections (Stone, 2002). Patients also report improved appetites (Nakiyemba, Aurugai, Kwasa & Oyabba, 2004). A study demonstrated that weight gain was highest in patients starting therapy with CD4 cell counts < 200 and/or BMI < 20. However the weight gain was found not to correlate with changes in viral load or CD4 counts and was therefore not useful as a surrogate marker (Teshale et al, 2004).

Virological response is determined by measuring the viral loads while immunological response is determined by measuring the CD4 cell counts (Hoffman et al, 2005). The measure of treatment success is the ability of HAART to suppress viral replication. This is done through monitoring of viral load. Viral load is very sensitive to adherence levels and suppression to undetectable levels is dependent on very high levels of adherence. Failure to suppress viral load or a viral rebound to detectable levels in a patient who previously had viral suppression is usually due to moderate or low adherence levels (Bisson et al., 2008).

Measurement of adherence by other methods can be correlated by viral load testing. However in the presence of resistance, viral loads may remain high despite optimal levels of adherence. In the absence of viral load testing, the WHO recommends using CD4 cell counts in monitoring patients on HAART in resource-limited settings. However CD4 cell levels start declining after virologic failure (Bisson et al, 2008). CD4 cell counts can also be affected by inter-current diseases. In the study by Bisson and others (2008), the researchers found that at 6 and 12 months, pharmacy refill adherence levels predicted virologic failure more accurately than CD4 cell count changes. Adherence levels during the first 3 months were also able to predict virologic failure at 6 months. The researchers suggest that monitoring adherence levels may provide an accurate early warning of virologic failure. It could help identify patients at risk of virologic failure. This gives an opportunity to increase adherence support thus preventing treatment failure and the cost of changing to second line regimens.

2.4.4 Factors that influence Adherence

Both high and low levels of adherence have factors that influence them. The following paragraphs explain some of these factors as described by various researchers. Reiter et al., (2000) identified five distinct groups of factors that affect adherence namely patient-related factors, patient provider relationship, regimen, disease characteristics, factors and general socio-environmental factors.

2.4.4.1 Patient-related factors

Patient variables include socio demographic factors (age, gender, race/ethnicity, income, education, literacy, housing status, insurance status, HIV risk factors) and psychosocial factors (mental health, substance use, social climate and support, knowledge and attitudes about HIV and its treatment) (Reiter et al., (2000).

According to Horne *et al.,* (1998); Gifford *et al*., (2000); Ammassari *et al*., (2002) the role of socio-demographic characteristics such as gender, race, age, exposure category, educational level, ethnicity, lack of stable housing, regimen complexity and substance use, anxiety, quality of life, knowledge and beliefs about treatment as predictors of adherence have produced inconsistent results.

In resource-rich settings where this association has been studied broadly, younger non-white race (ethnicity) and unstable housing have been consistently associated with non-adherence. Other factors, such as educational level and gender, have not been associated with difficulties relating to adherence (Bangsberg et al., 2001, Hogg et al., 2002). Similar to Wang & Zunyou (2007) did not find an association between adherence to ART and demographic characteristics. However, in their study, Gordillo *et al*., 1999 found that socio demographic factors influence the degree of adherence to ART. Nevertheless, some studies reported that socio-demographic factors do not predict adherence behaviour, although male sex, white ethnicity, older age, higher income, higher education and literacy correlate with better adherence (Ickovics & Meade, 2002).

Age also has been cited as a factor that can affect adherence. Mehta, Richard, & Graham (1997) established that one of the characteristics of good adherence was increase with age, except in the most elderly (that is, those over 75 years of age). Contrary to Karcher *et al.* (2007) in an 18-month observational cohort study done in a rural setting in Western Kenya, showed that higher age was a risk factor to non-adherence. A study conducted by Melissa *et al*. (2010), in Tanzania found out that both respondents were more likely to report poor adherence. Young people (19 to 30) who were less likely to adhere were possibly related to them having less stable social and economic situations compared to their older counterparts (50 years or more), and having less experience interacting with the health care system. Younger age has been associated with poor adherence in other African studies (Orell *et al*., 2003; Uzochukwu *et al*., 2009).

A study was conducted in Cuba by Aragonés *et al*. (2011) showed that there were no significant differences between highly and less adherent patients with regard to sex, place of residence, treatment setting, time of diagnosis, or length of treatment. Variables associated with high adherence were communication with the specialist physician, change in treatment, memory, self-efficacy, as well as commitment to and opinions about treatment.

2.4.4.2 Regimen factors

Factors related to the treatment regimen include the number of pills prescribed, the complexity of the regimen (dosing frequency and food instructions), the specific type of antiretroviral drugs, and the short- and long-term medication side effects (Reiter et al., 2000). Antiretroviral therapy is a long-term treatment, and not without side effects, maintaining a high level of drug adherence often represents a big challenge for both the patient and healthcare provider (Paterson et al., 2000).

Mills *et al*. (2006), in their systematic review of patient-reported barriers and facilitators to ART in both developed and developing nations, enumerated numerous regimen-related factors that facilitated adherence to ART. These comprise a belief in the efficacy of HAART, 'having faith' in the treatment, understanding the need for strict adherence, having a simple regimen, learning to balance HAART with daily schedules, incorporating ARVs into daily routine, and making use of reminder tools, a decreased quality of life while taking medications, feeling too sick, and being uncertain about potential long-term effects of HIV treatment.

Earlier studies done by Patterson *et al.* (2000) and Golin *et al*. (2002) support this by emphasizing that dosing frequency, pill burden and the long-term side effects of treatment as major barriers to adherence. Unlike Hansana *et al*. (2013) in Lao PDR who stated that no difference in adherence levels based on the duration of taking ART was observed.

For antiretroviral therapy to work, patients must adhere to a daily regimen of ARVs for life. Interrupting treatment can result in HIV becoming drug resistant, making first-line therapy no longer effective. Therefore, keeping patients on treatment programmes is imperative and the rise in patients failing to follow up their ART after 36 months is particularly worrying (Cornel, 2010).

In a prospective cohort study at two treatment sites in South Africa followed by qualitative interviews with patients that had defaulted. Respondents reported that

ART improved their health status and quality of life despite the socio-environmental factors (Candace et al., 2010). There have been significant improvements in antiretroviral medications, with pills that can be taken twice or once daily and co-formulations incorporating 2 or 3 types of medicine in a single pill (Stone, 2002). These innovations reduce dosing frequency and the number of tablets per dose. Currently most antiretroviral regimens are taken twice daily with 1 to 3 tablets per dose.

2.4.4.3 Disease Characteristics

Disease characteristics include the stage and duration of HIV infection, associated opportunistic infections, and HIV-related symptoms (Reiter et al., 2000).

Hansana *et al*. (2013) in Lao PDR reported that no difference in adherence levels based on WHO clinical stages was observed.

A few studies describe a relationship between HIV-related symptoms and nonadherence. Belenky et al., (2014) examined the prospective relationship between depressive symptoms and adherence, virologic failure, and suppressed immune function in people living with HIV/AIDS in Tanzania. Infections previously incurable, requiring lifelong maintenance treatment no longer require therapy once antiretroviral effects are established (Volderbing, 2003). The number of people dying from AIDS-related causes began to decline in the mid- 2000s because of scaled up access to antiretroviral therapy and the steady decline in HIV incidence since the peak of the epidemic in 1997 (UNAIDS, 2012).

2.4.4.4 Patient provider relationship

Patient-provider relationship characteristics that may affect adherence include the patient's overall satisfaction and trust in the provider and clinic staff, the patient's opinion of the provider's competence, the provider's willingness to include the patient in the decision-making processes, the affective tone of the relationship (warmth, openness, cooperation, etc.), the concordance of race/ethnicity between patient and provider, and the adequacy of referrals (Reiter et al., 2000).

Gifford *et al*. (2000); Malcolm et al., (2003) mentioned that the physician-patient relationship appears to have a significant impact on adherence.

In a study on the general care of patients living with HIV/AIDS, Tomlinson *et al*., (2000) found that 53% of the HIV positive patients studied would like their General Practitioner (GP) to be involved in their care.

A study measured the prevalence of adherence to antiretroviral therapy at St. Rita's Hospital, Glen Cowie using a one-week adherence questionnaire and a decrease in viral load within six months as a surrogate marker for adherence. It was found that the high level of adherence might be a reflection of patients' satisfaction with the support and effort of the clinic staff, as 93% of the respondents were very satisfied with the services that they received (Mphahlele, 2008).

2.4.4.5 General socio-environmental factors

Aspects of the clinical setting that may influence adherence include access to ongoing primary care, involvement in a dedicated adherence program, availability of transportation and childcare, pleasantness of the clinical environment, convenience in scheduling appointments, perceived confidentiality, and satisfaction with past experiences in the health care system (Reiter et al., 2000).

Mills *et al*. (2006); Talam *et al*., (2008) enumerated socio-environmental factors, such as being away from home, being too busy or distracted to properly comply, financial constraints, disruptions in access to medication, forgetting, changing in work routine, stigma, feeling sick as important barriers to adherence. Studies conducted by Dahab *et al.,* (2008); Candace et al., (2010) in South Africa and Kip *et al.* (2009) indicated that the main reported barriers to adherence were denial of existence of HIV or of one's own positive status, use of traditional medicines, speaking a different language from the HP, alcohol use, being away from home, feeling better on treatment and long waiting times at the clinic, inadequate knowledge about the disease and ARVs, stigma, travelling costs, side effects of ART. Service-centred barriers included nurses' attitudes and knowledge, health workers' inability to conduct home visits and to contact defaulters, limited clinic hours, delays in getting CD4 and viral-load results.

2.5 SUMMARY

This study aimed at finding out the determinants affecting adherence to antiretroviral therapy in patients receiving the free treatment at the wellness clinic of the Bela Bela District hospital.

Different issues concerning HAART. For the result from the use of HAART, adherence should be close to 100%. Different adherence measurement methods for HAART can be used such as medical events monitoring system, therapeutic blood level of HAART measurement, and pill counting etc. Each method has its own disadvantages. It is difficult to predict which patient will adhere or not to the treatment even though it is free. Factors influencing adherence and findings from other studies comprise patient variables; treatment regimen; disease characteristics; patient-provider relationship; clinical setting; and medication side effects.

CHAPTER 3

RESEARCH METHODOLOGY

3.1 INTRODUCTION

This chapter looks at the methodological procedures followed in the development and conduct of the study. The study was described in respect of the population demographics; the concepts of study design; study population and study sample were discussed and elucidated comprehensively. The study aimed at finding out the determinants affecting adherence to antiretroviral therapy in patients receiving free treatment at the wellness clinic of the Bela Bela District hospital. The objectives were to identify contributing factors that affect the adherence among HIV and AIDS patients and to determine which determinants were significant predictors of adherence among HIV and AIDS patients.

3.2 STUDY SETTING

The study was conducted at the wellness clinic in Bela Bela Hospital which is situated in Bela Bela Local Municipality within Waterberg District Municipality. The district is located within the Southern part of the Limpopo Province bordering the provinces of Gauteng, North West and Mpumalanga. Bela Bela is Northern-Sotho name meaning “Boiling-Boiling” and the name of the town is synonymous with the town’s famous hot water springs which were discovered in the 1800’s. The town was previously also known by the name of Warmbaths (Community Survey, 2007).

Bela Bela town is 144km from the provincial capital Polokwane (used to be called Pietersburg). The urban area of Bela Bela municipality is the growth point with a potential for further economic growth and development. It incorporates Warmbaths (Bela Bela), Spa Park, Bela Bela Township and Jinnah Park. The rural area consists of the settlements of Settlers, Rust de Winter, Pienaarsriver, Radium and Mabula as well as farms and smallholdings (Community Survey, 2007)

3.3 STUDY DESIGN

This is a retrospective study design. It is retrospective in the sense that review of patients' medical records will be reviewed. The patient medical record at Warmbaths Hospital contains information on demography, such as patient name, identification number, gender, age categories (adult and child), ART start date, weight and CD4 count at base time, WHO stage of HIV/AIDS, VL, weight and CD4 count every six months for two years, type of Regimens, reason for change of regimen if any, on TB treatment at start of ART, family planning method and pregnant due date if patient pregnant.

3.4 POPULATION AND SAMPLING

The sample was from HIV positive patients registered in the wellness clinic of Bela Bela District Hospital and who have been on HAART from the first visit. The estimated population size of adults' patients who visited the Wellness Clinic between 1 January 2010 and 31 July 2011 was 800.

3.4.1 Sampling method

A simple random sampling method, which ensures that each sampling unit in the population has an equal chance of being selected, was used to select a sample of adult patients from the population. The medical record at the hospital was used as a sampling frame. Numbers (001 to 800) were given to each of HIV positive adults' patients who visited the Wellness Clinic between 1 January 2010 and 31 July 2011. Then a table of random numbers was used to select the sampling units, i.e. HIV positive patients. When taking numbers from the table, a number was not repeated, that is the selection of recorded patients without replacement. Further, the eligibility criteria to be in the study included records of patients who were examined and screened and went through three adherence counselling.

3.4.2 Sample size

The sample size for this study was calculated using Morgan and Krejcie's (1997) table, i.e. using the formula

$$n = \chi^2_{\alpha,1} \frac{N \times P(1-P)}{d^2 \times (N-1) + \chi^2_{\alpha,1} \times P(1-P)}$$

where n is required sample size, $\chi^2_{\alpha,1}$ is a chi-square value for 1 degree of freedom at the $(1-\alpha)$ confidence level, N is the population size, P is the population proportion of patient who adherence to ART and d is the margin of error. The population size for this study is 800. Using a 5% margin of error, a 95% confidence level and the population proportion of 0.50, P is unknown and this value was selected since it provides the maximum sample size, the sample size is approximately 260, that is

$$n = 3.84 \times \frac{800 \times 0.5(1-0.5)}{(0.05)^2 \times (799) + 3.84 \times 0.5(1-0.5)} \approx 260.$$

3.4.2.1 Reliability

Reliability is a test of the stability of the measure over a period of time in which it is not expected to change (Bowling, 2002). To ensure that the instrument was reliable; it was tested on 20 files and additional information was included based on patients'.

3.4.2.2 Validity

Validity is an expression of the degree to which a measurement or tool measures what it purports to measure (Bowling 2002). To ensure content validity, data collection 2 was given to expert in the field and the supervisor to check whether the tool measured what was meant to measure.

3.4.2.3 Bias

To minimize bias in this study a sample of 260 recorded patients were randomly selected from the 800 existing recorded patients ensuring that every record has equal chance to be selected. The researcher conducted the study by herself, because she knows the content and what to look for in the files.

3.5 DATA COLLECTION

Secondary data was collected from the hospital patients' medical record (register book) for this study. Using the information in the records was strictly scrutinized so as to minimize bias and confounding variables. In the sample selection all necessary steps were taken to ensure that all recorded patients contain relevant information related to the study.

Demographic data of each recorded patient, age and gender, and variables that characterised the health status of patients and other related issues such as, weight and CD4 count at base time, the WHO stage of HIV/AIDS; viral load suppression, weight and CD4 count after six months of treatment for two years and treatment outcome were collected. The medical record shows that the viral load was taken only after 6 months of treatment.

3.5.1 Eligibility criteria

The eligibility criteria to be in the study included recorded patients who were examined and screened and went through three adherence counselling. The viral load was taken only after 6 months of treatment. Recorded patients visited the clinic on a monthly basis to collect their medication and undergo a general review which included physical examination and adherence counselling was emphasized, pill count and collection of treatment.

3.5.2 Limitation of the data

The selected sample patients' medical records have missing information on CD4 counts and viral load were recorded at the sixth month visit.

Inability to use a direct indicator of adherence instead of the proxy indicators of viral load and CD4 count.

3.6 DATA ANALYSIS

After collection, all data were captured using Microsoft Excel and cleaning of the captured data were done by the researcher. The Excel file was then imported to SPSS (Statistical Package for Social Science) Windows Version 21.0 for analysis. A

step by step approach was taken in the data analysis process. First, basic analysis such as descriptive statistics (mean, standard deviation) for quantitative variables, frequency distributions and graphical presentations were used to summarize the data collected.

Then a logistic regression analysis was used to predict whether gender, age, WHO stage status, weight and baseline CD4 count were determinants of adherence. Only the significant determinants were put in the logistic model. Backward or forward elimination was used in the process of logistic regression.

3.7 UTILIZATION AND REPORTING OF THE RESULTS

- The results of the study will be utilized for the purpose of writing a mini dissertation;
- For presentation at seminars or workshops, and
- For publication.

3.8 ETHICAL CONSIDERATIONS

Ethical considerations in relation to scientific research are premised on the protection of the right of participants in such research projects. The researcher undertook to observe all relevant ethical and legal considerations that are applicable to scientific research.

The researcher obtained clearance to collect data from the University of Limpopo, Ethics Committee and the related institutions to conduct the study.

3.8.1 Confidentiality: All information obtained in the course of this study was treated with utmost confidentially and was not used outside the scope of the study. This was done in compliance with the requirement for confidentiality, which seek to protect the identity of the research subject against potential abuse / stigmatisation. The names of the patients were not recorded.

3.9 SUMMARY

The chapter elucidated the research methodology used in this study: study setting, study design, population and sampling process; and ethical considerations.

CHAPTER 4

PRESENTATION OF RESULTS

As part of the analysis, data were grouped in a systematic method to indicate the determinants and adherence characteristics of the study in order to establish the factors associated with adherence among HIV and AIDS patients at the wellness clinic of the Bela District hospital.

- The computer based SPSS statistical software (Statistical Package for Social Science) Windows Version 21.0 was used to analyze data.

The results were analyzed and interpreted to support the following objectives of the study:

- To identify associations between determinants and the adherence to antiretroviral treatment among these patients.
- To determine which of these determinants were significant predictors of adherence among HIV and AIDS patients.

4.1 DESCRIPTION OF THE DATA

The target population was HIV and AIDS patients registered at the wellness clinic between 01/01/2010 and 31/07/2011. The study population consists of male and female adults aged from 18 and above who had received HAART for at least 6 months. Using the Morgan and Krejcie (1997) method, a sample of 260 HIV patients was drawn from a population of 800 HIV patients by use of a simple random sampling method.

The information concerning education, race, and marital status, and employment, weight after initiation, religion, and side-effects were not taken into consideration because of lack of consistency in recording, and incomplete information in the register book.

4.1.1 Demographic Information & Health Status of all participants

4.1.1.1 Gender

The results show that 65 per cent of the patients in the sample were female and 35 per cent were male.

4.1.1.2 Age

Most of the patients (47.3%) in the study belonged to the age group 21 to 35 years and only (2.7%) in the age group less or equal to 20 years. In these age groups, there were more females than males. They are displayed in Table 4.1.

Table 4.1 Illustration of distribution of HIV patients by Gender and Age group

Age groups	Gender		Total
	Male	Female	
Less or equal to 20	1 (1.1%)	6 (3.6%)	7 (2.7%)
21 – 35	35 (38.4%)	88 (52.1%)	123 (47.3%)
36 – 50	40 (44.0%)	56 (33.1%)	96 (36.9%)
51or more	15 (16.5%)	19 (11.2%)	34 (13.1%)
Total	**91 (100%)**	**169 (100.0%)**	**260 (100.0%)**

4.1.1.3 WHO Stage Category & Gender

Most patients were categorised into WHO stage I (31.2%). Only 9.2% of the patients were categorised into WHO Stage IV. In these WHO staging status there were more females than males. They are displayed in Table 4.2.

Table 4.2 Illustration of distribution of HIV patients by WHO Stage & Gender

WHO Stage	Gender		Total
	Female	Male	
I	60 (35.5%)	21 (23.1%)	81 (31.2%)
II	50 (29.6%)	27 (29.7%)	77 (29.6%)
III	46 (27.2%)	32 (35.2%)	78 (30.0%)
IV	13 (7.7%)	11 (12.1%)	24 (9.2%)
Total	**169 (100%)**	**91 (100.0%)**	**260 (100.0%)**

4.1.1.4 Weight Category & Gender

Most of the patients in group 2 (41.3%) had a weight between 40kgs and 54kgs and group 1 (4.2%) with patients whose weight was less than 40kgs. One of the patients has no record on weight. They are displayed in Table 4.3.

Note: Weight Category: 1 = Less than 40kgs; 2 = between 40 and 54kgs; 3 = between 55kgs and 64kgs; and 4 = Greater than 65kgs.

Table 4.3 Illustration of distribution of HIV patients by Weight Category & Gender

Weight Category	Gender		Total
	Female	Male	
1	9 (5.4%)	2 (2.2%)	11 (4.2%)
2	71 (42.3%)	36 (39.6%)	107 (41.3%)
3	52 (31.0%)	34 (37.4%)	86 (33.2%)
4	36 (21.4%)	19 (20.9%)	55 (21.2%)
Total	**168 (100%)**	**91 (100.0%)**	**259 (100.0%)**

4.1.1.5 CD4 count category at starting ART (Baseline) & Gender

The majority of patients (44.2%) had CD4 count, less or equal to 100. Only 2.7% had CD4 count 300 and more. They are displayed in Table 4.4.

Note: CD4 count category: 1: ≤ 100; 2: < 101 & 200 > 3: < 201 & 300 > 4: ≥ 301

Table 4.4 Illustration of distribution of HIV patients by CD4 Count at Baseline & Gender

CD4 count Category	Gender		Total
	Female	Male	
1	74 (43.8%)	41 (45.1%)	115 (44.2%)
2	65 (38.5%)	65 (38.5%)	100 (38.5%)
3	25 (14.8%)	13 (14.3%)	38 (14.6%)
4	5 (3.0%)	2 (2.2%)	7 (2.7%)
Total	**169 (100%)**	**91 (100.0%)**	**260 (100.0%)**

4.1.1.6 CD4 count category at 6 Months ART & Gender

After 6 months of treatment, 37% of patients had CD4 count from 300 and above; and only 9.7% of the patients had CD4 countless than 200. For 136 (52.3%) of the patients in the sample the information on CD4 count at 6 months is missing. They are displayed in Table 4.5.

Table 4.5 Illustration of distribution of HIV patients by CD4 Count at 6 Months & Gender

CD4 Count (6 Months)	Gender		Total
	Female	Male	
1	7(8.9%)	5 (11.1%)	12 (9.7%)
2	20 (25.3%)	16 (35.6%)	36 (29.0%)
3	14 (17.7%)	16 (35.6%)	30 (24.2%)
4	38(48.1%)	8 (17.8%)	46 (37.1%)
Total	**79 (100%)**	**45 (100.0%)**	**124 (100.0%)**

4.1.1.7 Viral Load at 6 Months (VL6) & Gender

The majority of patients (72.7%) in the sample had low viral load and only (27.3%) of the patients had high viral load. They are displayed in Table 4.6.

0 = High viral load and 1 = Low viral load

Table 4.6 Illustration of distribution of HIV patients by VL6 & Gender

VL (6 Months)	Gender		Total
	Female	Male	
0	18 (32.7%)	6 (18.2%)	24 (27.3%)
1	37 (67.3%)	27 (81.8%)	64 (72.7%)
Total	**55 (100%)**	**33 (100.0%)**	**88 (100.0%)**

4.1.1.8 Regimen (Reg) & Gender

Majority of patients (48.5%) are on New 1a Regimen instead of Regimen 1a (30.8%) because of the side effects the latter has on them. Some patients (11.2%) were on Regimen 1b, followed by patients (8.1%) on Regimen New 1b. The remaining patients were on Regimen 1c, Reg 2 and Truvada (1.6%). They are displayed in Table 4.7.

Table 4.7 Illustration of distribution of HIV patients by Regimen Category & Gender

Regimen Category	Gender		Total
	Female	Male	
1a	47 (27.8%)	33 (36.3%)	80 (30.8%)
1b	22 (13.0%)	7 (7.7%)	29 (11.2%)
1c	1 (0.6%)	1 (1.1%)	2 (0.8%)
New 1b	20 (11.8%)	1 (1.1%)	21 (8.1%)
New 1a	79 (46.7%)	47 (51.6%)	126 (48.5%)
Reg 2	0 (0.0%)	1 (1.1%)	1 (0.4%)
Truvada	0 (0.0%)	1 (1.1%)	1 (0.4%)
Total	**168 (100%)**	**91 (100.0%)**	**259 (100.0%)**

4.2. HYPOTHESIS TESTING FOR TWO CATEGORICAL VARIABLES: RESULTS

The objective of the study was to identify the determinants which affect the adherence to antiretroviral therapy in HIV/AIDS patients. To this effect, Chi-Square tests were done in order to test the association between a variable (such as age groups, gender, weight groups, regimens and WHO stages) and a CD4 count at 6 month category, and viral load category at six month. In this study, a 5 per cent level of significance was used for all statistical tests ($\alpha = 0.05$).

The decision rule was to reject the null hypothesis (H_O) if the p-value of the test (exact p-value for Fisher exact test) was less than alpha ($\alpha = 0.05$) and not to reject the null hypothesis if p-value of the test was greater than alpha ($\alpha = 0.05$).

4.2.1 Associations between variables

4.2.1.1 Association between CD4 count at 6 months * Gender

The observed frequencies for the association between CD4 count category at 6 months and gender are displayed in Table 4.10. The computed value of $\chi^2 = 12.060$ is compared with the tabulated value of χ^2 with 3 degrees of freedom, which equals to 7.81. There was significant association between CD4 Count Category at 6 months and Gender.

Table 4.8: Illustration of association between CD4 count at 6 month * Gender

Gender	**CD4 count category at 6 months**				
	Less or equal to 100	101 - 200	201 – 300	301 or more	Total
Female	7	20	14	38	79
Male	5	16	16	8	45
Total	**12**	**36**	**30**	**46**	**124**
$\chi^2 = 12.060$, d.f. = 3 and p-value = 0.007					

4.2.1.2 Association between CD4 Count Category at 6 months * WHO Stage

The observed frequencies for the association between CD4 count category at 6 months and WHO Stage are displayed in Table 4.9. The computed value of $\chi^2 =$ 36.549 is compared with the tabulated value of χ^2 with 9 degrees of freedom, which equal to 16.92.

There was a very high significant association between CD4 Count Category at 6 months and WHO stage.

Table 4.9: Illustration of association between CD4 count at 6 month * WHO Stage

WHO Stage	CD4 count category at 6 months				
	Less or equal to 100	101 - 200	201 – 300	301 or more	Total
I	1	5	9	29	44
II	4	12	8	11	35
III	4	17	9	6	36
IV	3	2	4	0	9
Total	**12**	**36**	**30**	**46**	**124**
$\chi^2 = 36.549$, d.f. = 9 and p-value = 0.000					

4.2.1.3 Association between CD4 count at 6 months * Weight Category

The observed frequencies for the association between CD4 count category at 6 months and Weight are displayed in Table 4.10. The computed value of $\chi^2 = 20.520$ is compared with the tabulated value of χ^2 with 9 degrees of freedom, which equal to 16.92.

There was significant association between CD4 Count Category at 6 months and Weight category at 5% level (p-value = 0.015).

Note: Weight Category: 1 = Less than 40 kg, 2 = between 40 and 54 kgs, 3 = between 55 and 64, and 4 = Greater than 65 kgs.

Table 4.10: Illustration of association between CD4 count at 6 months * Weight Category

Weight Category	CD4 count category at 6 months				
	Less or equal to 100	101 - 200	201 – 300	301 or more	Total
1	2	0	0	1	3
2	2	11	16	21	50
3	3	15	5	13	36
4	5	10	9	11	35
Total	**12**	**36**	**30**	**46**	**124**
$\chi^2 = 20.520$, d.f. = 9 and p-value = 0.015					

4.2.1.4 Association between CD4 Count Category at 6 months * CD4 Count Baseline Category

The observed frequencies for the association between CD4 count category at 6 months and CD4 Count Baseline are displayed in Table 4.16. The computed value of $\chi^2 =$ 37.821 is compared with the tabulated value of χ^2 with 9 degrees of freedom, which equal to 16.9.

Note that the p-value for the test, 0.000, is less than 0.05. We conclude then that there was a very high significant association between CD4 Count Category at 6 months and CD4 count at Baseline Category.

Table 4.11: Illustration of association between CD4 Count Category at 6 months * CD4 Baseline Count Category

CD4 Count Baseline	**CD4 count category at 6 months**				
	Less or equal to 100	101 - 200	201 – 300	301 or more	Total
1	11	18	16	5	50
2	1	13	10	29	53
3	0	5	2	11	18
4	0	0	2	1	3
Total	**12**	**36**	**30**	**46**	**124**
$\chi^2 = 37.821$, d.f. = 9 and p-value = 0.000					

Note: CD4 count category for Baseline: 1 = Less or equal to 100, 2 = between 101 and 200, 3 = between 201 and 300, and 4 = greater than or equal to 301.

4.2.1.5 Association between VL6_Categ * WHO Stage

The observed frequencies for the association between VL6_Category and WHO Stage are displayed in Table 4.12. The computed value of $\chi^2 =$ 7.807 is compared with the tabulated value of χ^2 with 3 degrees of freedom, which equal to 7.81.

Note that the p-value for the test, 0.050, is equal to 0.05. We conclude, then that the association between Viral Load Category at 6 months (binary category) and WHO Stage marginally significant.

Table 4.12: Illustration of association between VL6_Categ * WHO_Stage

VL6_Categ	**WHO Stage**				
	I	II	III	IV	Total
0	2	10	9	3	24
1	22	13	24	5	64
Total	**24**	**23**	**33**	**8**	**88**
$\chi^2 = 7.807$, d.f. = 3 and p-value = 0.050					

4.2.2 Summary of significant variables in different associations

The significant variables in different associations are displayed in tables 4.13 and 4.14.

Table 4. 13 Summary of significant determinants in association with CD4 Count at 6 Months

SIGNIFICANT DETERMINANTS	χ^2 = PV
Gender	12.060 0.007
WHO Stage	36.549 0
Weight	20.520 0.015
VL 6 months	25.723 0
CD4 Count baseline	37.821 0

Table 4.14 Summary of significant determinant in association with VL 6 Months

SIGNIFICANT DETERMINANT	χ^2 = PV
WHO Stage	7.807 0.050

4.3 LOGISTIC REGRESSION

Logistic regression was used for predicting of a categorical dependent variable based on one or more predictor variables. It measured the relationship between a categorical dependent variable and one or more independent variables. Only significant associations were put in the logistic model. Backward and forward elimination was used in the process of logistic regression.

4.3.1 Variables with Odds, P-value and Confidence Interval (Table 4.15)

- CD4 count baseline is not a significant predictor of adherence {P= .029, .571, respectively; CI: -4.160 / -.218, 2.409 /1.329, respectively, OR = -2.189, -.540, respectively}.

- CD4 count is not a significant predictor of adherence {P= .741, .137, .052 respectively; CI: -5.064 / 7.120, -1.531/ 11.203, -.054 / 12.758 respectively, OR = -1.028, .137, .052 respectively}.

- Age is not a significant predictor of adherence {P: .994, .996, .491 respectively CI: -4325.9 /4360.7,-1.678 / 1.670,-1.1004 / 2.299 respectively; OR: 17.396, -.004, .597, 0.00 respectively}.
- VL is a significant predictor of adherence {P: .000, CI: 2.155 / 6.494, 0.00 respectively; OR: 4.324}.
- Weight is not a significant predictor of adherence {P: .991, .800, .487 respectively; CI: -6040.5/ 5968.7, -1.204/ 1.563, -1.854/ .884 respectively; OR: -35.865, .179, -.485 respectively}.
- Starting Regimen is not a significant predictor of adherence {P: 1.000, .000, 1.000, .426 respectively; CI: -8481.3 / 8485.6, -23.879 / -10.749, -8482.6 / 8484.3, -3.000 / 7.101 respectively; OR: 2.114, -17.314, .830, 2.050 respectively}.
- Regimen 3 Months is not a significant predictor of adherence {P: .993, -, 1.000 respectively; CI: -11214.4 / 11314.6, 17.736 / 17.736, -8483.8 / 8483.1 respectively, OR: 50.091, 17.736, -.359 respectively}.
- Regimen 6 Months is not a significant predictor of adherence {P: .989, .739 respectively; CI: -7461.9 / -7359.7, -3.909 / 5.512 respectively; OR: -51.100, .801respectively}.

- WHO stage is not a significant predictor of adherence {P: .106, .462, .856 respectively; CI: -.400 / 4.171, -1.372 / 3.023, -1.952 / 2.351 respectively; OR: 1.886, .825, .199 respectively}.
- Gender is not a significant predictor of adherence {P: .889; CI: .187 / 7.020; OR; .136}.

Table 4.15 Variables with odds, p-value and confidence interval (95%)

VARIABLE	**GROUPINGS**	**ODDS**	**P-VALUE**	**95% CI Lower bound Upper bound**
CD4 Baseline	1.0 2.0 3.0	-2.189 -.540 .00	.029 .571 -	-4.160 / -.218 -2.409 /1.329 -
CD4	1.0 2.0 3.0	1.028 4.836 6.352	.741 .137 .052	-5.064 / 7.120 -1.531 /11.203 -.054 / 12.758
AGE	1.00 2.00 3.00 4.00	17.396 -.004 .597 0.00	.994 .996 .491 -	-4325.9/4360.7 -1.678 /1.670 -1.104 / 2.299 -
VL	1.00 2.00	4.324 0.00	.000 -	2.155 / 6.494 -
WEIGHT	1.00 2.00 3.00 4.00	-35.865 .179 -.485 0.00	.991 .800 .487 -	-6040.5/5968.7 -1.204 / 1.563 -1.854 /.884 -
WHO STAGE	1.0 2.0 3.0 4.0	1.886 .825 .199 0.00	.106 .462 .856 -	-.400 / 4.171 -1.372 /3.023 -1.952 /2.351 -

STARTING REGIMEN	1.0	2.114	1.000	-8481.3/8485.6
	2.0	-17.314	.000	-23.879/-10.74
	3.0	.830	1.000	-8482.6/8484.3
	4.0	2.050	.426	-3.000/7.101
	6.0	0.00	-	-
REGIMEN 3 MONTHS	1.0	50.091	.993	-11214/11314
	2.0	17.736	-	17.736 /17.736
	3.0	-.359	1.000	-8483.8/8483.1
	4.0	0.00	-	-
	6.0	0.00	-	-
REGIMEN 6 MONTHS	1.0	-51.100	.989	-7461.9/7359.7
	2.0	.801	.739	-3.909 / 5.512
	3.0	0.00	-	-
	4.0	0.00	-	-
	6.0	0.00	-	-
GENDER	1.0	.136	.883	.187 / 7.020
	2.0	0.00	-	-

In this research study, only one statistically significant result that was of those whose VL were low after 6 months of ART treatment (Odds ratio 4.324, p value 0.000, CI 2.155 – 6.494).

4.4 SUMMARY

The Chi-square method was used in order to test the association between a variable (such as age groups, gender, weight groups, regimens and WHO stages) and CD4 count at 6 months category, 5% level of significance was used.

The logistic regression was used to assess the effect of each predictor such as age, gender, CD4 count, VL, weight, starting regimen and WHO stages with adherence. Backward and forward elimination was used in the process of logistic regression.

CHAPTER 5

DISCUSSION

5.1 INTRODUCTION

The aim of this study was to find out the determinants affecting adherence to antiretroviral therapy in patients receiving free treatment at the wellness clinic of the Bela-Bela District hospital. In order that the study might be properly guided to achieve the set objectives, all the variables involved such as age, gender, the immunological status, viral load, weight, and regimens were investigated.

This chapter was aimed at discussing the findings based on the data collected from 260 recorded patients and analysed in the previous chapter. Contrasts and similarities are drawn from the findings of other studies as observed in the literature review.

5.2 FINDINGS & DISCUSSIONS

The findings of this study are in agreement with findings in other parts of the world.

5.2.1 Age and Gender

The results of the study showed that close to half of patients were in the age group 21-35 years and the majority were females. This is an indication of more patients in this category who were likely not to be adherent as they were of reproductive age and would fear isolation and stigmatisation among their peers if they were to be seen taking their medication. It also meant that females were more susceptible to early sexual exposure and therefore at greater risk earlier than males. The higher percentage recorded between the ages of 21-35 and 36-50 (47.3% and 36.9%) can be attributed to the fact that these age groups are sexually active and are prone to unprotected sexual intercourse, drug abuse and acts associated with youthful exuberance. The 51or more had lower number of patients (13.1%). HIV/AIDS is associated with decrease in life expectancy. If treatment is begun following the diagnosis of AIDS, life expectancy is approximately 10-40 years (Vogel, 2010).

The female and male ratio in the present study is 1.8:1 similar but slightly higher than 1.6:1 of Akinbami et al., (2012). However, it is in contrast with 1:1.2 of Oguejiofor et

al., (2008), Glynn et al., (2001) reported HIV prevalence was six times higher in women than in men amongst sexually active 15-19 years old, but it dropped to three times in men among 20-24 years old and equal that of men among 25-49 years old. Thus, disparity in gender prevalence is age-dependent. Women are more likely to be higher in number because of the added need to go for antenatal visits where HIV screening is also done. However, females are more predisposed to contracting HIV because of early marriage, polygamous relationships and pelvic inflammatory disease and genital ulcers (Dosekun and Fox, 2010; Current Opinion in HIV and AIDS, 2010; Asekun-Olarinmoye et al., 2011).

The current study showed a significant association between CD4 cell count at 6 months and gender (p-value < 0.05). Similarly, a study by (Akinseng et al., 2012) done in Lagos, Nigeria, where CD4 count was used to determine the percentage of HIV positive patients who required ART at registration and it was found that females were more than half of registered patients in HIV clinic and have relatively high CD4 count than males. In contrast a study by Tumwebaze (2012) found that there was no effect of gender on the CD4 count response to ARV therapy. Similar to studies by Parsons et al., (2011) where no significant association was seen between gender and CD4 cell count. The current study showed that gender was not a significant predictor of adherence {P: .889; CI: .187; OR; .136} was supported by Gifford et al., (2000) who stated that gender was one of the factors less consistently linked to poor adherence. Unlike in the literature Barbara et al., (2003) in a retrospective cohort study evaluated the relationship of gender, depression, medical care and mental health care to adherence in HIV-infected drug users. The outcome was that among patients treated with Highly Active Antiretroviral Therapy (HAART), women had worse pharmacy-measured antiretroviral adherence than men. Supported by Maqutu, Zewotir *et al.,* (2009) showed in their study that gender was among significant factors to HAART. (Cauldbeck *et al*. 2009) in a cross sectional study showed that positive trends to adherence were observed in males.

5.2.2 WHO Stage

The findings showed that third of patients were in WHO stage I which was the majority and more than half were females. In reality the WHO Staging does not

depends at the level of CD4 cell count to initiate HAART. More than half of the patients had high CD4 count and were in stages 1 and 2. It was also found a very high significant association between WHO Stage and CD4 cell count. Similarly, a study by Ghate et al., (2000) showed that CD4 counts were significantly lower among men, symptomatic patients, and those with oral candidiasis, weight loss and multiple clinical conditions. In contrast a study done by Baveewo et al., (2011) on 395 participants had for objective to validate the WHO clinical staging in predicting initiation to ART in a low-resource setting and to determine the clinical predictors of low CD4 count in Uganda found a significant inverse correlation between WHO Stage and CD4 cell count. The WHO HIV/AIDS clinical staging guidelines have a low sensitivity and about half of the participants in stages 1 and 2 would be eligible for ART initiation if they had been tested for CD4 count.

WHO stage did not affect adherence to HAART {P: .106; CI: -.400; OR: 1.886}. Supported by Hansanna *et al*. (2009) who stated that no difference in adherence levels based on WHO clinical stages were observed in their study. Also in the study done by OW Fong et al., (2003), they found the last drug adherence level assessed by self-report in Chinese patients. Patients with full adherence were more likely to have undetectable (< 500 copies/mL) plasma virus level. HIV disease status did not affect adherence. Unlike in a cross-sectional study assessing adherence to ARV in HIV positive patients was conducted in Bangalore, India, a country where only 10% of those who need therapy are receiving it. The results showed that regular attendance for follow-up was statistically significant for 100% lifetime adherence. Positive trends were observed in patients who had a previous AIDS defining illness (Cauldbeck et al., 2009). Also, Abaasa et al., (2009) in their studies from both resource-rich and resource-limited settings have repeatedly showed that high levels of ART adherence are associated with decreased risk of developing an AIDS-defining illness, and improved survival.

5.2.3 Weight

The results showed close to half of patients have weight between 40kgs and 54kgs in which the majority and more than half were females. It is important to know the weight of the patients at the first visit. If the weight increases meaning the patients

are adherent to HAART. To start HAART is not an emergency. If patient is underweight; it should be corrected before to start the treatment. In this study it was also found that there was a significant association between Weight and CD4 cell count. This means that the clients on HAART experienced immunological and clinical recovery with increases in the CD4 cell count and body weight gain .Similarly, a study conducted by Ayalu et al., (2013) in Eastern Ethiopia on 1540 patients with the objective to determine the predictors of changes in CD4 lymphocyte count and weight among HIV/AIDS patients taking ART detected a substantial increment in weight and CD4 lymphocyte count. Another study by Griensven et al., (2010) on 609 adults on stavudine based (ART) examined the association between weight loss and a number of variables, namely lipoatrophy, virological failure, adherence and on-treatment CD4 count and no significant association was found with virological failure or adherence and higher on treatment CD4 count were protective against weight loss. In contrast a study by Akinboro et al., (2013) reported at baseline, obesity was beneficial, and associated with robust CD4 count ($p<0.001$) . However, post HAART overweight was detrimental to CD4 count reconstitution ($p=0.290$). In this study, weight was not a significant predictor of adherence {P: .991; CI: -6040.5; OR: -35.865}. Unlike Njuguna (2010) in his study set out to determine adherence levels at Keetmanshoop in Namibia and factors that could influence adherence and found adherence levels have an impact on CD4 cell count and body weight. Sub-optimal adherence was associated with falling CD4 cell counts and weight loss.

5.2.4 CD4 count baseline

The results showed that close to half of patients had the CD4 count baseline which could allow them to start with the HAART therapy. In this study, 9.67% had CD4 cell count ≤100 cells/mm3; 101-200 cells/mm3 range was 29.03%; 201-300 cells/mm3 range was 24.19%; 301 or more cells/mm3 range was 37.09%. Adherence to HAART was noticed after 6 months of medication. There seems to be consensus of opinion on deferral of ART in asymptomatic HIV patients whose CD4 count is greater than 500 cells/mm3. In this study it was also found that there was a very high significant association between CD4 cell count baseline and CD4 cell count. This indicates that after 6 months of treatment patients were more adherent to HAART.

Similarly, a study by Smith et al (2004); Hunt et al (2003) investigated factors affecting the increases in CD4 cell count in patients receiving HAART both in short (3months) and long term (>4years) and found the increases in CD4 cell during HAART were associated with the ability to maintain the virus load of <400 copies/ml and pre-HAART CD4 cell counts. In contrast a study by Phillips (2001) found that relatively complete immune reconstitution can be achieved with virological suppressive therapy, even when initiated in people with very low CD4 counts. In the current study the CD4 cell count did not affect the dependent variable of adherence {P: .741; CI: -5.064; OR:-1.028} which is supported by sub-optimal adherence that has been associated with poor immunologic response (Kent et al., 2003; WHO, 2006). And Kip *et al*. (2009) stated that CD4 cell and viral load results were part of patient-centred barriers to ART adherence. Contrary to the results in a cross sectional study on adults, in South Africa, Maqutu, Zewotir *et al.,* (2009) showed that baseline CD4 cell count was significant factor to HAART. Also studies from both resource-rich and resource-limited settings have repeatedly showed that high levels of ART adherence are associated with better immunological and virological outcomes (Abaasa et al., 2009).

5.2.5 Viral Load (VL) at 6months

The results of the study showed that close to 3/4 of patients had low viral load and more than half were females. This means that VL at 6 months is a parameter indicating that taking HAART is beneficial to the HIV infected patients who are adherent. In this study it was also found that there was a very high significant association between Viral Load and WHO staging. This means that WHO staging is classified according to the symptoms. Similarly, a study by Engels et al (1999) evaluated the relationship between plasma HIV viral load and subsequent risk for disease progression in patients (n=398) with late stage HIV disease (Hemophilia) and found that viral load predicts disease progression independently of CD4 cell count. Because VL most strongly predicts progression immediately after load is tested; it reflects the current level of immunosuppression. In contrast a study conducted by Arora et al., (2013) with the aim to correlate plasma viral load and CD4 count with Mini Mental Status Examination (MMSE) scores and HIV Dementia

Scales (HDS) in patients diagnosed with HIV associated dementia (HAD) in a private psychiatric clinic in India. The results showed a negative correlation ascertained between Plasma viral load and MMSE scores. No significant correlations were found between HDS and either plasma viral load or CD4 count.

In this study the Viral load was the only predictor variable adherence {P: .000; CI: 2.155; OR: 4.324} was supported by Bisson *et al.,* (2008) who conducted a case-control study among HIV-infected individuals starting NNRTI-based HAART in Botswana's National ARV Therapy Program. It showed that there was a strong relationship between adherence and virological response when measured by pharmacy refill data and also virological failure may still be present in spite of high level of adherence to HAART even though the median of adherence was more than 90%. Similar to a study done by Mphahlele (2008), at St Ritas Hospital using a one week adherence questionnaire and a decrease in viral load within 6 months as a surrogate marker of adherence showed satisfactory results.

5.2.6 Regimen category

The results showed that close to half patients were in Regimen (New 1a) and more than half were females. This is an indication of more patients in this category were on this regimen because of less side-effects compare to other regimens.

In the current study regimen is not a significant predictor of adherence {P: 1.000; CI: -8485.6; OR: 2.114}. This finding is similar to the result of Gifford et al., (2000) who reported that regimen complexity was part of factors less consistently linked to poor adherence. This was not supported in a study conducted in Italy (Rome*)* which indicated that symptoms and adverse drug effects, complexity of the HAART regimen, and inconvenience of treatment were the factors most consistently associated with non-compliance (Ammassari, 2002). Also Weiser et al., (2003) conducted a cross-sectional study of the social, cultural and structural determinants of treatment adherence. The results showed that side effects of treatment were part of principal barriers to adherence. Dahab et al., (2008) conducted a qualitative study in a public workplace in South Africa; where

employees with HIV infection were provided with free treatment in.

Some of the main reported barriers were perceived severity of side-effects, feeling better on treatment and long waiting times at the clinic.

Cauldbeck et al., (2009) in a cross-sectional study assessing adherence to ARV in HIV positive patients was conducted in Bangalore, India, a country where only 10% of those who need therapy are receiving it. The results showed that patients on simple regimes and in patients without side-effects had effect on adherence.

CHAPTER 6

LIMITATIONS / RECOMMENDATIONS AND CONCLUSIONS

6.1 LIMITATION OF THE STUDY

This present study was primarily focussed on a hospital based data. This showed to be a limitation. The results would undoubtedly change if all HIV-positive patients in communities making-up Bela Bela town were investigated and analysed. It was well recognized that many HIV-positive people were unaware that they were infected with the virus. The data we used in this study reflected the number of people that willingly visited the wellness clinic in Bela Bela hospital apart the patients who were using the clinic in the township.

6.2 RECOMMENDATIONS AND CONCLUSIONS

Adherence to HAART is the foundation of achieving success in the use of medication. This study was aimed to finding out the determinants affecting adherence to ART in patients receiving free treatment at the wellness clinic of Bela Bela hospital. From the findings of this research some conclusions were inferred and some recommendations made.

6.2.1 Age & Gender

The researcher found that more patients were in the age group 21-35 years with more females who were likely not to be adherent due to the reproductive age, sexual risk behaviours among young people, stigma and discrimination. Legal protection and strengthening prevention efforts should be put in place. The number of males in the study was lower compared to females. From the same age group 21-35, the ratio male and female is 1:1.8. The reason for the low number may be due to lower infectivity of males compared to females or males are in denial and are not testing for HIV. Awareness programmes are needed in the community. In the current study, age was not a significant predictor for adherence. Similar to the findings of Gifford *et al* (2000); Okoronkwo *et al.* (2013) who reported that age was a factor less consistently linked to poor adherence. Also Karcher *et al* (2007), Melissa *et al*. (2010), Uzochukwu *et al*. (2009) and Orrel *et al*. (2003) who associated age with

poor adherence. In contrast Metha Richard and Graham (1997) stated that increase in age was one of the characteristics of good adherence except in the most elderly (>75years). Older people are more adherent to HAART because of their responsibility in their home and society.

In the current study, females are predominant. The female and male ratio in the present study is 1.8:1 similar but slightly higher than 1.6:1 of Akinbami et al., (2012). However, it is in contrast with 1:1.2 of Oguejiofor et al., (2008), Glynn et al., (2001). The current study showed a significant association between CD4 cell count at 6 months and gender (p-value < 0.05). Similarity with a study by (Akinseng et al., 2012). In contrast Tumwebaze (2012); Parsons et al., (2011) found that there was no effect of gender on the CD4 count response to ARV therapy. The current study showed that gender is not a significant predictor of adherence. It was supported by Gifford et al., (2000). Unlike in the literature of Barbara et al., (2003); Maqutu, Zewotir *et al.,* (2009) and showed in their study that gender was among significant factors to HAART.

6.2.2 WHO Stage

Most patients were in Stage 1 and 2 which showed that they were asymptomatic and still doing their normal social activities. This is supported by WHO Staging (e.g. Scale 1). The significant association between WHO stage and CD4 count in the current study was also found by Ghate et al., (2000) where lower CD4 count is associated to symptomatic patients, men, weight loss etc. Unlike Baveewo et al., (2011) who found a significant inverse correlation between CD4 count and WHO Stage. The outcome of treatment with HAART showed improvement in the clinical conditions and rising of CD4 cell count. In the current study, WHO Stage is not a significant predictor for adherence. Similar statement was given by Hansanna et al (2009); contrary to Caulbeck et al., (2009) and Abassa et al., (2009). HIV/AIDS defining conditions improved as the patients commenced on HAART medication according to the study. Supportive care should be introduced in the community to take care of challenges to HIV treatment adherence among people dealing with some conditions such as depression, tuberculosis and common side effect like fatigue, metabolic issues, and conditions associated with ageing like diabetes,

cardiovascular diseases. The intervention in the community should combine different services namely primary care, nutrition, social support.

6.2.3 Weight

Most patients have weight between 40 and 54kgs with more than half being females. Gain in weight is a sign of good adherence. In South Africa, the criteria for starting HAART in adults are a CD4 cell count of ≤ 200 or WHO Stage 3 or 4 diseases (MOHSS, 2007). Most patients therefore start HAART with advanced HIV disease and negative body weight. The current study showed a significant association between CD4 cell count and weight which is supported by Ayalu et al., (2013) unlike Griensven et al ., (2010) who stated no significant association was found between weight and CD4 count. The current study also demonstrated that the patients on HAART experienced immunological and clinical recovery with increases in the CD4 cell count and body weight gain. This study found that adherence does not have an impact on body weight contrary to Njuguna (2010).

6.2.4 CD4 count Baseline

The immunological response of the study participants was good as seen after 6 months of HAART medication. In the current study, the lowest CD4 cell count was ≤ 100 cells / mm3. CD4 cell count is one of the laboratory methods used to monitor the disease progression and to guide whether the patient will need antiretroviral therapy or not (Vajpayee et al., 2011). In the current study, a very high significant association was noticed which was supported by Smith et al., (2004); Hunt et al., (2003) in contrast with Philips (2001). The study also demonstrated that the patients on HAART experienced immunological and clinical recovery with increases in the CD4 cell count. In the current, CD4 cell count is no a significant predictor of adherence. Similar to Kent et al., (2003); WHO (2006). Unlike Maqutu, Zewotir et al., (2009) who showed that CD4 cell count is a significant factor to HAART.

Treatment guidelines recommend that HAART therapy should begin when CD4 cell count drop below 350 cells / mm3 (CD4 count, 2010). Most patients in treatment programmes in Africa start with CD4 cell count ≤ 200 cells/ mm3 (Njuguna, 2010) which is the case in wellness clinic of Bela Bela hospital.

6.2.5 Viral Load

The results of the study showed that close to 3/4 of patients had low viral load and more than half were females. The outcome of treatment in the current reported that suppression of viral load is linked with rising of CD4 count and amelioration in the clinical conditions. Viral load had a significant association with WHO stage. This statement was confirmed by Engels et al (1999) who found that viral load reflects the current level of immunosuppression. In contrast with Arora et al., (2013) where no significant correlations were found between HDS and either plasma viral load or CD4 count. Viral load was the only significant predictor of adherence in the current study. It is important to emphasize that virological failure may still be present in spite of high level of adherence to HAART even though the median of adherence is more than 90% (Bisson *et al.,* (2008).

6.2.6 Regimen

The findings showed that close to half patients were in Regimen (New 1a) and more than half were females. This is an indication of more patients in this category were on this regimen because of less side-effects compare to other regimens. In the current study regimen is not a significant predictor of adherence. It is similar to the result of Gifford et al., (2000); in contrast with Ammassari, (2002), Weiser et al., (2003). WHO recommends antiretroviral therapy in all adolescents, adults and pregnant women with a CD4 count less than 350 cells/µL or those with symptoms regardless of CD4 count (WHO, 2010). Benefits of treatment include a decreased risk of progression to AIDS (Sterne et al., 2009); improves physical and mental health (Beard et al., 2009), a decreased risk of transmission of the disease to sexual partners and a decrease in mother- to- child transmission (WHO, 2010). However, it is important to emphasize that those with severe and advanced clinical disease (WHO clinical stage 3 and 4) should start ART irrespective of their CD4 cell count. The community should know the benefits of to the patients, to the health service and to the community (Human rights and gender equality | 2010 GLOBAL REPORT)

6.3 OTHER RECOMMENDATIONS

The health care givers have major roles to play in motivating their patients to adhere to their medication. All the ART patients should receive counselling in order to ensure adherence before starting treatment. Discussion with the patient should revolve around the challenges to adherence that current HAART regimens present like complexity, poor tolerability, the need for disciplined adherence to minimize the risk of treatment failure and the emergence of drug-resistant variants. New antiretroviral drugs are being developed that have simpler dosing intervals, lower pill burdens, and fewer metabolic complications such as dyslipidaemia. Incorporation of these drugs into HAART regimens may alleviate some of the problems with adherence and improve responses to antiretroviral therapy. Health education is the key to make people aware of the benefits of treatment with HARRT.

REFERENCES

Abaasa, A. M., J. Todd, et al. (2009). "Good adherence to HAART and improved survival in a community HIV/AIDS treatment and care programme: the experience of The AIDS Support Organization (TASO), Kampala, Uganda." BMC Health Serv Res 8: 241.

Akinbami A, Dosunmu A, Adediran A, Ajibola S, Oshinaike O, Wright K and Arogundade O (2012): CD4 Count Pattern and Demographic Distribution of Treatment-Naïve HIV Patients in Lagos, Nigeria. AIDS Research and Treatment.

Akinboro AO, Onayemi O, Ayodele OE, Mejiuni AD, Atiba AS (2013):The impacts of first line highly active antiretroviral therapy on serum selenium, cd4 count and body mass index: a cross sectional and short prospective study

Amberbir, A., Woldemichael, K., Fatechew, S., Girma, B., & Deribe, K. (2008). Predictors of Adhrence to Antiretroviral Therapy among HIV-infected persons: A Prospective study in Southwest Ethopia.

Ammassari, A Trotta, M P, Rita Murri, Castelli, F, Narciso, P, Noto, P. (2002): Correlates and predictors of adherence to Highly Active Antiretroviral Therapy.

Antiretroviral therapy literacy for community- based caregivers a reference manual,

Aragonés C, Sánchez L, Campos JR, Pérez J. (2011). Antiretroviral therapy adherence in persons with HIV/AIDS in Cuba.

Arora S, De Sousa AA (2013): Plasma Viral Load, CD4 count and HIV associated Dementia.

Asekun-Olarinmoye E.O., Olajide F.O & Asekun-OlarinmoyeI.O. (2011). HIV/AIDS preventive measures among in-school adolescents in a sub-urban community in Southwestern Nigeria. Acta SATECH 4(1):81-96.

Ayalu A. Reda mail, Sibhatu Biadgilign, Amare Deribew, Betemariam Gebre, Kebede Deribe (2013)Predictors of Change in CD4 Lymphocyte Count and Weight among

HIV Infected Patients on Anti-Retroviral Treatment in Ethiopia: A Retrospective Longitudinal Study. Published: April 03, 2013 DOI: 10.1371/journal.pone.0058595

Bangsberg DR, Hecht FM, Charlebois ED, Zolopa AR, Holodniy M, Sheiner L, et al. (2000). Adherence to protease inhibitors, HIV-1 viral load and development of drug resistance in an indigent population.

Bangsberg DR, Perry S, Charlebois ED, Clark RA, Roberston M, Zolopa AR, et al. (2001): Non adherence to highly active antiretroviral therapy predicts progression to AIDS.

Bangsberg DR, Charlebois ED, Grunt RM, Holodniy M, Deeks SG, Perry S, et al. (2003). High levels of adherence do not prevent accumulation of HIV drug resistant mutations.

Bangsberg DR. (2006). Less than 95% adherence to Non-nucleoside reverse-transcriptase inhibitor therapy can lead to viral suppression. Clin Infect Dis. 43(7):939-941.

Barbara J. T, Laine C, Leon Cosler, RP,Walter W. Hauck, (2003). Relationship of gender, depression and health care delivery with antiretroviral adherence in HIV-infected drug users. J GEN INTERN MED 2003; 18: 248-257.

Bastos F I, Kerrigan D, Malta M, Carneiro-da-Cunha C, & Strathdee SA. (2001). Treatment for HIV/AIDS in Brazil: strengths, challenges, and opportunities for operations research. AID Science Vol. 1, No.15, 2001.

Baveewo S, Ssali F, Karamagi C, Kalyango JN, Hahn JA, Ekoru K, Mugyenyi P, Katabira E (2011):Validation of World Health Organisation HIV/AIDS clinical staging in predicting initiation of antiretroviral therapy and clinical predictors of low CD4 cell count in Uganda.

Beard J., Feeley F., Rosen S. (2009). Economic and quality of life outcomes of antiretroviral therapy for HIV/AIDS in developing countries: a systematic literature review.AIDS care 21(11): 1343-56.

Berg, KM & Arnsten, JH. (2006). Practical and conceptual challenges in measuring antiretroviral adherence. Journal of Acquired Immune Deficiency Syndromes 43(1):79-87.

Bisson, Gregory; Rowh, Adam; Weinstein, Rachel; Gaolathe, Tendani; Gross, Robert. (2008). Antiretroviral Failure despite High Levels of Adherence: Discordant Adherence- Response Relationship in Botswana.

Bowling, A. (2002). Reliability and validity; Research Methods in Health Open University Press P147, 150.

Brown S, Friedland GH, Bodasin U (2004). Assessment of adherence to antiretroviral therapy in HIV-infected South African adults.

Candace M Miller, Mpefe Ketlhapile, Heather Rybasack-Smith, Sydney Rosen Trop Med Int Health (2010). Why are antiretroviral patients lost to follow-up?

Cauldbeck MB, O'Connor C, O'Connor MB, et al., (2009): Adherence to anti-retroviral therapy among HIV patients in Bangalore, India.

Chesney, M.A. (2000). "Factors affecting adherence to antiretroviral therapy". Clinic Infect 30 Suppl 2:5171-6.

Chesney, M.A. 2006. The elusive gold standard. Future perspectives for HIV adherence assessment and interventions. Journal of Acquired Immune Deficiency Syndrome 43(1):149-155.

Clinical Guidelines for the Management of HIV & AIDS in Adults and Adolescents (2010). www.ndoh.gov.za retrieved 20 September 2011.

"Community Survey, 2007: Basic Results Municipalities" PDF. Statistics South Africa. Retrieved 2009-10-20.

Cornell, M. (2010). 'Temporal changes in programme outcomes among adult patient initiating antiretroviral therapy across South Africa, 2002-2007' AIDS 24(14).

Dahab M, Charalambous S, Hamilton R, Fielding K, Kielman K, Gavin J Churchyard and Alison D Grant. (2008). “That is why I stopped the ART” Patients’ & Providers’ perspectives on barriers to and enablers of HIV treatment adherence a South African work place programme.

Darder M, Michaels D, Boulle A, Ncobo N, MacLean E, Goemaere E. (2004). Determinants of short and long term adherence to antiretroviral treatment in resource-poor settings.

Dosekun O., and Fox J. (2010). An overview of the relative risks of different sexual behaviours on HIV transmission. Current Opinion in HIV and AIDS 5(4):291-7.

Eholie ESP, Bissagnene - Emmanual BE, Quiminga-Maryam OM, Kangah-Koffi KC, Diakhite DN, Ehui EE, et al. (2004). Adherence to HAART and its principal determinants in the HIV infected adult in Abidjan (Cote d’Ivoire).

Engels EA, Rosenberg PS, O’Brien TR, and James J. Goedert JJ (1999): Plasma HIV Viral Load in Patients with Hemophilia and Late-Stage HIV Disease: A Measure of Current Immune Suppression.

Ferris DC, Dawood H, Chiasson MA, Diamond B, Hammer SM, Lalloo UG. (2004). Self-reported adherence to antiretroviral therapy and virologic outcomes in HIV-infected persons in Durban, KwaZulu Natal, South Africa.

Fong OW, Ho CF, Fung LY, LEE FK, Tse WH, Yuen CY, Sin KP and Wong KH. (2003): Determinants of adherence to highly active antiretroviral therapy (HAART) in Chinese HIV/AIDS patients.

Ghate MV, Mehendale SM, Mahajan BA, Yadav R, Brahme RG, Divekar AD, Paranjape RS (2000): Relationship between clinical conditions and CD4 counts in HIV-infected persons in Pune, Maharashtra, India.

Gifford AL, Burman JE, Shively MJ, Wright B, Richman D, Richman DD**,** et al. (2000). Predictors of self-reported adherence and plasma HIV concentrations in patients on multidrug antiretroviral regimens. J Acquir Immune Defic Syndr ; 23:386-95.

Glynn JR, Caraël M, Auvert B, Kahindo M, Chege J, Musonda R, Kaona F, Buvé A; Study Group on the Heterogeneity of HIV Epidemics in African Cities (2001): Why do young women have a much higher prevalence of HIV than young men? A study in Kisumu, Kenya and Ndola, Zambia.

Golin CE, Liu H, Hays RD, Miller LG, Beck CK, Ickovics J, Kaplan AH*, et al*., (2002): A prospective study of predictors of adherence to combination antiretroviral medication.

Gordillo, V., Amo, J. d., Soriano, V., & Gonzalenz-Lahoz, J. (1999): Socio demographic and Psychological Variables influencing Adherence to Antiretroviral Therapy. *AIDS* (13), 1763-1769.

Granich RM, Gilks CF, Dye C, De Cock KM, Williams BG. (2009): Universal voluntary HIV testing with immediate antiretroviral therapy as a strategy for elimination of HIV transmission: a mathematical model.

Griensven J, Zachariah R, Mugabo J, Reid T (2010): Weight loss after the first year of stavudine-containing antiretroviral therapy and its association with lipoatrophy, virological failure, adherence and CD4 counts at primary health care level in Kigali, Rwanda

Harris, A., D. Nyangulu, et al. (2001). “Preventing antiretroviral anarchy in Sub-Saharan Africa”. Lancet 358: 410-414.

Hansana V, Sanchaisuriya P, Durham J, Sychareun V, Chaleunvong K, Boonyaleepun S, Schelp FP. (2013): Adherence to antiretroviral therapy (ART) among people living with HIV (PLHIV): a cross-sectional survey to measure in Lao PDR.

Harrigan PR, Hogg RS, Dong WWY, et al. (2005). Predictors of HIV drug-resistance mutations in a large antiretroviral-naive cohort initiating triple antiretroviral therapy.

Hogg RS., K.V. Heath, et al. (1998). “Improved survival among HIV-infected individuals following initiation of antiretroviral therapy”.

Hogg RS, Heath K, Bangsberg D, Yip B, Press N, O'Shaughnessy MV, et al. (2002). Intermittent use of triple combination therapy is predictive of mortality at baseline and after one year of follow-up.

Horne R. Adherence to medication, a review of existing research. In Myers L and Midence K (Eds) (1998) Adherence to treatment in medical conditions (pp.285-310).

Hunt PW, Deeks SG, Rodriguez B, et al (2003): Continued CD4 cell count increases in HIV infected adults experiencing 4 years of viral suppression on antiretroviral therapy. AIDS 2003;17:1907-15.

http://www.safaids.net/files/LEM%202.pdf, accessed on February 09, 2014.

http://en.wikipedia.org/wiki/Antiretroviral_drug, accessed on February 10, 2014.

Ickovics JR, Meade CS. (2002). Adherence to HAART among patients with HIV: breakthroughs and barriers.

Ickovics, JR & Meade CS. (2002). Adherence to antiretroviral therapy among patients with HIV: a critical link between behavioral and biomedical sciences.

Karcher, H., Omondi, A., Odera, J., Kunz, A., & Harms, G. (2007). Risk Factors for Treatment Denial and Loss to Follow-up in an Antiretroviral Treatment Cohort in Kenya. Tropical Medicine and International Health, 12, 687-694.

Kent, D. M., D. McGrath, et al. (2003). "Suitable monitoring approaches to antiretroviral therapy in resource-poor settings: setting the research agenda."

Kip E, Ehlers V, Wal van der D. (2009): Patients' adherence to antiretroviral therapy in Botswana.

Kredo T, Walt Van der J, Siegfried N, Cohen K. (2009): Therapeutic drug monitoring of antiretroviral for people with HIV. http://onlinelibrary.wiley.com/doi/10.1002/14651858.CD007268.pub2/pdf, accessed on February 12, 2014.

Laurent C, Diakhate N, Gueye NF, Touré MA, Sow PS, Faye MA, et al. (2002). The Senegalese government's highly active antiretroviral therapy initiative.

Maggiolo F, Airoldi M, Kleinloog HD, Callegaro A, Ravasio V, Arici C, et al (2007): Effect of adherence to HAART on virologic outcome and on the selection of resistance-conferring mutations in NNRTI or PI - treated patients.

Maqutu, D., T Zewotir, et al. (2009). Factors affecting early adherence to antiretroviral therapy amongst the HIV positive adults in South Africa. Submitted to AIDS; under review.

Mehta, S., Richard, M., & Graham, N. M. (1997). Potential Factor affecting Adherence with HIV Therapy.

Melissa H Watt, Suzanne Maman, Carol E Golin, Jo Anne Earp, Eugenia Eng,Shrikant I Bangdiwala, Mark Jacobson. (2010): Factors associated with self-reported adherence to antiretroviral therapy in a Tanzanian setting.

Mills EJ, Nachega JB, Bangsberg DR, Singh S, Beth R, Ping Wu, et al. (2006). Adherence to HAART: a systematic review of developed and developing nations. Patient reported barriers and facilitators.

Mills EJ, Nachega JB, Buchan I, Orbinski J, Attaran A, Singh S, et al. (2006). Adherence to antiretroviral therapy in Sub-Saharan Africa and North America. A meta-analysis.

Morgan, D.W. & Krejcie, R.V. (1999). Determining sample size for research activities. Minnesota, MN: University of Minnesota.

Moss AR, Bacchetti P. Natural history of HIV infection. *AIDS*. 1989; 3(2):55–61.

Mphahlele M. Progress report on ARV rollout at St.Rita's Hospital. (2008). Presentations at the 1st District meeting on ARV roll out. Glen Cowie. Sekhukhune district.

Nachega JB, Stein DM, Lehman DA, Hlatswayo D, Mothopeng R, Chaisson RE, et al. (2004). Adherence to antiretroviral therapy in HIV-infected adults in Soweto, South Africa.

Neuman W.L. (1997). Social research methods qualitative and quantitative approaches, 3rd edition. Boston MA: Allyn & Bacon.

Njuguna W (2010): Adherence to Highly Active Antiretroviral Therapy among patients in the Keetmanshoop Antiretroviral Therapy Programme, Namibia

Okoronkwo I, Okeke U, Chinweuba A, Iheanacho P. (2013). Non adherence Factors and Socio demographic Characteristics of HIV-Infected Adults Receiving Antiretroviral Therapy in Nnamdi Azikiwe University Teaching Hospital, Nnewi, Nigeria.

Oguejiofor O.C., Odenigbo C.U., Odenigbo U.M.(2008).CD4 cell count in HIV positive subjects in Asaba, South-South Nigeria. Tropical journal of Medical Research, Vol. 12 no 2:44-46.

Orell C, Bangsberg DR, Badri M, Wood R. (2003). Adherence is not a barrier to successful antiretroviral therapy in South Africa.

Paterson DL, Swindells S, Mohr J, Brester M, Vergis E, Squire C, et al. (2000). Adherence to protease inhibitor therapy and outcomes in patients with HIV infection.

Phillips AN, Staszewski S, Weber R, et al (2001): HIV viral load response to antiretroviral therapy according to the baseline CD4 cell count and viral load. JAMA 2001; 286:2560-7.

Remien R. H., Bastos F. I., Terto V. Jnr. , Raxach J. C., Pinto R.M., Parker R.G., A Berkman A., Hacker M.A. (2007). Adherence to antiretroviral therapy in a context of universal access, in Rio de Janeiro, Brazil. AIDS Care, 19 (6): 740-748.

Schneider J, Kaplan SH, Greenfield S. (2004). Better physician-patient relationships are associated with higher reported adherence to antiretroviral therapy in patients with HIV infection. J Gen Intern Med. 2004; 19(11):1096-1103.

Smith CJ, Sabin CA, Youle MS, Loes SK, Lampe FC, Madge S, Cropley I, Johnson MA and Phillips AN (2004): Factors Influencing Increases in CD4 Cell Counts of HIV-Positive Persons Receiving Long-Term Highly Active Antiretroviral Therapy.

Sterne J.A., May M., Costagliola D., de Wolf F., Phillips A.N., Harris R., Funk M.J., Geskus R.B., Gill J., Dabis F., Miro J.M., Justice A.C., Ledergerber B., Fatkenhewer G., Hogg R.S., Monforte A.D., Saag M., Smith C., Staszewski S., Egger M., Cole S.R. (2009). Timing of initiation of antiretroviral therapy in AIDS-free HIV-1 infected patients: a collaborative analysis of 18 HIV cohort studies.

Talam N.C, P. Gatongi, J. Rotich; S. Kimaiyo (2008). Factors affecting antiretroviral drug adherence among HIV/AIDS adult patients attending HIV/AIDS clinic at Moi Teaching and Referral Hospital, Eldoret, Kenya.

Tomlinson DR, Colebunders R, Coppieters Y, Dreezen C, Andraghetti RFleerackers Y, et al. (2000). Primary care involvement in human immunodeficiency virus infection.

UNAIDS. (2009). Retrieved April 2, 2011, from UNAIDS Web site: http://www.unaids.org.

UNAIDS. Joint United Nations Programme on HIV/AIDS (UNAIDS) World AIDS Day report. 2011.

UNAIDS (2012) 'World AIDS Day Report - Results'

Uzuchukwu, B. S., Onwujeke, O. E., Onoka, A. C., Okoli, C., Uguru, N. P., & Chukwuogo, O. I. (2009). Determinants of non-adherence to Subsidised Antiretroviral Treatment in Southeast Nigeria. *Health Policy and Panning* (24), 189-196.

Vajpayee M and Mohan T (2010): Current practices in laboratory monitoring of HIV infection.

Vogel M., Schwarze-Zander C., Wasmuth J.C., Spengler U., Sauerbruch T., Rockstroh J.K (2010).The treatment of patients with HIV. Deutsches Arzte blatt International 107 (28-29): 507-15; quiz 516.

Volberding P.A (2003). HIV therapy in 2003.Concensus and Controversy. AIDS, 17 (Suppl. 1): S4-S11.

Walsh JC, Mandalia S, Gazzard BG. (2002). Responses to a one month self-report on adherence to antiretroviral therapy care consistent with electronic data and virologic treatment outcome.

Wang, X., & Zunyou, W. (2007). Factors associated with Adherence to Antiretroviral Therapy among HIV/AIDS Patients in Rural China. *AIDS , 21*, S149-S155.

Weiser S, Wolfe W, Bangsberg D, Thior I, Gilbert P, Makhema J, Kebaabetswe P, Dickenson D, Mompani K, Essex M, and Marlink R. (2003). Barriers to Antiretroviral Adherence for Patients Living with HIV Infection and AIDS I Botswana.

WHO 2003.

WHO 2006

World Health Organization (WHO)(2010).Antiretroviral therapy for HIV infection in adults and adolescents: recommendations for a public health approach. Pp 19-20. ISBN 978-92-4-159976-4.

www.hivforum.org/publications/adherence_therapybuilding.pdf

www.ndoh.gov.za, 2010

www.safaids.net/files/LEM%202.pdf

APPENDICES

Appendix A: Clearance certificate from MREC

Appendix B: DOH Ethical Committee Certificate

Appendix C: Data collecting tool for research

Appendix D: Recommended ART Regimens

Appendix E: World Health Organization Adults HIV/AIDS Staging system

Appendix F: Cross tabulation and Logistic Regression results

APPENDIX A

UNIVERSITY OF LIMPOPO
Medunsa Campus

MEDUNSA RESEARCH & ETHICS COMMITTEE

CLEARANCE CERTIFICATE

MEETING:	**09/2012**
PROJECT NUMBER:	**MREC/HS/272/2012: PG**
PROJECT:	
Title:	Determinants affecting adherence to antiretroviral therapy in patients receiving free treatment at the wellness clinic of the at Bela-Bela District Hospital, Limpopo Province.
Researcher:	Dr Y Nyantabana
Supervisor:	Dr MBL Mpolokeng
Hospital Superintendent:	Dr Langa
Other involved HOD:	Kriel SJW
Department:	Medical Sciences, Public Health & Health Promotion
School:	Health Sciences
Degree:	MPH

DECISION OF THE COMMITTEE:

MREC approved the project.

DATE: 08 November 2012

PROF GA OGUNBANJO
CHAIRPERSON MREC

The Medunsa Research Ethics Committee (MREC) for Health Research is registered with the US Department of Health and Human Services as an International Organisation **(IORG0004319)**, as an Institutional Review Board **(IRB00005122)**, and functions under a Federal Wide Assurance **(FWA00009419)**
Expiry date: **11 October 2016**

Note:
i) **Should any departure be contemplated from the research procedure as approved, the researcher(s) must re-submit the protocol to the committee.**
ii) **The budget for the research will be considered separately from the protocol.**
PLEASE QUOTE THE PROTOCOL NUMBER IN ALL ENQUIRIES.

Finding Solutions for Africa

PROUDLY SOUTH AFRICAN

APPENDIX B

LIMPOPO
PROVINCIAL GOVERNMENT
REPUBLIC OF SOUTH AFRICA

DEPARTMENT OF HEALTH

Enquiries: Selamolela Donald

Ref:4/2/2

Nyantabana Y

University of Limpopo

Sovenga

0727

Dear Dr Nyantabana Y

Re: Permission to conduct the study titled: Determinants affecting adherence to antiretroviral therapy in patients receiving free treatment at the wellness clinic of the Bela-Bela District hospital, Limpopo Province

1. The above matter refers.
2. Permission to conduct the above mentioned study is hereby granted.
3. Kindly be informed that:-
    - Further arrangement should be made with the targeted institutions.
    - In the course of your study there should be no action that disrupts the services.
    - After completion of the study, a copy should be submitted to the Department to serve as a resource.
    - The researcher should be prepared to assist in the interpretation and implementation of the study recommendation where possible.

Your cooperation will be highly appreciated.

General Manager: Strategic Planning, Policy and Monitoring

Date..11/01/2013.....

APPENDIX C

(DATA COLLECTING TOOL FOR THE RESEARCH STUDY)

1. IDENTIFICATION				
RESEARCH IDENTIFICATION:				
FILE NUMBER				
AGE				
GENDER	MALE		FEMALE	
2. HEALTH STATUS				
CD4 COUNT BASELINE		DATE		VALUE
CD4 COUNT AT 6 MONTHS		DATE		VALUE
VIRAL LOAD AS AFTER 6 MONTHS OF INITIATION OF TREATMENT		DATE		VALUE
REGIMEN				
WHO STAGE	I	II	III	IV
WEIGHT				

APPENDIX D

RECOMMENDED ART REGIMENS

REGIMENS	DRUGS
1a	d4T/ 3TC/ EFV
1b	d4T/ 3TC/ NVP
1c	AZT/3TC/EFV
2	AZT/ ddI /LPV & RTV
New 1a	TDF /3TC /EFV
New 1b	TDF /3TC / NVP
Truvada	

Adults 1st line Regimens: 1a, 1b, 1c, New 1a, New 1b

Adults 2nd line Regimens: 2a, 2b.

Nucleoside Reverse Transcriptase Inhibitors (NRTIs):

3TC: lamivudine AZT or ZDV: zidovudine

d4T: stavudine ddI: didanosine

TDF: tenofovir

Non- Nucleoside Reverse Transcriptase Inhibitors (NNRTIs):

EFV: efavirenz

NVP: nevirapine

Protease Inhibitors (PIs):

LPV: Lopinavir RTV: ritonavir

APPENDIX E

WORLD HEALTH ORGANISATION ADULTS HIV AND AIDS STAGING SYSTEM

Stage I

Asymptomatic
Persistent generalised lymphadenopathy (PGL)
Acute retroviral infection (sero-conversion illness) and/orperformance Scale 1: asymptomatic, normal activity.

Stage II

Unintentional weight loss <10% of body weight
Minor mucocutaneous (e.g. seborrhoea, prurigo, fungal nail infections, oral ulcers, angular cheilitis)
Herpes zoster within the last five years
Recurrent upper respiratory tract infection (e.g. bacterial sinusitis)
(URTI) and/or performance Scale 2: symptomatic, normal activity.

Stage III

Unintentional weight loss >10% of body weight
Chronic diarrhoea >one month
Prolonged fever >one month
Oral candidiasis
Oral hairy leukoplakia
Pulmonary TB within the last year (PTB)
Severe bacterial infections (pneumonia, pyomyositis)
Vulvovaginal candidiasis >one month / poor response to therapy and/or performance Scale 3: bedridden <50% of the day during the last month.

Stage IV

HIV wasting (8+9 or 10)
Pneumocystis carinii pneumonia (PCP)
CNS toxoplasmosis (Toxo)
Cryptosporidiosis plus diarrhoea >one month
Isosporiasis plus diarrhoea
Cryptococcosis – non pulmonary
Cytomegalovirus infection other than liver, spleen or lymph node (CMV)
Herpes simplex infection; visceral or >one month mucocutaneous (HSV)
Progressive multifocal leucoencephalopathy (PML)
Disseminated mycosis (i.e. histoplasmosis, coccidiomycosis)
Candida oesophageal/tracheal/pulmonary
Atypical mycobacteriosis disseminated (MOTT)
Non-typhoidal Salmonella septicaemia
Extra-pulmonary tuberculosis (ETB)
Lymphoma
Kaposi's sarcoma (KS)
HIV encephalopathy (ADC)
Invasive cervical carcinoma and/or performance Scale 4: bedridden >50% of the day during the last month

APPENDIX F: CROSSTAB & LOGISTIC REGRESSION RESULTS

Age Group * Gender Crosstabulation

			Gender		
			F	M	Total
Age Group	1	Count	6	1	7
		% within Gender	3.6%	1.1%	2.7%
	2	Count	88	35	123
		% within Gender	52.1%	38.5%	47.3%
	3	Count	56	40	96
		% within Gender	33.1%	44.0%	36.9%
	4	Count	19	15	34
		% within Gender	11.2%	16.5%	13.1%
Total		Count	169	91	260
		% within Gender	100.0%	100.0%	100.0%

Weight Category * Gender Crosstabulation

			Gender		
			F	M	Total
Weight Category	1	Count	9	2	11
		% within Gender	5.4%	2.2%	4.2%
	2	Count	71	36	107
		% within Gender	42.3%	39.6%	41.3%
	3	Count	52	34	86
		% within Gender	31.0%	37.4%	33.2%
	4	Count	36	19	55
		% within Gender	21.4%	20.9%	21.2%
Total		Count	168	91	259
		% within Gender	100.0%	100.0%	100.0%

One of the patients has no record on weight.

WHO_Stage * Gender Crosstabulation

			Gender		
			F	M	Total
WHO_Stage	I	Count	60	21	81
		% within Gender	35.5%	23.1%	31.2%
	II	Count	50	27	77
		% within Gender	29.6%	29.7%	29.6%
	III	Count	46	32	78
		% within Gender	27.2%	35.2%	30.0%
	IV	Count	13	11	24
		% within Gender	7.7%	12.1%	9.2%
Total		Count	169	91	260
		% within Gender	100.0%	100.0%	100.0%

VL6_Categ * Gender Crosstabulation

			Gender		
			F	M	Total
VL6_Categ	0	Count	18	6	24
		% within Gender	32.7%	18.2%	27.3%
	1	Count	37	27	64
		% within Gender	67.3%	81.8%	72.7%
Total		Count	55	33	88
		% within Gender	100.0%	100.0%	100.0%

CD4 Baseline Count Category * Gender Crosstabulation

			Gender		
			F	M	Total
CD4 Baseline Count Category	1	Count	74	41	115
		% within Gender	43.8%	45.1%	44.2%
	2	Count	65	35	100
		% within Gender	38.5%	38.5%	38.5%
	3	Count	25	13	38
		% within Gender	14.8%	14.3%	14.6%
	4	Count	5	2	7
		% within Gender	3.0%	2.2%	2.7%
Total		Count	169	91	260
		% within Gender	100.0%	100.0%	100.0%

CD4 Count Category at 6 month * Gender Crosstabulation

			Gender		
			F	M	Total
CD4 Count Category at 6 month	1	Count	7	5	12
		% within Gender	8.9%	11.1%	9.7%
	2	Count	20	16	36
		% within Gender	25.3%	35.6%	29.0%
	3	Count	14	16	30
		% within Gender	17.7%	35.6%	24.2%
	4	Count	38	8	46
		% within Gender	48.1%	17.8%	37.1%
Total		Count	79	45	124
		% within Gender	100.0%	100.0%	100.0%

For 136 (52.3%) of the patients in the sample the information on CD4 count at 6 month is missing.

Index * Gender Crosstabulation

			Gender		
			F	M	Total
Index_Lege2	0	Count	26	21	47
		% within Gender	32.9%	46.7%	37.9%
	1	Count	53	24	77
		% within Gender	67.1%	53.3%	62.1%
Total		Count	79	45	124
		% within Gender	100.0%	100.0%	100.0%