CLINICAL OUTCOMES OF ANTIRETROVIRAL THERAPY PATIENTS FOLLOWING THE IMPLEMENTATION OF NEW ELIGIBILITY CRITERIA IN SEKHUKHUNE DISTRICT

by

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DECLARATION

I, Makgato Valerie Kedibone, declare that **CLINICAL OUTCOMES OF ANTIRETROVIRAL THERAPY PATIENTS FOLLOWING THE IMPLEMENTATION OF NEW ELIGIBILITY CRITERIA IN SEKHUKHUNE DISTRICT** is my own original work and that all the sources that I have used or quoted have been indicated and acknowledged by means of complete reference and that this work has not been submitted before any other degree at any other institution.

24 August 2018

SIGNATURE **DATE**

DEDICATION

This research work is dedicated to the following persons:

- My children; Letago, and Diphagamisho.
- My parents; Isrom and Martha, brother Tshepo, my sisters Mahlatse & Portia
- My former manager Dr Kevin Kelly.
- All HIV positive patients on ART treatment.
- All health-care professionals.

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ABSTRACT

Background: The prevalence of HIV in South Africa has increased largely due to the combined effect of new infections, and a successfully expanded antiretroviral treatment programme, which has increased survival among people living with HIV. As the up-scaling of patients on ART has been increased, the aim of the current study was to investigate the variations of the clinical outcomes between patients initiated with CD4 < 350 and of those above 350 after the implementation of the new eligibility criteria for ARV therapy.

Methods

The current study used quantitative approach to retrospectively review a total of 488 records of adult patient who were registered in health facilities which were purposefully sampled from Sekhukhune District of Limpopo Province. SPSS version 23.0 was used to analyse data.

Results

Approximately 60% of the patients initiated on ART were having CD4 count <350 and male patients were more at 74% as compared to females at 54.7%. Patients who started ART with a baseline CD4 >350 had a high rate of lost to follow up within 3 months after start of ART at 15% than those with a baseline CD4 <350 at 10.2. More patients were lost to follow-up shortly after starting treatment at 3 months at an average of 13.8% in both CD4 counts. Majority of patients retained in care were those who started ART treatment with a baseline CD4<350 at 87.4%. Viral load completion rate at 12 months was higher than that of 6 months, at 86.8 and 80.5 respectively. Patients with a baseline CD4 >350 suppressed more than those who started ART with a baseline CD4 <350 at both 6 and 12 months at >90% suppression rate. Lastly, most of the patients died within 3 months of ART treatment and had a baseline CD4 < 350 than at 2.4% those with a baseline CD4 >350 at 0.6%.

Conclusions

The implementation of the new eligibility criteria of ART initiation improves the clinical outcome of patients on ART. There are still patients that are missed to be monitored viral load bloods which play a key role in determining the clinical outcomes of patients. Clinicians and nurses should adhere to the recommended time frames for monitoring of ART patients to improve clinical outcomes.

Keywords: HIV/AIDS, antiretroviral therapy, clinical outcome, ART initiation; Eligibility Criteria;

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DEFINITION OF TERMS

- **Clinical outcomes** refers to the measures need to be implemented to routinely monitor the progress and treatment outcome of patients after the initiation of ART (Bezabhe, Bereznicki, Chalmers, Gee, Kassie, & Bimirew, 2015). In this study the clinical outcomes refers to the patients' outcomes after being on ART for at least 3 months, 6 months and 12 months, these outcomes are: Lost to follow-up, viral load suppression, death and retention on ART.
- **Retention to care** refers to patients who were still alive and receiving antiretroviral treatment at the time of assessment (NSP 2012 - 2014). In this study retention to care refers to active patients, still accessing ART care at the time of assessment and analysis
- **The viral load** refers to an instrument enabling the clinician to understand the impact of treatment to the patient, and from a population perspective, monitoring this enables the programme to measure the success of the ART programme. The viral load monitoring in this study refers to the monitoring blood to measure the efficacy of ART intervention (DOH 2013).
- **Viral Load suppression** is defined as suppressing the viral load to undetectable levels (<50 copies per ml) is the primary goal of ART (DOH 2014). Viral load suppression in this study is when the amount of the VL level has lowered to a certain limits, an HIV-1 RNA lower than detectable limits/ < 400copies/ml and shows that the patient is responding well to the ART.
- **Lost to follow up** is defined as 90 days without a clinical visit (Boulle, Bock, Osler, Cohen & Channing, 2008.). In this study lost to follow up refers to patients without ART drugs in hand for more than 90 consecutive days (3months).
- **Died** is defined as, to cease to live, undergo the complete and permanent cessation of all vital functions; become dead (Houghton Mifflin, 2002). In this study died refers to someone who ceases to live within 3, 6 or 12 months of ART initiation.

ABBREVIATIONS

ART- Antiretroviral therapy

VL- Viral load

VLD- Viral load done

VLS- Viral load suppression

LTF- Lost to follow-up

T1- Tier 1 system

T2- Tier 2 system

T3- Tier 3 system

TB- Tuberculosis

HIV- Human Immunodeficiency virus

AIDS- Acquired Immunodeficiency Syndrome

CDC- Centre for disease control

WHO- World health organization

NSP- National strategic plan

DOH- Department of Health

CHAPTER ONE
INTRODUCTION AND BACKGROUND

1.1 BACKGROUND

Africa has one of the highest HIV prevalence in the world and it is estimated that 5.38 million South Africans are living with HIV/AIDS (De Wet, Oluwaseyi & Odimegwu, 2014). In addition, new infections among adults aged 15 years and above were reportedly 316 900 in 2011 (De Wet et al., 2014). New infections among children (0–14 years old) was also high in 2011 at 63 600 (De Wet et al., 2014). There are geographical differences by provinces with regard to HIV prevalence thus rural informal areas have a significantly higher HIV prevalence than urban formal areas in South Africa (Shisana, Rehle, Simbayi, Zuma, & Onoya, 2014). The top four high HIV-prevalence provinces are KwaZulu-Natal, Mpumalanga, Free State, and the North West while Limpopo province is among the lowest HIV prevalence including Western Cape and Northern Cape than the other provinces (Shisana et al., 2014).

The National Department of Health (NDOH) in South Africa, has committed to ensure universal access to antiretroviral therapy (ART) in order to improve the quality of lives and the country health outcomes, but the national ART roll out programme for South Africa requires human resources, financial planning and monitoring and evaluation systems, as well as institutional capacities (Jones, 2009). This is mainly because South Africa has the largest number of people living with HIV (PLHIV) which is estimated at 5.8 million (Bekker, Venter, Cohen, Goemare, & Van Cutsem, 2014).

In the past decade, considerable efforts have been made to scale-up antiretroviral therapy (ART) in resource-limited countries, in order to decrease HIV/AIDS-related mortality and morbidity (Gabillard, Lewden, Ndoye, Moh, & Segeral, 2013). Therefore, the World Health Organization (WHO) recommended the global treatment changes to the eligibility criteria of a CD4 cell count cut off of <500 in 2013 but WHO acknowledged that not all countries will be able to implement the recommended change (UNAIDS 2012). By revising the ART guidelines, the countries are striving to

achieve the set targets of initiating 80% of people in need of ART and keeping 70% of them alive after 5 years of being on treatment (DOH 2011).

Increasingly effective antiretroviral regimens have prolonged the life expectancy of HIV-infected patients, transforming the HIV epidemic into one requiring chronic care. As survival continues to improve, clinicians and patients must optimize patients' ability to manage their illness over many years (Marshall, Beach, Saha, Mori, & Loveless, 2013). More importantly, the success of the South African ART programme is dependent on early identification of HIV infected people, rapid and appropriate starting of ART, and high levels of viral suppression, management of toxicities as well as retention in care of a proportion of HIV patients (Bekker et al., 2014). If all these factors are addressed, then the clinical outcomes of the ART patients will improve and lives will be saved.

The purpose of the current study was to investigate the clinical outcomes of antiretroviral therapy patients following the implementation of the new eligibility criteria for initiation of ART in Sekhukhune District, Limpopo Province, South Africa. In this study the focus was on viral load (VL) completion and suppression, retention rate only at 12 months, and lost to follow up and mortality within 12 months, viral load blood monitoring which is a criteria used to determine whether ART drug regimen given to the patient is suppressing the virus or not.

1.2. PROBLEM STATEMENT

The rationale for initiating ART treatment is to reduce the replication of the Human Immunodeficiency virus (HIV) and increase the immune system which results in improving the quality of life. Although there's an increase in up-scaling of patients on ART, the clinical outcome of these patients remains a challenge. It became important to measure the clinical outcomes, as accessing ART is no longer a challenge in South Africa, but retaining patients on ART has emerged to be a serious challenge that raises a global concern. Initially, patients were initiated on ART based on CD4 eligibility criteria of less than 350 and non-eligible patients (CD4 more than 350) would be registered in the Pre-ART program and followed up on 6 monthly basis for ART eligibility. Hopefully initiating ART using new ART eligibility criteria (CD4 350-500 or more), will add value in improving the quality of life and preventing HIV/AIDS related deaths. Several studies have been conducted in and outside South Africa on

the clinical outcomes of ART regimen, but there are limited studies found in Limpopo Province, which is mainly a rural province in SA.

1.3. RESEARCH QUESTION

What are the clinical outcomes of antiretroviral therapy patients following the implementation of new eligibility criteria in Sekhukhune District, Limpopo Province?

1.4. AIM OF THE STUDY

The aim of this study is to determine the clinical outcomes of ART patients following the implementation of new ART eligibility criteria.

1.5. STUDY OBJECTIVES

- To compare the clinical outcomes between patients initiated with CD4 < 350 and those initiated with CD4 > 350 after the implementation of new ART eligibility criteria versus the old criteria.

- To determine the retention to care and lost to follow-up (LTF) rate between patients initiated with CD4 < 350 and those initiated with CD4 > 350.
- To compare the VL suppression rate between patients initiated with CD4 < 350 and those initiated with CD4 > 350.
- To compare mortality rate between patients initiated with CD4 < 350 and those initiated with CD4 > 350.

1.6. OVERVIEW OF RESEARCH METHODOLOGY

Research methodology on this study describes the study design and how the requisite data was gathered. Focus on study method, study design, study site, study population, study sampling, data collection methods and procedure, data analysis, measures taken to ensure validity and reliability and ethical consideration.

1.7. SIGNIFICANCE OF THE STUDY

It is important that the new developments of policies and guidelines within the management of the ART patients are adhered to and implemented to enable the track changes which these new developments may bring. It is anticipated that the study may assist in determining the clinical outcomes of ART patients following the implementation of new ART eligibility criteria. The study may add value in quantifying the importance and the need of the policy and guidelines changes from time to time. Finally recommendations made at the end of the study may add value on the new developments of the ART programme.

1.8. OUTLINE OF SUBSEQUENT CHAPTERS

Chapter 2: Literature Review

Review existing literature on the local and international authors.

Chapter 3: Research methodology

Describes the study design and how the requisite data was gathered.

Chapter 4: Results

Provide a thematic, structural and textural description of the data analysis and procedure.

Chapter 5: Discussion, Limitations, Recommendations and conclusion

Contains a discussion of the results as guided by the research question described in chapter one. The chapter is arranged in line with objectives used as well as themes emerged from the analysis of the data collected.

1.9. CONCLUSION

This chapter introduced the study and provided the overview of the problem statement, aim of the study, study objectives, significance as well as an outline of the dissertation structure. The next chapter contains a review of the existing literature on basic information regarding Human Immunodeficiency virus (HIV), antiretroviral therapy (ART) and clinical outcomes.

CHAPTER TWO
LITERATURE REVIEW

2.1. INTRODUCTION

This chapter discusses the literature review on basic information regarding Human Immunodeficiency virus (HIV), antiretroviral therapy (ART) and clinical outcomes. Maartens, Celum, & Lewin, (2014) defines HIV as a virus spread through body fluids that affects specific cells of the immune system, called CD4 cells, or T cells. The HIV epidemic arose after zoonotic infections with simian immunodeficiency (SIV) viruses from African primates (Maartens, Celum, & Lewin, 2014). The bush-meat hunters were probably the first group to be infected with HIV. HIV-1 was transmitted from apes and HIV-2 from sooty mangabey monkeys (Maartens, Celum, & Lewin, 2014). Over time, HIV can destroy so many of these cells that the body can't fight off infections and disease. When this happens, HIV infection leads to Acquired Immunodeficiency Syndrome (AIDS) (Maartens, Celum, & Lewin, 2014). HIV can infect a person amongst other ways mainly through unprotected sex with a person who is HIV positive. HIV testing and counselling (HTC) services have helped millions of people learn their HIV status, and for those testing positive, learn about options for long term care and treatment (WHO 2015).

2.1.1 HIV Prevalence

In recent years, the number of people becoming newly infected has declined slightly, but the virus continues to spread at unacceptably high levels (Eaton, Johnson, Salomon, Bärnighausen, & Bendavid, 2012). Epidemiological surveillance has provided critical information to track the HIV epidemic and to characterize affected populations. It has also been a main source of data to estimate HIV incidence and prevalence (Hamers & Phillips 2008). Therefore, accurate and timely data on the number of people living with HIV infection which will give us the HIV prevalence are needed to guide planning for disease prevention, program evaluation, and resource allocation in each country (Campsmith, Rhodes, Hall, & Green, 2010). However, overall HIV prevalence cannot be measured directly because a proportion of persons infected with HIV have neither been diagnosed nor reported to local surveillance programs (CDC 2008). Consequently, AIDS surveillance no longer provides accurate population-based monitoring of the current HIV epidemic. Therefore, CDC recommends that all states and territories adopt confidential, name-based

surveillance systems to report HIV infection (Hall, Song, Rhodes, Prejean, Karon, & Lee, 2008).

2.1.1.1 Global HIV prevalence

HIV prevalence is increasing worldwide because people on antiretroviral therapy are living longer, although new infections decreased from 3·3 million in 2002, to 2·3 million in 2012 (Maartens, Celum, & Lewin, 2014). In Europe, as in other industrialized regions, the notification of diagnosed cases of HIV infection is the cornerstone of HIV surveillance. This is complemented by other surveillance tools such as repeated HIV prevalence and behavioural surveillance, which is mostly conducted in specific populations at risk for HIV infection (Hamers & Phillips 2008).

An estimated 760 000 persons were living with HIV in Western and Central Europe in 2007 (Hamers & Phillips 2008). National HIV reporting data are not available from Italy and Spain. Overall, 60% of diagnoses were in men, 10% were in young people aged 15–24 years and 1% were in children <15 years old (Hamers & Phillips 2008). The HIV epidemic in Ukraine remains concentrated among most-at-risk populations (MARPs), including injecting drug users (IDUs), sex workers (SWs), men who have sex with men (MSM) and sexual partners of these populations (Kruglov, Kobyshcha, Salyuk, Varetska, Shakarishvili, & Saldanha, 2008). Ukraine reports an estimated 395 296 adults (aged 15–49) living with HIV and the adult HIV prevalence was estimated at 1.63%, which represents the highest adult HIV prevalence of any country in Europe (Kruglov et al., 2008).

2.1.2.2 HIV Prevalence in Africa

The HIV/AIDS epidemic in demonstrating an extraordinary challenge to communities and nations across Africa. This devastating challenge is on human survival, human rights, and human development (Poku 2017). UNAIDS estimates that over the past decade, 33 countries which includes 22 sub-Saharan African countries have achieved declines in HIV incidence of more than 25%. These decreases highlight overall advances in the fight against HIV, but might mask sustained or expanding spread among MARPs, SWs, MSM, and IDUs (Baral, Beyrer, Muessig, Poteat, & Wirtz, 2012). Sub-Saharan Africa contains only 3% of the global population but an alarming 68% of the world’s adults and children living with HIV/AIDS (Lurie &

Rosenthal 2010) and two-thirds of the world's HIV-infected people live in sub-Saharan Africa and more than 1.5 million of them die annually (Lawn, Harries, Anglaret, Myer, & Wood, 2008). At the global level, there is evidence of a positive correlation between countries' HIV prevalence and poverty but the HIV epidemic in sub-Saharan Africa represents a notable exception to this general pattern. On the one hand, at the macro level African nations with high HIV prevalence, such as South Africa and Botswana, tend to be the wealthier countries in the region (Mishra, Bignami-Van Assche, Greener, Vaessen, & Hong, 2007).

2.1.2.3 HIV Prevalence in South Africa

South Africa has one of the highest HIV infection rates in the world (Welz, Hosegood, Jaffar, Bätzing-Feigenbaum, & Herbst, 2007) and more HIV-positive people live in South Africa than in any other country in Africa (Bärnighausen, Tanser, Gqwede, Mbizana, Herbst, & Newell, 2008). This country alone has an estimated 5.3 million people living with HIV/AIDS which represent a quarter of the burden of HIV infection in sub-Saharan Africa (Rehle, Hallett, Shisana, Pillay-van Wyk, Zuma, & Jooste, 2010). Antenatal surveillance data and repeated national HIV prevalence surveys from South Africa suggest a continued rise in HIV prevalence despite extensive efforts to reduce sexual risk behavior (Hargreaves, Bonell, Morison, Kim, & Phetla, 2007).

The past decade has seen South Africa make considerable progress in ‘turning the tide of HIV incidence (Shisana et al., 2012). By 2008, the country had begun to observe a decline in HIV incidence among the younger age groups and recent evidence-based interventions focused on HIV prevention, treatment, care and support have been implemented with some success (Shisana et al., 2012). The challenge remaining is that the prevalence of HIV has remained high and stable over the last decade which cause the interpretation of HIV prevalence trends in South Africa is increasingly complex resulting in a matured epidemic coupled with prevention and treatment programmes are implemented at the same time. Increased access to ART has increased the survival time of people living with HIV, with the effect that HIV prevalence is expected to increase in the age groups who are predominantly receiving ART (Rehle et al., 2010.)

2.2. ART TREATMENT

Antiretroviral therapies are drugs used in HIV positive patients to reduce the replication of the HIV virus and strengthen the immune system; taking three different ARV drugs does the best job of controlling the amount of virus in the body and protecting the immune system (AIDs.gov 2009. There are five classes of ART, but the commonly used once are three, i.e. Nucleoside Reverse Transcriptase Inhibitors *(*NRTIs), Non-Nucleoside Reverse Transcriptase Inhibitors *(*NNRTIs) and Protease Inhibitors (PIs). A person to be put on ART 1st line regimen needs at least 2 NRTIs plus 1 NNRTIs (AIDs.gov 2009).

2.3. UPSCALING OF ART TREATMENT AND ART ELIGIBILITY

Access to antiretroviral therapy (ART) in Africa increased dramatically over the past decade, beginning with a few thousand people and reaching five million people by mid-2010 (Mermin, Ekwaru, Were, Degerman, & Kaharuza, 2011). Most countries aspiring to expand treatment access set themselves a goal of providing antiretroviral treatment to around 80 percent of those in need of ART, including SA. This is part of a wider objective to provide universal access (15 million people on treatment) by 2015, as agreed in 2010 (UNAIDS 2010). In SA initially when the ART program started in 2004, the eligibility criteria for ART was CD4 less than 200 and WHO stage iv which allowed only few people to be put on ART. The ART eligibility criteria was then revised to CD4 < 350 for HIV positive pregnant women and Tuberculosis (TB) patients in 2011 and for the general population the ART eligibility was revised to CD4 <350 in 2012.

In 2013 the global treatment recommendations changed, stating that where feasible, people with HIV should begin treatment even earlier at 500 cells/mm3; increasing the number of people eligible for treatment by 9.2 million (WHO 2013). SA revised its guidelines in line with the WHO recommendations which were implemented in 2015 January, with a CD4 < 500 to the general population and HIV positive pregnant women and TB/HIV co-infected to be put on lifelong ART irrespective of CD4 count, and on WHO stage iii and iv (DOH 2015). Hopefully these changes will add value in improving the clinical outcomes.

2.4. DECENTRALIZATION, TASK SHIFTING AND MENTORING

The World Health Organization promotes the role of primary health care and community-led care in the delivery of antiretroviral therapy (ART) in resource limited settings. In keeping with these principles, the delivery of HIV services in Lusikisiki (South Africa) was achieved through decentralization to primary health care, task shifting within services, and strong community support (Bedelu, Ford, Hilderbrand, & Reuter, 2007). The provision of treatment at the clinic level inevitably resulted in a significant increase in the number of service users, by almost 2-fold since the start of the program (from 16,465 service users in April 2004 to 28,191 service users in April 2006) Bedelu et al., 2007. Despite the increase in the number of service users the number of professional nurses (30) to render the services did not increase (Bedelu et al., 2007).

One of the major requirements of successfully accelerated ART programmes was the presence of enough well trained health workers to run the programme (Katabiraa & Oelrichs, 2007). With appropriate training, mentoring, and supervision, it was possible to delegate the running of the ART program to primary health care (PHC) nurses and community health workers (Bedelu et al., 2007). South African government improved the ART program task shifting from the Down Referral (ART pre-packed medication was sent to the clinics for nurses to issue treatment to ART patients without them understanding the program) service points to nurse initiated management of ART (NIMART) program PHC nurses in 2010. PHC nurses were trained to rollout ART at the PHC level and mentorship guideline was also developed to give guidance (DOH 2010). This intervention has increased the number of facilities providing ART drastically to over 3800 nationally, about 521 in Limpopo province and 95 facilities in Sekhukhune district as of March 2017.

2.5. ART CLINICAL OUTCOMES

A clinical outcome refers to the end results of a medical intervention, such as survival or improved health (DOH 2016). There are different types of the clinical outcomes after putting patients on ART which are: viral load suppression and died and patient outcome of lost to follow up, retention in care (Cohen, Lynch, Bygrave, Eggers, & Vlahakis, 2009). These outcomes are monitored periodically as recommended by WHO and in-country ART treatment guidelines and for the

program to do well there are some expectations to perform with certain limits and targets.

2.5.1. Viral load suppression

Viral Load suppression is defined as HIV-1 RNA lower than detectable limits/ < 400copies/ml (Dybul, Fauci, Bartlett, Kaplan, & Pau, 2002). Viral load suppression is a criteria put in place to determine whether ART drug regimen given to the patient is suppressing the virus or not. It is expected that when patients are initiated on ART should achieve viral suppression by 24 weeks of treatment (Dybul et al., 2002). DOH (2015) indicates that viral load is monitored at 6 and 12 months of ART treatment, then monitored annually only if the VL has suppressed. It is important to frequently monitor the viral load suppression for early identification of the first line ART treatment failure and provides guidance on timeous switching of the first line drug regimen if the patient has experienced virological failure (VL>1000) on at least two occasions two months apart despite good adherence (DOH 2015). Similarly, treatment failure as measured by detectable viral load during chronic care is most likely the result of non-adherence as already stated (WHO 2014).

2.5.2. Mortality amongst HIV patients

In 2007 UNAIDS estimated that there were 4.9–6.6 million adults and children living with HIV/AIDS and that 270 000–420000 people died annually from the disease in South Africa (Fatti, Grimwood & Bock, 2010). The AIDS epidemic in South Africa (SA) is continuing and furthermore, an alarming HIV incidence of 10.9% has been reported among the population aged >2 years. Death notification data in SA show that the death rate among young women aged 25 - 34 years has increased fourfold between 1997 and 2004, and that among men aged 30 - 39 years has doubled, presumably in part due to HIV infection (Fox, Sanne, Conradie, Zeinecker, & Orrell, 2010). Unfortunately, mortality data are difficult to analyse, as the majority of HIV-related deaths are misclassified. Thus, the ascertainment of deaths related to HIV remains a serious concern (Schutte, 2013). There is a limitation of studies on this aspect since the mortality data amongst HIV patients on ART is not clearly defined as to what should it entail, e.g. if the HIV positive patient on ART could be involved in a car accident or a heart attack, the patient will still be considered as though the

cause of death is HIV-related death. It is therefore important that further studies are conducted on determining the actual cause of death in HIV positive patients on ART.

2.6. PATIENT ADHERENCE TO ART

Adherence is defined as the extent to which a person's behaviour corresponds with agreed recommendations from a health care provider in respect of taking medication, following a diet and/or implementing lifestyle changes (DOH 2016). Adherence to medication has become a major issue in the treatment of HIV-infected individuals and an important determinant of the outcome of highly active antiretroviral therapy (HAART) (Mannheimer, Friedland, Matts, Child, & Chesney, 2002). Strict adherence to ART is key to sustained HIV suppression, reduced risk of drug resistance, improved overall health, quality of life, and survival, as well as decreased risk of HIV transmission. Conversely, poor adherence is the major cause of therapeutic failure. Achieving adherence to ART is a critical determinant of long-term outcome in HIV infected patients (AIDSinfo 2014). Patient self-report, the most frequently used method for evaluating medication adherence, remains a useful tool for assessing adherence over time (AIDSinfo 2014). Adherence to ART can be influenced by a number of factors, including the patient's social situation and clinical condition; the prescribed regimen; and the patient-provider relationship (DOH 2016). AIDSinfo (2014) indicates that it is critical that each patient receives and understands information about HIV disease including the goals of therapy (achieving and maintaining viral suppression, decreasing HIV-associated morbidity and mortality, and preventing sexual transmission of HIV), the prescribed regimen (including dosing schedule and potential side effects), the importance of strict adherence to ART, and the potential for the development of drug resistance as a consequence of suboptimal adherence..

2.6.1. Retention to Care

Geng (2011) says treatment of HIV infection can be effective only if patients are retained in care over time. Retention in care is defined as continuous engagement in appropriate medical care and continues to emphasizing that it is a critical but challenging aspect of efforts to optimize patient outcomes. In response to these challenges, HIV care in resource-limited settings must be based on primary care models that emphasize accessibility, sustainability, and continuity and recommended

alternative models are community ART stations, group medication pick-up, hybrid models of home- and clinic-based care and streamlined monitoring activities are needed to expand the scope and reach of care to places and people who need it (Geng, Nash, Kambugu, Zhang, & Braitstein, 2011). ART retention rate targets for SA are outlined as follows 94% at 12 months, 88% at 24months, 82% at 36months, 76% at 48months, and 70% at 60months of being on ART (DOH 2011), the country still struggles to achieve this targets.

2.6.2. Lost to follow up

Lost to follow up refers to all patients without drugs in hand for more than 90 consecutive days (DOH 2011). In several studies of ART programs for persons with HIV infection, investigators have reported that there has been a higher rate of loss to follow-up (LTF) among patients initiating ART in recent years than among patients who initiated ART during earlier time periods. This finding is frequently interpreted as reflecting deterioration of patient retention in the face of increasing patient loads (Johnson, Estill, Keiser, Cornell & Moolla, 2014). Similarly Fox (2006) says, lost to follow-up have been influential in demonstrating both that the rates of retention in HIV care programs in sub-Saharan Africa are improving over time, but also that many patients are still being lost from treatment programs leading to increased mortality.

2.7. THE CURRENT STRATEGIES TO IMPROVE HIV PATIENT CARE

HIV testing and counselling (HTC) services have helped millions of people learn their HIV status, and for those testing positive, learn about options for long term care and treatment (WHO 2015). In September 2016, South Africa introduced a new strategy of early HIV diagnosis and treatment, i.e. test and treat, whereby every person who test HIV positive should be put on ART treatment irrespective of CD4 count and WHO staging, which makes the ART eligibility criteria fall off. Although the test and treat strategy, patients are not forced on to treatment but patient's readiness to start ART is still assessed.

Recently South African country has revised the HTC services to HIV testing services (HTS) which introduced pre-exposure prophylaxis (PrEP) services to prevent

exposure to HIV infection. PrEP is defined by WHO as the use of antiretroviral drugs by HIV-negative people, before potential exposure to HIV, to block the acquisition of HIV infection. South Africa (SA) will use a phased approach in the implementation of PrEP and has committed to offer it to all sex workers, both male and female in the initial phase (DOH, 2016).

Geng (2011) recommends that alternative models such community ART stations, group medication pick-up, hybrid models of home- and clinic-based care and streamlined monitoring activities are needed to expand the scope and reach of care to places and people who need it. South Africa recently introduced the national adherence guideline strategy which is aimed at improving patient adherence to treatment and retention in care. The strategy outlines different decanting models designed to improve patient retention by allowing ART and non-communicable diseases (Hypertension and diabetes mellitus) stable patients to collect treatment at their most convenient place of choice. Decanting models are CCMDD which includes internal and external pickup points (using the contracted suppliers), adherence club (at a health facility or community) and the spaced fast lane appointment (at a health facility), this is a patient centred approach whereby all models are discussed with the patients and the patients chooses whichever method suitable to them. The models also assist in reducing the facility workload (DOH 2016). These strategies are put in place to improve HIV care in South Africa.

2.8 CONCLUSION

Numerous studies were conducted to improve early HIV diagnosis and treatment and examine the benefits of starting ART treatment earlier at a higher CD4 count than at a lower CD4 counts. Some of the studies conducted discovered that the earlier the patients get started on ART treatment the better clinical and patient outcomes, contrary to that other researchers found the opposite and others emphasis that patients remains the major role players of improving the clinical and patient outcomes.

This study is also aimed at determining determine the clinical outcomes of ART patients following the implementation of new ART eligibility criteria versus the old criteria. Hope fully the study will discover new findings which will add value in

improving the clinical and patient outcomes of patients on ART. There are still some gaps in identifying factors contributing to poor clinical and patient outcomes.

CHAPTER THREE

METHODOLOGY

3.1. Introduction

This chapter presents study method, study design, study site, study population, study sampling, data collection methods and procedure, data analysis, measures taken to ensure validity and reliability and ethical consideration.

3.2. Research study design

A quantitative approach, retrospective cohort study design was used to compare the clinical outcomes of ART patients following the implementation of new ART eligibility criteria versus the old criteria. A cohort is a group of people derived from the study population, who share a common experience or condition and whose outcome is unknown at the beginning of the study (Brink & Wood 1998). Burns & Grove further defines a retrospective cohort study design as an epidemiological study in which the cohort is evaluated, after identifying a group of people who have experienced a particular event, to determine the occurrence of changes in health status, usually a development of a particular disease or death (Burns & Grove 2009). In this study these group of people share a common characteristic of HIV condition and are all on ART treatment.

The country has developed an information monitoring system called 3 tiered System to monitor the ART program, which are named as T1- Paper based register, T2- Non-network Electronic system and T3- Network electronic system based also known as SMART (DOH 2011). All the facilities in the district are on T2- Non-network Electronic system. A T2 system has got phases 0-6 and when the facility is on phase 6 it means the facility is no longer back-capturing or cleaning the data, but it captures patients as they come, also known as live capturing and it can be certified/signed off to report data. Phase 6 facilities are expected to produce and report a cohort data on quarterly basis. The electronic patients' files (Dispatch files) were extracted from tier.net system, and assessed and analyzed after the patients was on ART for at

least 3, 6 and 12 months. Only facilities that were on phase 6 were eligible to be sampled to participate in the study.

3.3. Research Site

The study was conducted in Greater Sekhukhune district in 6 health facilities providing ART services [3 clinics and 3 Hospitals] representing all the 5 sub-districts in the district. Greater Sekhukhune is one of the 5 districts in Limpopo province with 88 fixed facilities which provides ART services and 76 facilities are on phase 6 and reporting cohort data. The district office is situated in Capricorn district Parliament offices in Lebowakgomo next to Lebowakgomo shopping complex in Limpopo province (South Africa).

Participating facilities were as follows: Mecklenburg and Dilokong hospital in Greater Tubatse sub-district, Philadelphia hospital in Elias Motsoaledi sub-district, Motsepe clinic in Fetakgomo sub-district, Klipspruit clinic in Makhuduthamaga sub-district and Vander Merwe Skraal clinic in Ephraim Mogale sub-district. All the 5 sub-districts were represented and all hospitals in phase 6 are represented, the district has got 7 hospitals in total but the other 4 hospitals were not yet phase 6 facilities at the time the study took place. Records of patients initiated on ART in the first 3 months of the implementation of the new guideline (CD4 <500), from 01 January 2015 to 31 March 2015 and were treated according to the new guideline were analysed retrospectively over a period of 3, 6 and 12 months cohort.

3.4. Study population and sampling

Study population refers to all possible cases of what the researchers are interested in studying (Monette, Sullivan, & Dejong, 2008). The researcher targeted the electronic records of adult HIV positive patients who were initiated on antiretroviral treatment (ART) in the first 3 months of the implementation of the new guideline (CD4 <500), from 01 January 2015 to 31 March 2015. These records were monitored retrospectively at 3, 6 and 12 month period after the initiation of ART as this is a cohort study. At the initial study period the district was having 36 594 total remaining on ART (this figure is inclusive of the non-phase 6 facilities) as of end of October 2014 (DHIS data). The population target and size is 488 records of adult

patients initiated on ART from the 01 January to 31st March 2015 in all participating facilities.

3.5. Sample method

Purposive sampling was used to sample the phase 6 health facilities consisting of 3 hospitals and 3 clinics participating in the study. The health facilities were selected based on the performance of Adult naïve patients initiated on ART from April to November 2014. Phase 6 facilities with high number of patients initiated on ART and were consistently reviewing their patients were prioritised to participate in the study and all naïve patients' records of the patients initiated on ART at the specified period of the study were assessed. Criteria for selection of participants were based on the availability of baseline CD4 results in the records of the patients.

3.6. Sample size

The sample size should be large enough to have high probability to be statistically significant, so the number of subjects should not be too small to have a chance of detecting the meaningful effects and producing reliable results to the research hypothesis tested (Ahn, Heo, & Zhang, 2014). The size of this study is 488 and was calculated using Morgan & Krejcek (1994) formula (See appendix H).

Where $s = \frac{X^2NP(1-P)}{d^2(N-1)+X^2 P(1-P)}$

S= is sample size

N = Population size

P=population proportion (assumed to be .50)

d = degree of accuracy (.05).

3.6.1 Inclusions criteria

Files of patients with a CD4 of <350 and > 350 initiated on ART in the participating facilities after the implementation of the new ART eligibility criteria. Patients with CD4 >500 initiated on ART irrespective of the WHO clinical staging were included in the study. For example the new ART guideline eligibility criterion recommends that HIV

positive pregnant women should be put on a lifelong ART irrespective of the CD4 cell count and WHO clinical staging.

3.6.2. Exclusion criteria

All files of ART experienced patients (Patients whom were previously on ART and are re-initiated on ART) and files without CD4 cell counts recordings in the patient's records that were initiated on ART in the specified period of study were excluded from the study.

3.7. Data collection

3.7.1. Tool

A self-designed data collection tool was used to collect data from the electronic clinical records of naive patients who started ART from January to March 2015. Data was collected from the patient electronic files only. The data collection tool/sheet had three sections namely: Socio-Demographic, Baseline and Follow-up (3, 6 and 12 months). See Appendix A for the data collection tool.

Data collection tool was piloted to test and strengthen the tool in Ikageng clinic situated in Fetakgomo sub-district.

3.7.2. Data collection Procedure

All the health facilities are using standardised clinical records called adult clinical stationery and these records are completed by clinicians (Nurses and clinicians) upon enrolment of HIV care (it is used for both Pre and ART patients) and updated at subsequent visits. The clinical stationery is aligned to the tier 2 system and everything that is recorded in it, is transcribed into the tier system by the data capture.

All records of naïve patients initiated on ART from the 01 January – 31st March 2015 were sought from the dispatch files (Extracted patient Files in the tier system). These electronic patients' records were extracted; assessed and identified patients files which met the eligibility criteria for inclusion and exclusion of the study. Data was

collected in April 2016 when all the patients have completed 12 months on ART treatment.

The data collection tool was inclusive of the following: Demographic Data: Age and gender; Baseline Data: Unique identification number for anonymity, baseline CD4 cell count, and regimen at start of ART, ART start date and pregnancy at start of ART; Retention, LTF, Died and current outcome baseline were at 3 months, VL monitoring and VL suppression baseline were at 6 months of being on ART. Follow-up Data: consists of six months follow-up category being the retention, LTF, Died and current outcome and at the twelve months follow-up category included VL monitoring, VL suppression, Retention, LTF, Died and current outcome

3.8. Validity and Reliability

3.8.1. Reliability

Reliability refers to the consistency with which the instrument repeatedly measures what it supposed to measure and yields the same results if used by other researchers (Brink et al., 2012). To ensure reliability of the study the researcher piloted the data collection tool at Ikanyeng clinic in Fetakgomo sub-district and assessed 26 records of patients (All patients initiated ART from January to 31st March 2015) and checked if the information required was available. The pilot observed the eligibility criteria for inclusion and exclusion criteria.

Pilot findings:

The findings of the tool testing led the researcher to revise and adjust the data elements of the Socio-Demographic, Baseline and Follow up section. The following variables; Marital status (Minor, Single and Married), Occupation (Employed and Unemployed) were not available in the pilot facility because these variables will only reflect on the tier system if the facility have activated them on the tier system; these variables were therefore removed from the data collection tool because of the inconsistency of facilities in capturing them on the tier system.

Intervention for Non-VLS variable was only identified if the patient had the record of VL repeated after 2 months of being non-suppressed virally, it only reflected the

outcome of the intervention for non-suppressed VL, not the action such as details on intensified adherence offered as expected, capturing of these actions is inconsistent, it depends on the data capture. Due to the inconsistency it's capturing, this variable was also removed. There is one variable added on the baseline section, pregnant status on the females.

3.8.2. Validity

Validity of an instrument relates to whether it measures what it supposed to measure, it refers to the accuracy and truthfulness of the findings (Brink et al., 2006). To ensure validity the researcher checked and verified if the aspects on the tool were addressing the objectives of the study, this was achieved by taking the data collection tool to the experts such as supervisors and professional nurses working in the clinic.

3.9. Bias

A bias is an influence which can affect the quality of evidence in a study by producing an error or distortion. The results are different from the truth (Brink et al., 2012). As the data was collected from the patients' electronic records, bias could be introduced due to the inconsistency of capturing the relevant information, missing information and incomplete records which may influence the results. This kind of bias was handled during the data collection tool pilot by removing variables from the data collection tool which had inconsistent information and during the data analysis and results by disclosing the number of files which had incomplete or missing information by excluding those files in the interpretation of the final findings.

3.10. Data analysis

Data was captured using Microsoft excel and was analysed in accordance with the objectives of the study. Statistical package SPSS of 23.0 was used to analyse data. Clinical outcomes and patient outcomes of the patients initiated on ART with a baseline CD4 cell count of <350 and >350 was stratified and analysed.

The patient electronic files were analysed using Chi-Square test, tables and graphs for comparisons of proportions between the two groups for continuous variables between patients initiated on a CD4 < 350 and those with a CD4 > 350. Data will be presented using tables, graphs and charts.

3.11. ETHICAL CONSIDERATIONS

3.11.1. Obtaining ethical clearance

An ethical clearance was obtained from the University of Limpopo's Research Ethics Committee and the permission to collect data was requested from the provincial Department of Health and the District Executive Manager (DEM). After obtaining the permission from the DEM the researcher informed the PHC, Hospital services and Health Special Programmes (HSP) senior managers about the study to be conducted and informed the Operational managers and CEOs of the participating facilities that the researcher obtained permission from the district and provincial Department of Health to conduct a study on their facilities using. Facilities were reassured that they need not to participate on the study since the researcher was using secondary data.

3.11.2. Beneficence

The principle of beneficence refers to a duty to minimise harm and maximise benefits (Polit, Beck, & Hungler, 2001). There was no harm in conducting this research because only electronic files of patients were used.

3.11.3. Justice

The principle of justice refers to fairness and equity which relates to the respondents' rights to fair treatment and their rights to privacy (Polit et al., 2001). The researcher ensured that all files selected for the study met the inclusion criteria.

3.11.4. Confidentiality

The principle of confidentiality refers to the right of an individual to have personal, identifiable medical information kept private (Pilot et al., 2001). The ethical principles of confidentiality were observed at all times and the information collected from patients' records was accessed by the researcher and were not shared with an unauthorised people.

3.12. Conclusion

This chapter outlined the research methodologies employed in this study in detail, the next chapter will be outlining research results/findings, that will be addressing objectives it will address.

CHAPTER FOUR

RESULTS

4.1. Introduction

This chapter presents and describe the findings of the data collected during the study period. The results are presented in the form of text, tables, figures and graphs. The chapter is made out of the following sessions as illustrated in the research instrument: Demographic, Baseline and Follow-up characteristics of patients' records.

4.2. Demographic profile

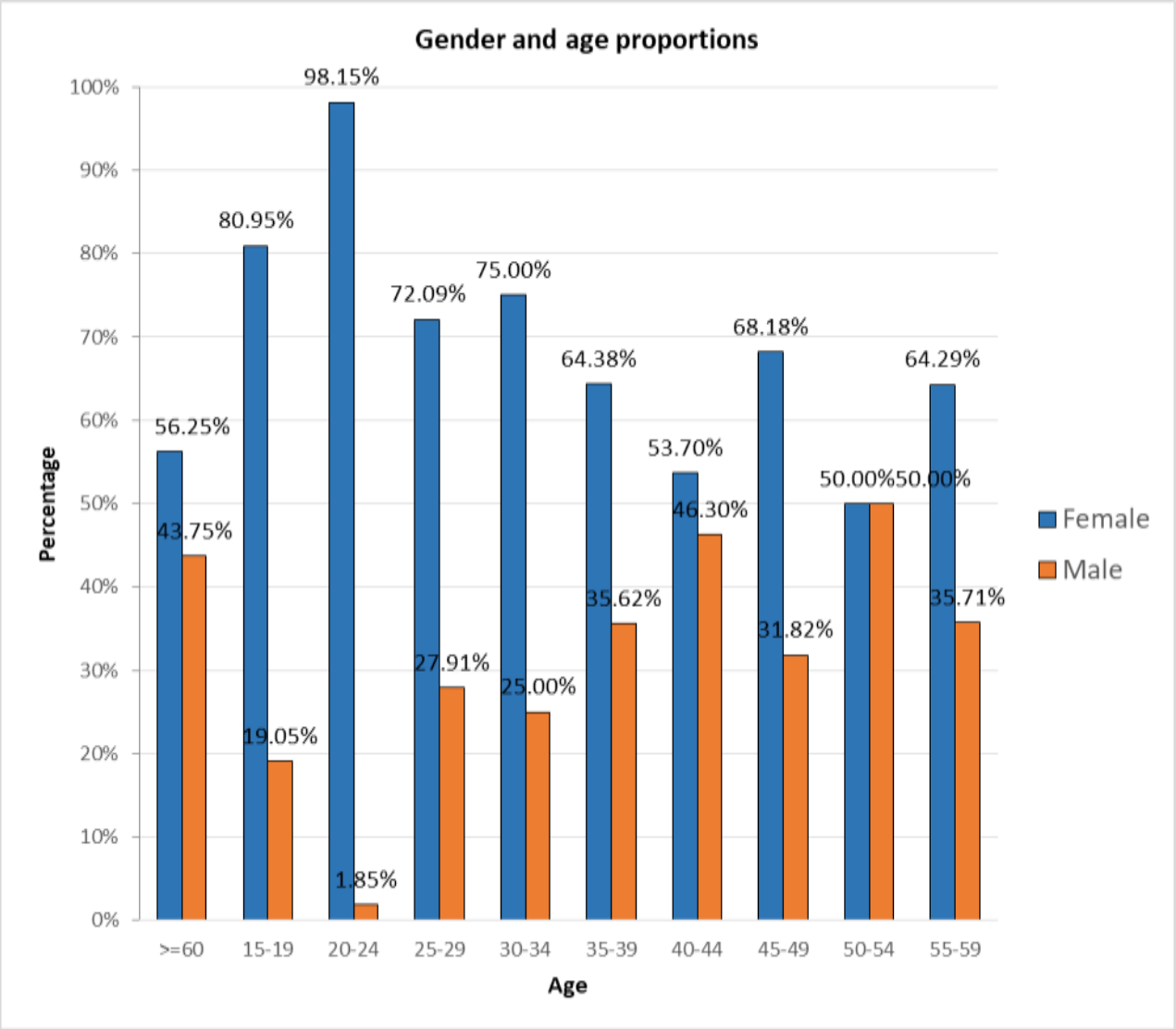

Figure4. 1: Gender and age proportions

Figure 4.1 above shows that most of the patients' records were females than males at 70% and 30%. The age group 20-24 years seem to have more females than males at 98.15% and 1.5%. The second highest female age group is 15-19 years at 80.5% and 19.05% of males

This figure further illustrates the difference in gender within the same age group with females contributing higher percentage of more than 60% in the following age group; 15-19 years(80.5%), 20-24 years(98.15%), 30-34years(75%), 25-29years(72.09%), 45-49years(68.18%), 35-39years(64.38%) and 55-59years(64.29%). There is no significant difference in females and males in the following age groups 50-54 years at 50%, 40-44 years at 46.03% and =/>60 years at 43.75%.

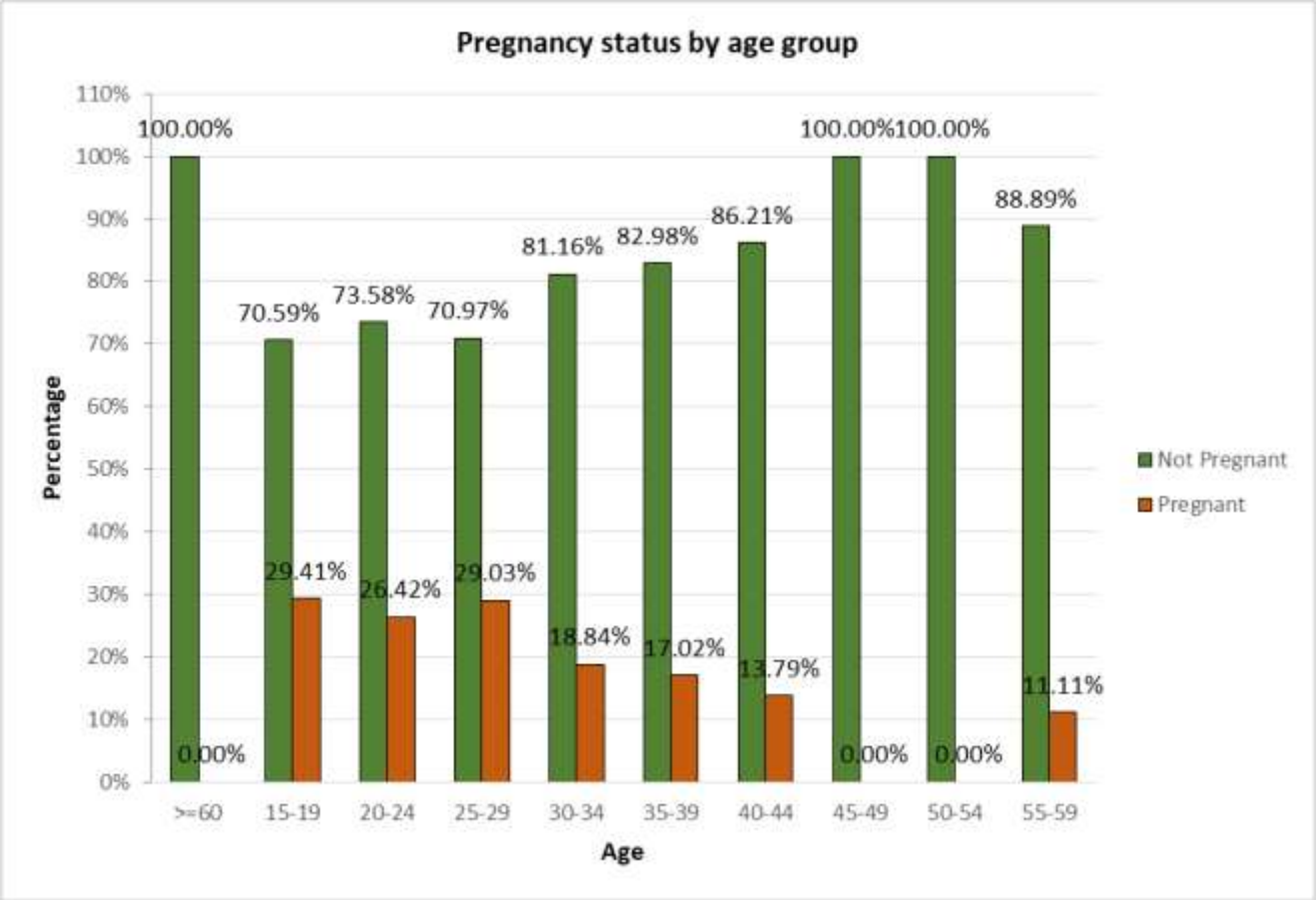

Figure 4. 2: Pregnancy status by age group

Figure 4.2 above shows that there is a high pregnancy in the following age groups of the people who started ART treatment during the study period, 20-24 years at 26.42%, 25-29 years at 29.03% and highest at 29.41% in a 15-19 years of age. The

figure further shows that 11.11% of those at 55-59 age group, were pregnant when starting ART.

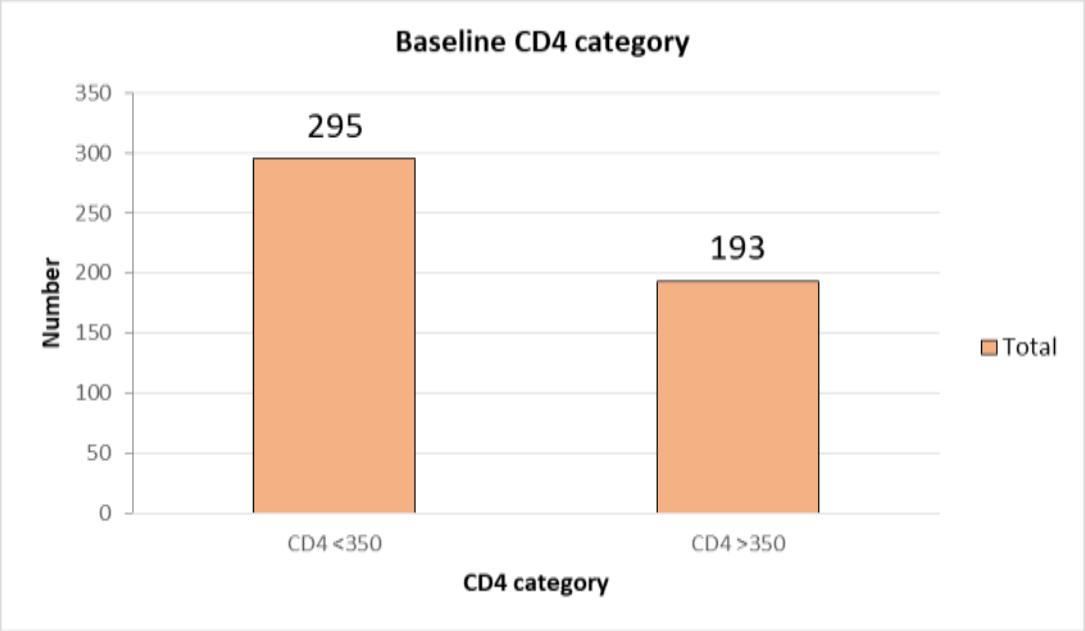

Figure 4.3: Baseline CD4 category for participants

Figure 4.3 above shows that most patients initiated on ART during this period are those with a CD4 count of less than 350 at 295 (60.5%) than those with CD4 more than 350 at 193 (39.5%).

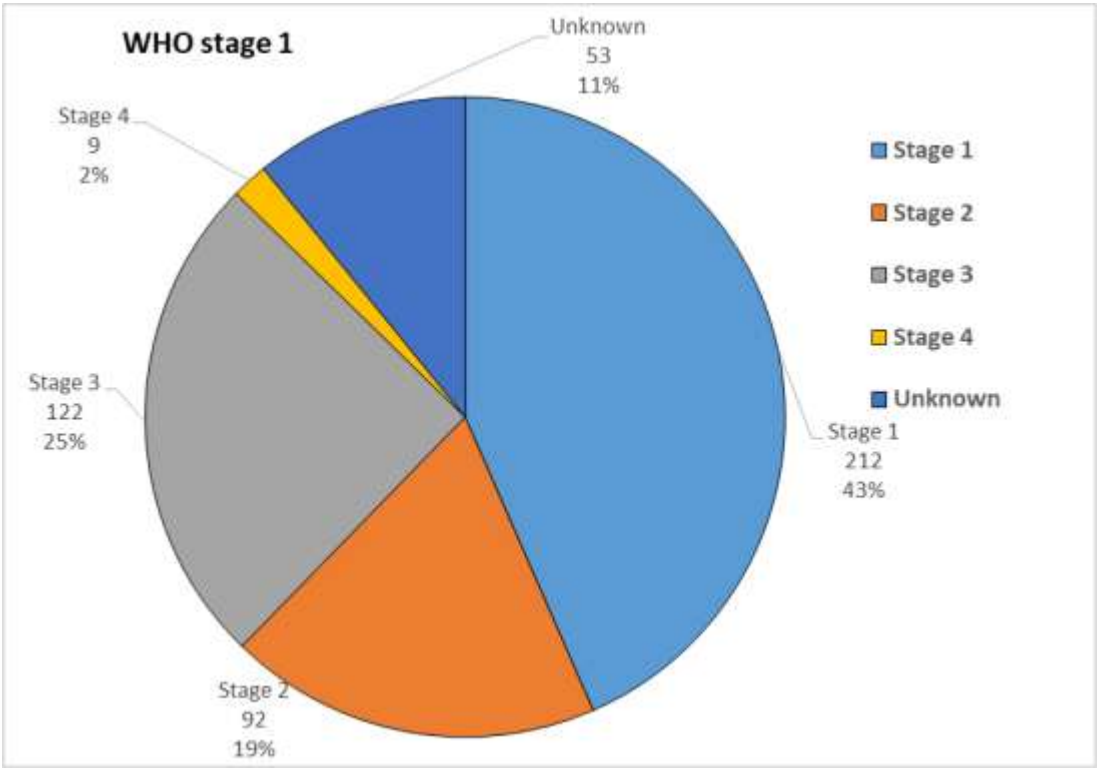

Figure 4.4 WHO stage category

Figure 4.4 above shows that most of the patients' records had WHO stage 1 at 43.4%, followed by those with stage 3 at 25%, stage 2 at 18.9%, unknown stage at 10.9% and the least were those with stage 4 at 1.8%.

Table 4.1: Viral load completion and CD4 count

Variables		Female (n=342)	Male (n=146)	Total	P-value
Viral load completion at 6 months		n (%)	n (%)	n (%)	
	VL Done	214 (62.6)	84 (57.5)	298 (80.5)	0.296
	VL not Done	53 (15.5)	19 (13.0)	72 (19.5)	0.479
	Sample not eligible for measure	75 (21.9)	43 (29.5)	118	0.076
Viral load completion at 12 months					
	VL Done	203 (59.4)	72 (49.3)	275 (86.8)	0.000
	VL not Done	30 (8.8)	12 (8.2)	42 (13.2)	0.842
	Sample not eligible for measure	109 (31.9)	62 (42.5)	171	0.025
CD4 Count					
	<350	187 (54.7)	108 (74.0)	295 (60.5)	0.000
	>350	155 (45.3)	38 (26.0)	193 (39.5)	0.000

Table 4.1 above shows that viral load completion rate at 12 months is higher than that of 6 months, at 86.8% and 80.5% respectively. It further shows that patients that were not done viral load at 6 months were more at 19.5% than those not done at 12 months at 13.2%. The table further shows that most patients initiated on ART during this period are those with a baseline CD4 count <350 at 60.5% than those initiated ART with a baseline CD4 >350 at 39.5%. Males are the highest in initiating ART treatment with a baseline CD4 <350 at 74% than women at 54.7%. The viral load completion between males and females at 6 months does not show statistical significance as all p-values were above 0.05. At 12 months the viral load done shows statistical significance (*P=0.000*) between males and females whereas viral load not done does not show statistical significance (*p=0.842*) and the samples which were not eligible for measures shows statistical significance (*p=0.025*).

4.3. Clinical outcomes

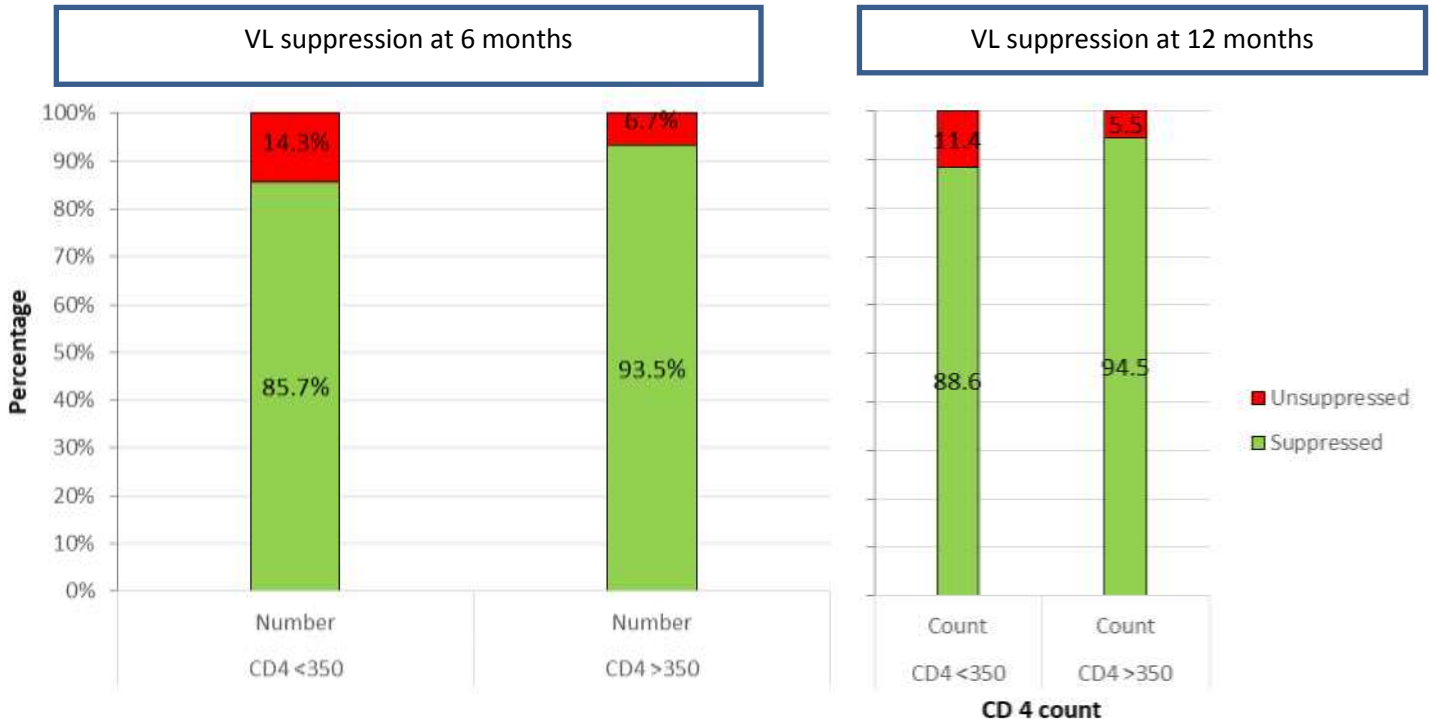

Figure 4.5: Viral Load Suppression at 6 months stratified by CD4

Figure 4.5 above shows that most patients that were initiated ART with a CD4 >350 demonstrates better clinical outcomes than those initiated on a lesser CD4 count <350. Viral load suppression of patients with CD4 >350 was statistical significantly higher than that of patients with CD4 <350 at 93.5% and 85.7 respectively at p-value 0.035 (Refer to Appendix A). On average the viral load suppression of the samples is at 88.9%. This figure shows that 88.6% of those who started with a baseline CD4<350 suppressed at 12 months whilst 94.5% of those with a baseline CD4 >350 were suppressed at 12 months of ART treatment. These findings show that the benefit of starting ART with a higher CD4 count >350 is improving the clinical outcomes of patients and increases life expectancy.

Table 4.2: VL suppression categorised stage and CD4 category by WHO

WHO stage category	Baseline CD4 category	Viral load suppression by 6 and 12 months							
		Suppressed		Unsuppressed		Grand Total		Percentage	
		6 months	12 months	6 months	12 months	6 months	12 months	6 months	12 months
Stage 1	CD4 <350	53	47	5	5	58	52	91.4%	90.4%
	CD4 >350	71	70	4	3	75	73	94.7%	95.9%
Stage 1 Total		**124**	**117**	**9**	**8**	**133**	**125**	**93.2%**	**93.6%**
Stage 2	CD4 <350	33	35	11	7	44	42	75.0%	83.3%
	CD4 >350	19	12	2	1	21	13	90.5%	92.3%
Stage 2 Total		**52**	**47**	**13**	**8**	**65**	**55**	**80.0%**	**85.5%**
Stage 3	CD4 <350	47	48	5	5	52	53	93.4%	90.6%
	CD4 >350	14	11			14	11	100.0%	100%
Stage 3 Total		**61**	**59**	**5**	**5**	**66**	**64**	**92.4%**	**92.2%**
Stage 4	CD4 <350	2	4	2	1	4	5	50.0%	80%
Stage 4 Total		**2**	**4**	**2**	**1**	**4**	**5**	**50.0%**	**80%**
Unknown	CD4 <350	15	13	2	1	17	14	88.3%	92.9%
	CD4 >350	11	10	2	2	13	12	84.6%	83.3%
Unknown Total		**26**	**23**	**4**	**3**	**30**	**26**	**86.7%**	**88.5%**
Grand Total		**265**	**250**	**33**	**25**	**298**	**275**	**88.9**	**90.9%**

Table 4.2 above shows that WHO stage 1 patients were found to be more virally suppressed, followed by stage 3 patients both at more than 90% target of the country, at both 6 and 12 months period of being on ART treatment. This table further shows that those patients that started ART with a baseline CD4 >350 suppressed more than those who had a baseline CD4 <350 in three stages, stage 1 at 94.7% & 95.0%, stage 2 at 90.5% & 92.3% and stage 3 at 100% at both 6 and 12 months of treatment. Patients with unknown WHO stage with a CD4 <350 have suppressed more than those with a baseline CD4 >350 at 88.3%.
Patients who started ART with stage 4 suppressed equally at 50% and 80% in both CD4 categories after 6 and 12 months of ART treatment.

Table 4.3 below shows that 80.3% of those who started with a baseline CD4<350 suppressed at 6 and 12 months whilst 93.5% of those with a baseline CD4 >350 were suppressed at 6 and 12 months. This table further shows those who were suppressed at 6 months and became virally unsuppressed at 12 months were 3.6% within a baseline CD4<350 and 2.2% within baseline CD4 >350.
Some patients were unsuppressed at 6 months and became virally suppressed at 12 months at 9.5% within CD4<350 and 3.3% within CD4 >350; other patients had unsuppressed viral load at both 6 and 12 months' intervals, at 6.6% in CD <350 and 1.1% in CD4>350.

Table 4.3: CD4 category at baseline vs VL Suppression @ 6 and 12 months

Baseline_CD4_category at 6 and 12 months' Cross tabulation										
	Viral load suppression analysis of patients who had a viral load completion at both intervals : 6_n_12_month by baseline CD4 category									
	Suppressed at 6; Suppressed at 12 months		Suppressed at 6; Unsuppressed at 12 months		Unsuppressed at 6; Suppressed at 12 months		Unsuppressed at 6; Unsuppressed at 12 months		Total	
Baseline CD4 category	CD4<350	CD4>350	CD4<350	CD4>350	CD4<350	CD4>350	CD4<350	CD4>350	CD4<350	CD4>350
Number of patients with viral load suppression at both 6& 12 months stratified by baseline CD4	110	86	5	2	13	3	9	1	137	92
% of viral load suppression at both 6 & 12months stratified by baseline CD4	80.3%	93.5%	3.6%	2.2%	9.5%	3.3%	6.6%	1.1%	100%	100%

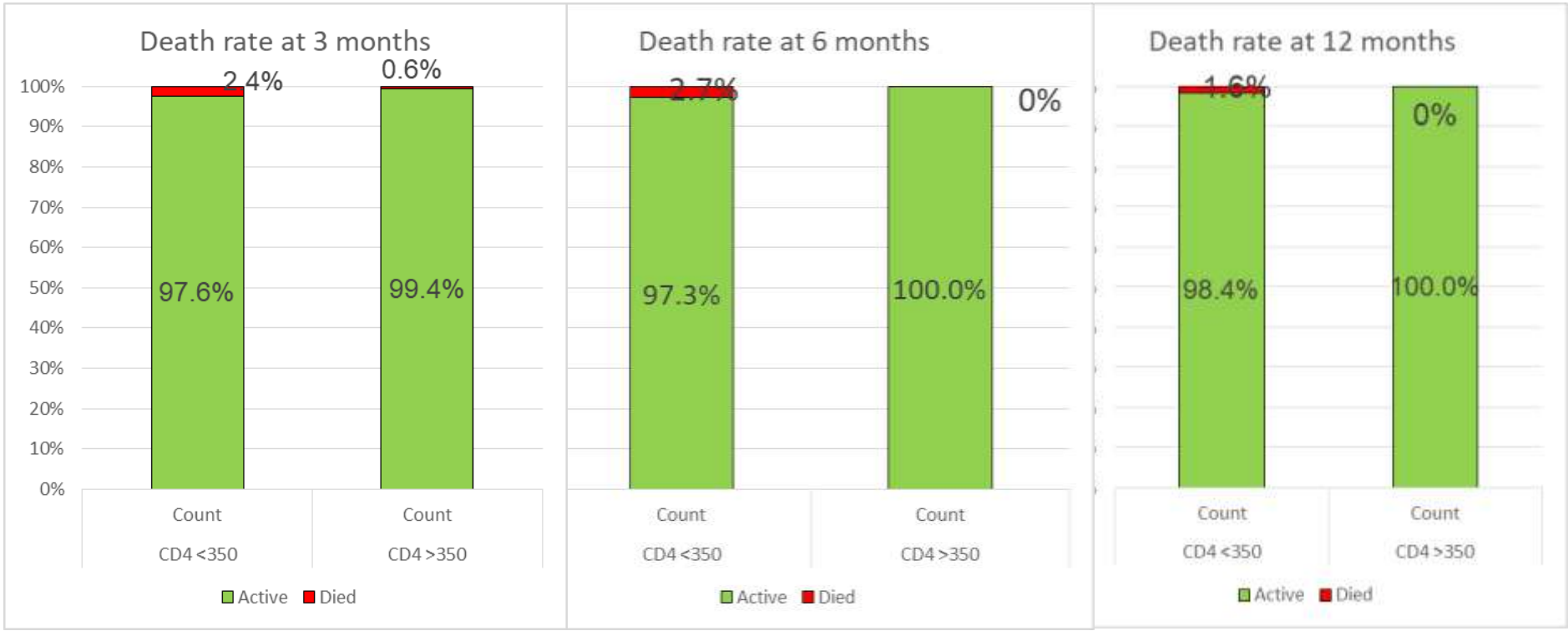

Figure 4.6: Death categorised by baseline CD4 count proportions

Figure 4.6 above shows that 2.4 % of those who started with a baseline CD4<350 died within 3 months of starting ART whilst 0.6% of those with a baseline CD4 >350 died within 3 months of starting ART. The table shows that about 2.7% and 1.6 of those who started ART with a baseline CD4<350 died after 6 and 12 months after start of ART whilst none of those with a baseline CD4 >350 neither died after 6 and 12 months after start of ART.

4.4. Patient outcomes

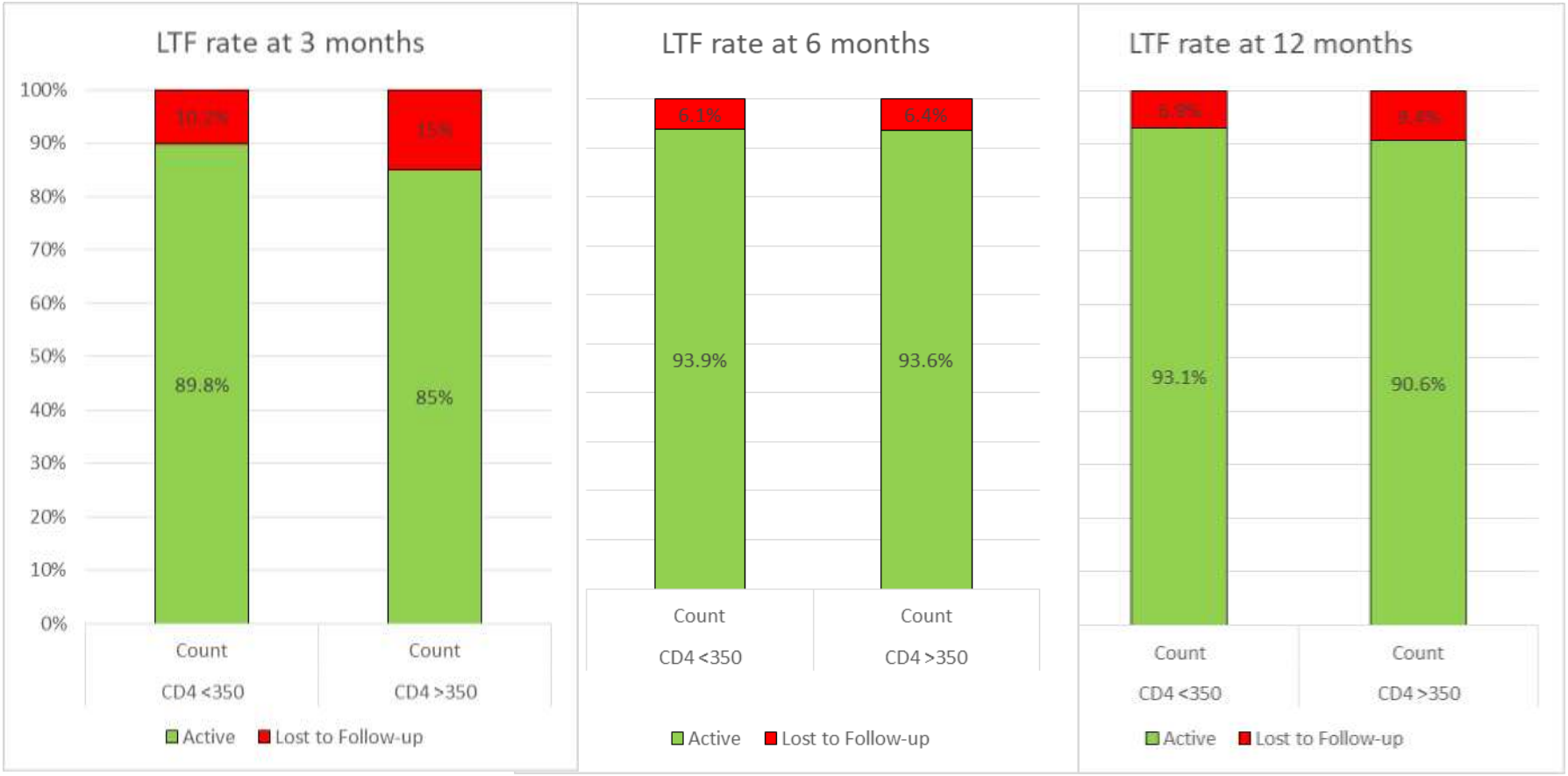

Figure 4.7: Lost to follow-up at 3, 6 & 12 months of ART treatment

Figure 4.7 above shows that 10.2% of those who started with a baseline CD4<350 were lost to Follow-up within 3 months after start of ART whilst 15% of those with a baseline CD4 >350 were lost to follow-up within 3 months after start of ART. This figure shows that 6.9% of those who started with a baseline CD4<350 were lost to follow-up by 12 months of starting ART whilst 9.4 % of those with a baseline CD4 >350 were lost to follow-up by 12 months of start of ART; and at 6 months of ART patients lost were 6.1% of CD4 <350 and 6.4 of >350.

Figure 4.8: Retention in care at 3, 6 & 12 months of ART treatment

Figure 4.8 above shows that 87.9% of those who started with a baseline CD4<350 are retained in care 3 months after start of ART whilst 84.6 % of those with a baseline CD4 >350 are retained in care 3 months after start of ART. Further shows that 80 % of those who started with a baseline CD4<350 are retained in care 6 months after start of ART whilst 79 % of those with a baseline CD4 >350 are retained in care 6 months after start of ART. The figure illustrate 72.7% of baseline CD4<350 and 70.8% of baseline CD4 >350 to be retained in care at 12 months of ART

Table 4.4: Percentage cumulative attrition and retention in care over 12 months by age

Percentage cumulative attrition and retention in care over 12 months by age				
	Variables			
Age group	**Death**	**LTF**	**Retention in care**	**Total**
15-19	5.3	52.6	42.1	100.0
20-24	0.0	27.5	72.5	100.0
25-29	0.0	38.0	62.0	100.0
30-34	4.8	16.7	78.6	100.0
35-39	1.7	22.4	75.9	100.0
40-44	7.7	21.2	71.2	100.0
45-49	2.4	12.2	85.4	100.0
50-54	3.6	17.9	78.6	100.0
55-59	9.4	6.3	84.4	100.0
>60	7.1	21.4	71.4	100.0
Total	**4.2**	**23.6**	**72.2**	**100.0**

The above table 4.4 shows the high lost to follow-up in the following age groups, 20-24 years at 27.5%, 25-29 years at 38.0%, and highest in 15-19 years at 52.6%; the following age groups shows to have lost to follow up of less than 20% with 50-54 years at 17.9%, 30-34 years at 16.7%, 45-49 at 12.2% and lowest at 6.3% in 55-59 age group.

The table further shows the death rate to be highest at the age 55-59 years at 9.4%, followed by 40-44 years at 7.7%, >60 age group at 7.1%, then 15-19 years at 5.3%; the table shows that certain age groups had 0% death rate i.e. 20-24 years and 25-29 years and other age groups had death rate of <5%.

Age 45-49 shows the highest retention in care at 85.4% followed by 84.4%. Most of the age groups have < 80% with age 15-19 being the lowest at 42.1%.

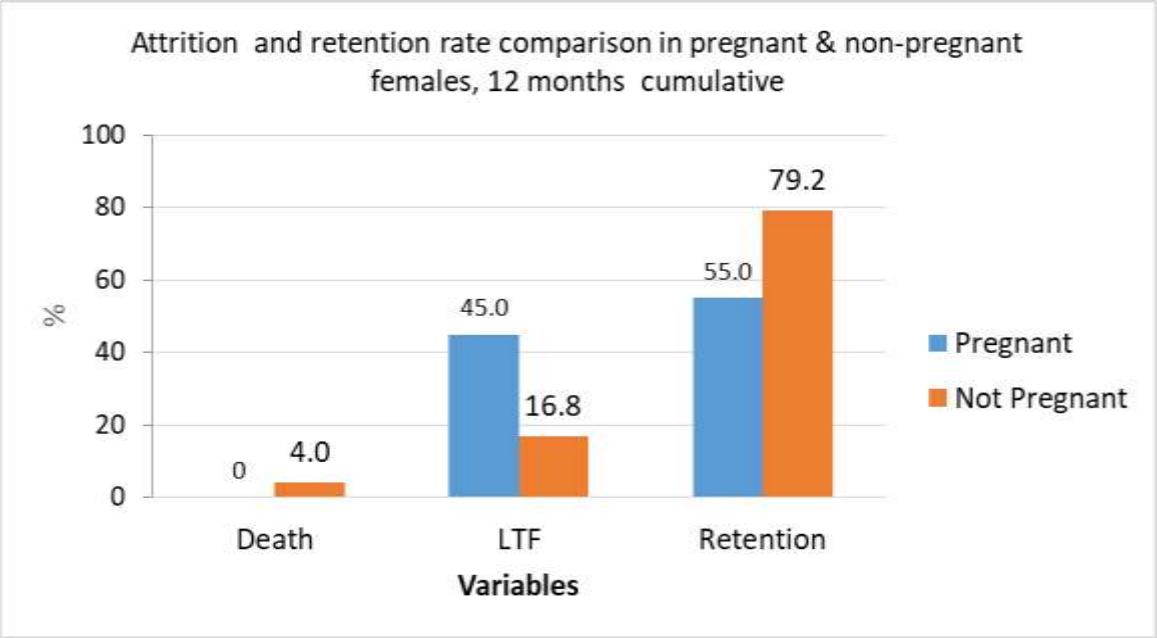

Figure 4.9: Comparison of attrition (LTF & Death) and retention rate in pregnant & non-pregnant females, 12 months cumulative.

The above figure shows 0% death rate in pregnant and 4% death rate in non-pregnant females. Lost to follow-up is high in pregnant females at 45% than in non-pregnant females at 16.8%. The figure further illustrate that retention in care is low in pregnant females at 55% and at 79.2% in non-pregnant females.

Table 4.5: Chi-Square Tests for viral load suppression at 6 months of ART

		Chi-Square Tests			
	Value	**df**	**Asymp. Sig. (2-sided)**	**Exact Sig. (2-sided)**	**Exact Sig. (1-sided)**
Pearson Chi-Square	4.442a	1	0,035		
Continuity Correctionb	3,687	1	0,055		
Likelihood Ratio	4,709	1	0,03		
Fisher's Exact Test				0,04	0,025
N of Valid Casesb	298				
a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 13.62.					
b. Computed only for a 2x2 table					

P-value=0.035 <0.05 so we reject the null hypothesis and conclude that there is a significant relationship between CD4 category at baseline and Viral Load Suppression at 6 months.

Table 4.6: Chi-Square Tests for viral load suppression at 12 months of ART

		Chi-Square Tests			
	Value	**df**	**Asymp. Sig. (2-sided)**	**Exact Sig. (2-sided)**	**Exact Sig. (1-sided)**
Pearson Chi-Square	2.810a	1	0,094		
Continuity Correctionb	2,137	1	0,144		
Likelihood Ratio	2,987	1	0,084		
Fisher's Exact Test				0,132	0,069
N of Valid Casesb	275				
a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 9.91.					
b. Computed only for a 2x2 table					

p-value=0.094 >0.05 so we fail to reject the null hypothesis and conclude that there's no significant relationship between CD4 category at baseline and Viral Load Suppression at 12 months.

4.4 Conclusion

This chapter presented the results analysis; the following chapter will discuss the results of the study, conclude the study and provide recommendations.

CHAPTER FIVE

DISCUSSIONS, CONCLUSIONS AND RECOMMENDATIONS

5.1. Introduction

The previous chapter presented data analysis and results interpretation. Chapter 5 will be discussing, concluding and recommendations and limitations of the study will be addressed.

5.2 Discussion

Discussion will be presented according to the demographic profile, baseline characteristics and study objectives

5.2.1. Gender and age proportions

The results of this study revealed that the majority of the patients initiated on ART were females than males. This finding concurs with the findings found in a three population-based HIV sero-surveys, that women were consistently found to have a higher infection rate (approximately 1.4 times) than men (Berkley, Naamara, Okware, Downing & Konde-Lule, 1990). The higher rate of HIV infection in females in this study suggests differential contributing factors such as their genetic make-up which exposes and makes them susceptible to sexually transmitted infections predisposing them more to HIV infection than males (Berkerly et al., 1990; Feldmeier, Krantz, & Poggensee, 1994).

Sexually transmitted diseases increase the probability for HIV transmission, presumably through lesions in the genital mucosa. Female genital schistosomiasis, a special form of urinary schistosomiasis due to infection with *Schistosoma haematobium*, may be another risk-factor for transmission of HIV in females (Feldmeier, Krantz, & Poggensee, 1994).

Feldmeier, Krantz, & Poggensee, (1994) states that from the published data there seem to be pathophysiological, immunological and epidemiological evidence for an association between genital ulcer disease due to *S. haematobium* and HIV-infection in women (Feldmeier, Krantz, & Poggensee, 1994). The researcher concludes that genetic make-up of females and STI infections predisposes them to a higher risk of contracting HIV infections, hence in this study females who started ART had a higher rate than males.

The results of the study revealed that 20-24 years age group seems to have more females than males this may be probably because this age group is sexually active and most females of this age group are dating older men than those of their age group, predisposing them to contract sexually transmitted infections. Pettifor, Rees, Kleinschmidt, Steffenson, & MacPhail, (2005) cited that a history of genital ulcers in few, was associated with HIV infection whereas a history of unusual vaginal discharge in most women was associated with HIV infection. Hence in this study the HIV positive patients, females of age 20-24 years were found to be more than males at start of ART.

The findings of this study suggests that females of this age group, are trying to settle and getting married younger than males of the same age group and marriage was identified as a risk factor for HIV infection, although the disparity in HIV prevalence was present in both married and unmarried individuals. Women often had older partners, and men rarely had partners much older than themselves (Glynn, Caraël, Auvert, Kahindo, & Chege, 2001). Pettifor et al., (2005), had similar findings reporting that young women with older partners were also at increased risk of HIV infection in a study conducted amongst age 15-24 years old.

Females of age group 15-19 years are the second highest group contributing more than three quarter than males contributing less than a quarter; similarly to what is cited in Glynn et al., (2001) that HIV prevalence in women was six times that in men among sexually active 15-19 year olds. This is a critical age group to deal with, because it is a teenage and adolescent stage.

Being infected with HIV infection in this age group, let alone starting ART may pose serious challenges with regard to HIV status disclosure and adherence to treatment leading to a high lost to follow-up as it is found that lost to follow-up is highest in younger age (Van Cutsem, Ford, Hildebrand, Goemaere, & Mathee, 2011). Disclosure of the HIV status may not be easy for this age group, to disclose to their sexual partners as they may have fear to lose their potential sexual partners, and this may lead to a non-adherence to ART treatment (WHO. 2013).

According to WHO report (2013), adolescents living with HIV (ALHIV) in the near future would plan to have children and it is within their rights to have a pleasurable and healthy sexual and reproductive life and to programmes that respond to their different needs and challenges (WHO 2013)..

The Department of Health therefore needs to provide a comprehensive approach to support and care for adolescent mothers who are living with HIV and to deliver services of adherence support and disclosure unto this age group (WHO 2013). Disclosure to parents is equally important as disclosing to the sexual partners and it enhances adherence to ART treatment (WHO 2013). These patients may need psychological and treatment support such as treatment buddies and support groups to ensure that they can have good clinical and patient outcomes.

This study further revealed a difference in ART starts in females and males within the same age groups whereby females often contributes more than two third in more than half of the age groups in comparison (Glynn et al., 2001). The researcher also observed the equalization in females and males when starting ART by one third in age 40years and above, meaning that the HIV infection rate is almost the same amongst males and females within these age groups (Glynn et al., 2001)

5.2.2. Pregnancy status

The results revealed that some patients were pregnant when starting ART treatment. Pregnancy was equally high within the age groups 15-19 years and 25-29 years, both contributing to two third, followed by age group 20-24 years contributing to almost a quarter. Results further reveals that fewer patients were pregnant at start of ART at age group 55-59 years.

These pregnant patients may contribute to lost to follow-up since they actually started ART treatment because of pregnancy, and their primary visit to the facility was rather to access the antenatal care services (Van Cutsem et al., 2011). There is a high probability of these patients to become lost to follow-up after giving birth or even before then, Van Cutsem, et al., (2011) discovers that highest lost to follow is found in younger age and pregnant.

5.3. Baseline characteristics

5.3.1. WHO clinical stage

The results revealed that majority of patients were having WHO stage 1 at start of ART treatment and few patients had accessed the health facilities with WHO stage at a later stage.

The results of this study further revealed that some patients had unknown WHO stage at start of ART; and this may imply that some patients whom accessed health services were not clinically staged. These finding suggests that some clinicians and nurses are somehow misclassifying the patients clinically when initiating them on ART. This may affect the clinical management of patients as the clinical staging plays a key role in determining the need to initiate preventative prophylaxis treatment such as cotrimaxazole to prevent bacterial infections in HIV positive patients (DOH 2015)

5.3.2. CD4 cell count

The results of this study revealed that two third of patients initiated on ART during this period were those with a CD4 count <350. These finding suggests that there are still missed opportunities out there, either due to late presentation of patients to health facilities leading to delayed HIV diagnosis or delay in putting eligible HIV patients on ART Antinori, Coenen, Costagiola, Dedes, & Ellefson, (2011). Late presentation is defined as persons presenting for care with a CD4 count below 350 or presenting with an AIDS-defining event, regardless of CD4 cell count. The longer the therapy is delayed when clinically indicated, the poorer the patient outcome. In the cases of untreated HIV-infected persons, the risk of developing an AIDS-defining condition increases more as the CD4 count drops, being particularly high in those with a CD4 count <200 Antinori, et al., (2011). This statement concurs with the objective of the study that's says the Implementation of new ART eligibility criteria which is a CD4 <500 but >350 improve the clinical outcomes of the ART patients.

The results of this study further reveal that males are the highest in initiating ART treatment with a baseline CD4 <350 compared to females. These finding suggests that most men do not visit the health facilities often, they visits the health facilities when they are sick already; this is a health seeking behaviour that needs attention (Galdas, Cheater, & Marshall 2005). says that the investigation of men's health related help seeking behaviour has great potential in improving both men and women's lives and reducing costs implications associated with national health

through the development of responsive and effective interventions (Galdas, et al., 2005).

Objective 1: To determine the retention to care and lost to follow-up (LTF) rate between patients initiated with CD4 < 350 and those initiated with CD4 > 350.

5.4.1.1. Lost to follow-up

Results further revealed that majority of patients were lost to follow-up as early as 3 months of starting ART, and this shows that the likelihood of being LTF in the 1st three months of ART treatment is high (Caluwaerts & Chu 2009; Tenthani, Haas, Tweya, Jahn, & Van oosterhout, 2015).

The results of the study revealed that majority of patients who were found to be lost follow-up were those started ART with a baseline CD4 >350 than those with a baseline CD4 <350. These results revealed that there is a likelihood of being lost to follow-up when starting ART at baseline CD4 >350. Lost to follow- up was the highest in patients with a baseline CD4 > 350 than that of CD4 < 350 in all three intervals of assessment, 3, 6 and 12 months of ART treatment; although 6 months period shows no significant difference (Van Cutsem, et al., 2011).

Similarly to what is found in a study cited in Van Cutsem, et al., (2011), that the younger age, the higher baseline CD4 count and pregnancy were associated with higher true LTF; the results of this study concurs with these findings. The youngest age group in the study 15-19 years have lost more than half of the patients within 12 months period of the study. More than a quarter of some patients were lost to follow-up at age group 20-24 and 25-29 years, these findings confirms what is discovered in Van custem, et al., (2011) that the younger the age the higher the LTF, since the first three age groups highest in LTF, are within the younger age. The findings of the results reveal that older patients had a better LTF as compared to younger ones, some age groups lost fewer patients to follow-up, such as age 55-59 years. Other age groups have lost to care less than quarter of their patients.

The study further revealed that lost to follow-up amongst females was higher in pregnant than in non-pregnant females. Almost half of the patients were LTF among pregnant females, whereas amongst the non-pregnant females, LTF was less than a quarter. This findings leads the researcher to conclude in conjunction with Van Cutsem, et al., (2011), that the young age, higher baseline CD4 >350 and pregnancy is somehow associated with high lost to follow-up and that higher CD4 >350 does not improve patients outcome, instead it contributes to higher LTF. More studies need to be conducted on this aspect and explore the reasons of lost to follow-up. This brings the researcher to conclude that the implementation of the new eligibility criteria does not improve the patient outcome of lost to follow-up.

5.4.1.2. Retention in care

The results of this study revealed that the most patients retained in care were those who started ART treatment with a baseline CD4<350 than those with the baseline of CD4 >350. Results of the study shows that retention in care is less than 90 percent as early as 3 months of ART treatment and continue to decline over time with one third at 12 months in patients with CD4 <350 and with more than one third at 12 months in patients with CD4 >350.

The results further revealed that retention in care is even lower in the younger age group, CD4 < 350 and in pregnant females (Van custem, et al., 2011). The patients in the age 15-19 years have lost more than half of the patients over a 12 months period, leaving these age group with less than half of patient retained in care. Retention in care is lowest in this age group followed by age 25-29 years with two third patients retained in care (Van custem, et al., 2011). Ulett, et al., (2009) in their study states that worse retention in the first 2 years was associated with younger age, higher baseline CD4 count, and substance abuse.

This finding suggests that there is a need to focus on improving retention in care amongst young people, as cited in Ulett, et al., (2009) went further to recommend that efforts to improve retention should address younger patients, those with higher baseline CD4 counts and people abusing substance.

The results also revealed that older patients had a better retention compared to the younger patients, 45-49 years and 55-59 years have retained more than three quarter of patients in care.

Results of the study also revealed that retention in care amongst females was lower in pregnant than in non-pregnant females. Retention in pregnant females in this study was just above half of patients whereas in non-pregnant females retention in care was more than two third. This result suggests that pregnancy is somehow associated with low retention in care Van custem, et al., (2011).

Just like within the lost to follow-up, this findings leads the researcher to conclude in conjunction with Van Cutsem, et al., (2011), that the young age, higher baseline CD4 >350 and pregnancy is somehow associated with lower retention in care and that higher CD4 >350 does not improve patients outcome, instead it contributes to higher LTF and lower retention. More studies need to be conducted on this aspect and explore the reasons of low retention in care in ART patients. This brings the researcher to conclude that the implementation of the new eligibility criteria may not improve the patient outcomes (LTF and retention in care), does not prevent lost to follow up of this patients resulting in low retention in care of ART patients.

The Limpopo department of health, HIV/AIDS, STI and TB directorate, developed strategies to improve the clinical and patient outcomes, namely viral load completion and operation find all strategies (see appendix C & D). The operation find all strategy was meant to identify the potential lost to follow-up early and start with the tracing and linking patients back to care; to reduce and prevent lost to follow-up. Operation Find All is put in place to strengthen and improve the patient outcomes, particularly retention in care and lost to follow-up. Retention in care plays a key role in determining the clinical outcomes of ART patients. Geng (2011) states that treatment of HIV infection can be effective only if patients are retained in care over time, meaning that patients need to be retained in care to enhance better clinical outcome assessment. In order to improve the patient outcome, the facilities should take cognisance of the strategy developed in the province to address the lost to follow-up and improve patient retention in care in the district and province as a whole.

Objective 2: To compare the VL completion and VL suppression rate between patients initiated with CD4 < 350 and those initiated with CD4 > 350.

5.5.1. Viral load completion

The result of the study revealed that viral load completion rate at 12 months is higher compared to that of 6 months, almost three quarter of patients had VL completion at 12 months of ART. These results reveals that some patients were missed to be monitored viral load in both 6 and 12 months period, but almost quarter of patients were missed at 6 months of ART, this is regarded as missed opportunity because the patients had accessed the health facilities, but left the facilities without accessing other services such as VL monitoring in this case.

The South African national consolidated guidelines; recommends that viral load should be monitored at 6 and 12 months of starting ART treatment, then monitored annually only if the VL has suppressed (DOH 2013), regardless of the recommendation, clinicians and nurses seem to miss the VL completion opportunity.

It is necessary to note that there is no significant relationship between viral load completion and baseline CD4 count, this are two independent variables. Therefore it will not be fair to compare these variables, because it is expected that viral load completion should take place to all patients that are retained on ART when they are due for the VL monitoring irrespective of the baseline CD4 count

The “Sample not eligible for measure” refers to the patients that exited the ART services in the facility either by being transferred out, lost to follow up or died before reaching the period of being monitored viral load i.e. 6 or 12 months.

5.5.2. Viral load suppression

The results of the study revealed that majority of patients with a baseline CD4 >350 suppressed more than those who started ART with a baseline CD4 <350 at both 6 and 12 months at >90% suppression rate. This finding confirms that the earlier the start of ART treatment at a higher CD4, the higher the chances of improved clinical outcomes amongst ART patients Phillips, Staszewski, Weber, Kirk, & Francioli, 2001. Funk, Fusco, Cole, Thomas & Porter (2011), states that treatment initiation at CD4 counts of 350-499 was associated with slower disease progression in their cohort study. It is expected that when patients are initiated on ART should achieve viral suppression within 4-6 months of treatment. The South African national

consolidated guidelines regards the patient to be virally suppressed when the viral load blood results are <400 copies/ml (DOH 2015).

The results of the study further revealed that majority of patients that were virally suppressed were patients with WHO stage 1 and stage 3 at ART start, at both 6 and 12 months period of being on ART treatment. This table further shows that those patients that started ART with a baseline CD4 >350 suppressed more compared to those who had a baseline CD4 <350 in three stages i.e. stage 1, 2 and 3 after 6 and 12 months of treatment. A noticed higher suppression in patients with baseline CD4 <350 in unknown WHO stage has no association with baseline CD4 count.
There is no statistical significance difference in patients who started ART with WHO stage 4, the viral load suppression is equally in both CD4 categories after 6 and 12 months of ART treatment. Generally, viral load suppression looks better at 12 months than at 6 months of treatment. This findings shows the likelihood of better clinical outcomes when patients are started on ART earlier when they are well not sick. This findings shows a high possibility of having a better clinical outcome in terms of viral load suppression if the patients start ART at a higher CD4 count and when they are fairly well clinically, classified by WHO clinical staging Phillips, et al., 2001.

The results of the study revealed that majority of patients were virally suppressed at both 6 and 12 months of ART treatment, and those with a baseline CD4 >350 had suppressed higher compared to those with a baseline CD4 <350. There is a statistical significance difference amongst patients who started ART with baseline CD4 >350 and CD4 < 350 respectively. This finding serves as an evident that implementing the new ART eligibility criteria improves clinical outcomes.

The results further shows that some patients had a poor clinical outcome by not suppressing virally at 6 months of ART but eventually had improved clinical outcome by suppressing at 12 months from the same group of patients suppressed at 12 months; this may suggests that intensified adherence might have taken place hence the improvement of the viral load suppression in the subsequent viral load assessment (DOH 2015).

The results further revealed that fewer patients were suppressed at 6 months and became virally unsuppressed at 12 months; this findings may suggests that there might have been poor adherence, the need for intensified adherence counselling amongst this patients and repeat of viral load monitoring after 2 months as recommended in the national consolidated guidelines (DOH 2015)

The other finding which was observed is that some patients, though few were virally unsuppressed at both 6 and 12 months of VL load monitoring; these findings may suggest that patients may be failing first line regimen drugs, developing a drug resistant or the patients may have been infected with a drug resistant virus at the point of HIV transmission and these patients will need to be classified and managed accordingly as patients who are failing first line regimen and switched to second line regimen (DOH 2015). The South African national consolidated guidelines considers switching patients on the first line regimen if the patient has experienced virological failure (VL >1000 copies/ml) on at least two occasions two months apart despite good adherence (DOH 2015).

Contrary to the previous findings when discussing the retention in care and lost to follow-up, that the CD4 > 350 does not improve the patient outcomes, there is evidence that early diagnosis and initiation of ART at CD4 higher than 350 can improve the clinical outcome of patients on ART, CD4 >350 at ART start improves the clinical outcomes of patients. Based on the findings the researcher concludes that implementation of new ART eligibility criteria improves the clinical outcomes of ART patients.

Objective 3: To compare mortality rate between patients initiated with CD4 < 350 and those initiated with CD4 > 350.

The results of the study revealed that majority of the patients who died, died within 3 months of ART treatment and had a baseline CD4 < 350 than those with a baseline CD4 >350; The results of the study further revealed that at 6 and 12 months no death occurred amongst the patients who had a baseline CD4 >350.

This study also revealed that the death rate amongst female patients is higher in non-pregnant females than in pregnant females. The finding in this study is that all

female patients died in this study were non-pregnant, no death occurred from pregnant patients.
The majority of patients died were from the age 55-59 years, surprisingly the age 15-19 years is also found amongst the high death rate age groups; this age group need to be prioritised and be given attention, since it is highly affected in these (LTF, death and retention in care) variables Van Cutsem, et al., (2011).

These findings shows that the relative risk of dying within 3 months after start of treatment is higher when the baseline CD4 is <350. This finding is similar to what was cited in Gupta, Nadkarni, Yang, Chandrasekhar, & Gupte, (2011), stating that among the studies that reported on deaths within the first year of ART initiation, it was observed that most deaths occurred within the first 3 months of ART initiation. This also confirms that starting ART at a higher CD4 >350 is likely to improve patients' clinical outcomes than starting at a CD4 < 350 and increases the life expectancy of patients. These results of the study concurs with what is cited in Funk et al., (2011); in the analysis of all-cause mortality, HAART initiation appeared to have a stronger effect on death than on the combined endpoint at CD4 counts of 350-499.

On contrary Schutte (2013) says unfortunately, mortality data are difficult to analyse, as the majority of HIV-related deaths are misclassified. Thus, the ascertainment of deaths related to HIV remains a serious concern. There is limitation of studies on this aspect since the mortality data amongst HIV patients on ART is not clearly defined as to what should it entail, e.g. if the HIV positive patient on ART could be involved in a car accident or a heart attack and die, the patient will still be classified as though the cause of death is HIV-related. It is therefore important that further studies are conducted on determining the actual cause of death in HIV positive patients on ART.
Based on these findings, the researcher concludes that starting ART earlier at a CD4 >350 improves clinical outcomes and life expectancy of patients on ART; and is evident that implementing new ART eligibility criteria improves the clinical outcomes of ART patients.

5.3. Limitation of the study

Missed opportunities to monitor viral load on patients was a limitation because the results and findings would have been different if all patients retained in care had viral load monitoring. The definition of death in an HIV positive patient on ART may have acted as a limitation to the study, since any death resulted from the HIV positive client is associated and assumed to be HIV-related, even if death can result from any other cause other than HIV-related, the fact that the person was on ART, it is classified as an HIV related death.

5.4. Conclusion

The findings of this study confirm that the implementation of the new eligibility criteria of ART initiation improves the clinical outcome of patients on ART compared to the old criteria. Even though this is the case, there are still patients that are missed for viral load monitoring bloods which play a key role in determining the clinical outcomes of patients. Missed cases cannot be classified in terms of viral load suppression, so it is empirical that clinicians and nurses in all facilities takes into account the importance of this blood monitoring type and other blood monitoring as recommended in (DOH 2015).

5.5. Recommendations

Research

This study managed to identify gaps in the health services which opens an opportunity for several studies to be conducted. To address a limitation of HIV-related mortality, studies determining the actual cause of death in HIV positive patients on ART can be conducted to accurately classify mortality rate amongst HIV positive patients.

The researchers may consider conducting studies around how to maximize health services utilization amongst men to improve early diagnosis and treatment of HIV and other health conditions. Early diagnosis and treatment of HIV condition will results in most men being initiated on ART treatment with a higher baseline CD4 count of >350; contributing to improved clinical outcomes and increasing men's life expectancy.

Health workers

Monitoring and evaluation of the implementation of the developed and established viral load completion and operational find all strategies should take place throughout the patient care in all facilities. The clinicians and nurses should consider drawing blood for viral load monitoring from ART patients on regular basis, as indicated within the viral load completion strategy to enable the assessment of the viral load suppression and improve the clinical outcomes.

Healthcare workers should consider rendering proper and quality treatment literacy and adherence counselling during the pre-test, post-test and ongoing HIV counselling as recommended within the national adherence strategy guidelines; with more emphasise to patients with a baseline CD4 >350 to minimise the already identified high LTF amongst this group of patients. In addition to these activity, a robust monitoring of the implementation of the operation find all strategy should be considered by health care workers for early identification of potential LTF, early tracing and linkage to care to prevent lost to follow-up and improve retention in care.

Education

Patients need to be educated about the importance of adherence to treatment and honouring of clinical visit appointments as early as during the pre-test, post-test and on-going HIV counselling for better viral load suppression and retention in care as recommended within the national adherence strategy guidelines.

Healthcare workers should consider empowering patients to take responsibility and accountability of their clinical and patient outcomes, with more emphasise to patients with a baseline CD4 >350 to minimise the already identified high LTF amongst this group of patients. In addition, a robust monitoring of the implementation of the operation find all strategy should be considered by health care workers for early identification of potential LTF, early tracing and linkage to care to prevent lost to follow-up and improve retention in care. Funk et al., 2011 discovers that across Europe, almost one-third of individuals infected with HIV do not enter health care until late in the course of infection. Despite attempt to encourage earlier testing for HIV, the situation remained unchanged over the years without evidence of improvement

Policies

The in-country policy makers have developed the HIV care and treatment SOPs and guidelines to provide the healthcare workers with guidance on how to manage HIV positive patients. Implementation of these guidelines, just to mention one; “national consolidated guidelines for the prevention of mother-to-child transmission of HIV (PMTCT) and the management of HIV in children adolescents and adults” should be considered at all times by health workers for proper clinical care of patients. Starting patients on ART at a higher CD4 count and clinically staging patients using WHO clinical staging on diagnosis of HIV and at every clinical visit improves the clinical outcomes when implementing the new ART eligibility criteria as opposed to the old criteria.

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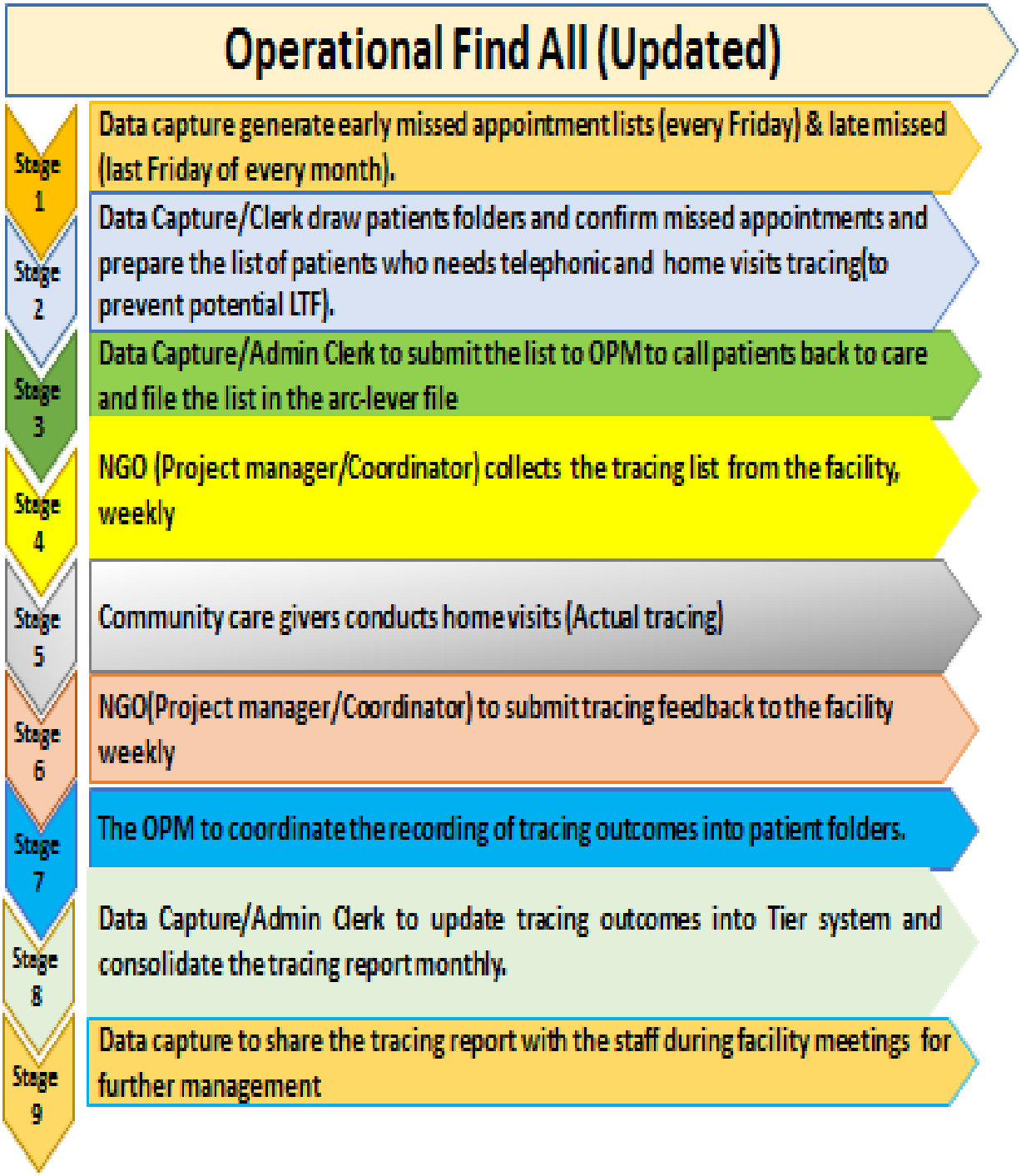
LIST OF APPENDICES

APPENDIX A:

Viral load completion strategy

APPENDIX B: Operation find all strategy



APPENDIX C: Letter for permission

PO Box 185

Rozano

0723

09 June 2015

Limpopo Department of Health

Provincial Research and Ethics

Polokwane

0700

Dear Sir/Madam

RE: REQUEST FOR PERMISSION TO CONDUCT THE RESEARCH AT THE IDENTIFIED FACILITIES IN SEKHUKHUNE DISTRICT

I hereby request the permission to conduct the study on patients'records/files of the ART patients. The facilities identified for the study are as follows: Philadelphia, Mcklenberg and Dilokong Hospitals and Motsepe, Klipspruit and Van der Merwe clinics.

I am currently enrolled for Master of Public Health Degree at the department of Public Health with University of Limpopo. I am required to submit a research report in a partial fulfilment of my degree.

The title of my study is **"clinical outcomes of antiretroviral therapy patients following the implementation of new eligibility criteria in sekhukhune district"**.

The protocol has been submitted and approved by the UL Research Ethics Committee (Proof of Ethical clearance attached). The findings of the study will be shared with your department.

Yours truly

Valerie Kedibone Makgato

Contact no: 082 472 3991/ Email address: vkmakgato@gmail.com

APPENDIX D: Letter for permission

PO Box 185

Rozano

0723

09 June 2015

Sekhukhune District Department of Health

Senior Manager Primary Health Care (PHC) services

Lebowakgomo

Dear Sir/Madam

RE: REQUEST FOR PERMISSION TO CONDUCT THE RESEARCH AT THE IDENTIFIED PHC FACILITIES IN SEKHUKHUNE DISTRICT

I hereby request the permission to conduct the study on patients'records/files of the ART patients. The facilities identified for the study are as follows: Motsepe, Klipspruit and Van der Merwe clinics.

I am currently enrolled for Master of Public Health Degree at the department of Public Health with University of Limpopo. I am required to submit a research report in a partial fulfilment of my degree.

The title of my study is **"clinical outcomes of antiretroviral therapy patients following the implementation of new eligibility criteria in sekhukhune district"**.

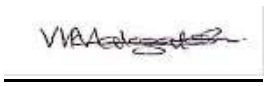
The protocol has been submitted and approved by the UL Research Ethics Committee (Proof of Ethical clearance attached). The findings of the study will be shared with your department.

Yours truly

Valerie Kedibone Makgato

Contact no: 082 472 3991

Email address: vkmakgato@gmail.com



APPENDIX E: Letter for permission

PO Box 185

Rozano

0723

09 June 2015

Sekhukhune District Department of Health

Senior Manager Hospital service management services

Lebowakgomo

Dear Sir/Madam

RE: REQUEST FOR PERMISSION TO CONDUCT THE RESEARCH AT THE IDENTIFIED FACILITIES IN SEKHUKHUNE DISTRICT

I hereby request the permission to conduct the study on patients'records/files of the ART patients. The facilities identified for the study are as follows: Philadelphia, Mcklenberg and Dilokong Hospitals.

I am currently enrolled for Master of Public Health Degree at the department of Public Health with University of Limpopo. I am required to submit a research report in a partial fulfilment of my degree.

The title of my study is "clinical outcomes of antiretroviral therapy patients following the implementation of new eligibility criteria in sekhukhune district".

The protocol has been submitted and approved by the UL Research Ethics Committee (Proof of Ethical clearance attached). The findings of the study will be shared with your department.

Yours truly

Valerie Kedibone Makgato

Contact no: 082 472 3991

Email address: vkmakgato@gmail.com

APPENDIX F: TREC CLEARANCE CERTIFICATE

University of Limpopo
Department of Research Administration and Development
Private Bag X1106, Sovenga, 0727, South Africa
Tel: (015) 268 2212, Fax: (015) 268 2306, Email:noko.monene@ul.ac.za

TURFLOOP RESEARCH ETHICS COMMITTEE CLEARANCE CERTIFICATE

MEETING:	02 September 2015
PROJECT NUMBER:	TREC/111/2015: PG
PROJECT:	
Title:	Clinical outcomes of antiretroviral therapy patients following the implementation of new eligibility criteria in Sekhukhune District
Researcher:	Ms VK Makgato
Supervisor:	Prof L Skaal
Co-Supervisor:	Mr E Maimela
Department:	Medical Sciences, Public Health and Health Promotion
School:	Health Sciences
Degree:	Masters in Public Health

PROF TAB MASHEGO
CHAIRPERSON: TURFLOOP RESEARCH ETHICS COMMITTEE

The Turfloop Research Ethics Committee (TREC) is registered with the National Health Research Ethics Council, Registration Number: **REC-0310111-031**

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

APPENDIX G: DEPARTMENT OF HEALTH APPROVAL LETTER

LIMPOPO
PROVINCIAL GOVERNMENT
REPUBLIC OF SOUTH AFRICA

DEPARTMENT OF HEALTH

Enquiries: Latif Shamila 015 2936210

Ref:4/2/2

Makgato VK
University of Limpopo
Private Bag X1106
Sovenga
0727

Greetings,

RE: Clinical outcomes of antiretroviral therapy patients following the implementation of new eligibility criteria in Sekhukhune District

The above matter refers.

1. Permission to conduct the above mentioned study is hereby granted.
2. Kindly be informed that:-
   - Research must be loaded on the NHRD site (http://nhrd.hst.org.za) by the researcher.
   - 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.
   - The above approval is valid for a 3 year period.
   - If the proposal has been amended, a new approval should be sought from the Department of Health.

Your cooperation will be highly appreciated.

Head of Department

06/11/2015
Date

18 College Street, Polokwane, 0700, Private Bag x9302, POLOKWANE, 0700
Tel: (015) 293 6000, Fax: (015) 293 6211/20 Website: http/www.limpopo.gov.za

The heartland of Southern Africa – *development is about people*

APPENDIX H: sample size by Morgan & Krecjie

TABLE FOR DETERMINING SAMPLE SIZE FROM A GIVEN POPULATION

N	S	N	S	N	S
10	10	220	140	1200	291
15	14	230	144	1300	297
20	19	240	148	1400	302
25	24	250	152	1500	306
30	28	260	155	1600	310
35	32	270	159	1700	313
40	36	280	162	1800	317
45	40	290	165	1900	320
50	44	300	169	2000	322
55	48	320	175	2200	327
60	52	340	181	2400	331
65	56	360	186	2600	335
70	59	380	191	2800	338
75	63	400	196	3000	341
80	66	420	201	3500	346
85	70	440	205	4000	351
90	73	460	210	4500	354
95	76	480	214	5000	357
100	80	500	217	6000	361
110	86	550	226	7000	364
120	92	600	234	8000	367
130	97	650	242	9000	368
140	103	700	248	10000	370
150	108	750	254	15000	375
160	113	800	260	20000	377
170	118	850	265	30000	379
180	123	900	269	40000	380
190	127	950	274	50000	381
200	132	1000	278	75000	382
210	136	1100	285	1000000	384

N = Population size

S = Sample size

APPENDIX I: Data collection tool

Socio-Demographic Section	
Gender	
Age	

Baseline Section:	
Unique ID number	
Baseline CD4	
ART Start date	
Pregnancy at start of ART	
ART Regimen at start of ART	
Current regimen	
VLD and VLS (At 6 months)	

Three, six and twelve Months Follow-up section:							
	LTF	**Died**	**Retention**	**VLD**	**VLS**	**Current Outcome**	**Final Outcome**
3 months							
6 months							
12 months							