ANALYSIS OF RETENTION IN CARE AMONG HIV PATIENTS IN SELECTED HEALTH CARE FACILITIES IN ZAMBIA

2013 – 2015

By

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DECLARATION

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APPROVAL

The University of Zambia approves the dissertation of **Biko Soko** in partial fulfillment of the requirement of the award of Master of Science in Epidemiology by the University of Zambia

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ABSTRACT

An estimated 2 million people are being newly infected, and 1.2 million people are dying of Human Immune Virus (HIV) – related causes (WHO, 2015). Despite significant success in scaling up Anti-retroviral Therapy (ART) programmes worldwide, many people living with HIV (PLHIV) start ART late in the progression of HIV infection, resulting in high rates of early mortality on ART. Poor retention of patients in care – especially in ART is a major driver of poor programme performance and increased morbidity and mortality. The objective of this study was to determine proportion and factors that may be associated with retention among HIV patients in Care in Zambia.

This was a mixed design study which included ART patients retained on ART between the year 2013 and 2015 (n=61,111). The study was conducted through a health facility survey and a nested retrospective cohort to determine proportion and factors associated with ART patients who were retained on ART after initiation in 90 days in HIV Care. The study used test of two proportions and chi-square to describe the relationship between retention, age, sex, HIV status, enrolment in HIV care and ART initiation.

The study showed that retention for the period 2013-2015 (36 month) stood at 69.3% at (95% CI: 68.9, 69.6). The finding were that male adult retention stood at 66.1% (95% CI: 65.5, 66.8) while female adult retention was 71.8% (CI: 71.3, 72.3) and pediatrics at 66% (95% CI: 63.7, 66.3). These findings were statistically significant with a p-value of $p<0.0001$. The study also showed mortality at 40/1000 per-month of follow-up (p-m of fu) (CI: 39.2, 41.3) while Lost to Follow-up (LTFu) was registered at 97/1000 p-m of fu/1000 (95% CI 95.4, 98.7). Results showed that retention in care among HIV patients in 12 month in selected health care facilities accounted for 80% of the total clients enrolled on ART.

Lost to follow up and Mortality are key factors affecting retention. Male adults and pediatrics, were associated with an increased risk of attrition (LTFu 104.2/1,000(101.4, 107), 106.2/1,000(100.2, 112.1) and Mortality: 52.1/1,000(50, 54.1), 43/1,000(39.5, 47.4)) respectively.

The study has shown that Zambia retention in care stands at 69% with low retention in key demographic characteristic such as male adults and pediatrics both recorded at 66%. Retention of 69% has a negative implication to the country attaining epidemic control as this leaves the larger

population vulnerable to infection transmission. Having established that male adults and pediatric variables are predictors affecting increased risk of attrition, the need to address factors affecting retention becomes important. This is by establishing policy that clearly addresses the most affected group that directly affects the larger population.

Male adults and pediatric variables were predictors of retention that resulted in an increase in LTFu and Mortality factors. The study showed that identifying which clients are at greatest risk for not being retained is important to target intervention efforts to these groups. The findings suggest the need for health care to be decentralized and focused on delivering service at home based therapy level. This is where direct contact with gender and age is established. Chances of affecting male and pediatrics that have been associated with poor retention will reduce the risk of attrition. Interventions like these have a greater effect in complimenting other interventions such as socio-economical characteristics and other social determinants.

Keywords: Retention, Attrition, Lost to follow-up, Mortality, Transfers and Anti-Retroviral Therapy (ART)

DEDICATION

This thesis is dedicated to my beautiful wife Chana Kabo Soko, our two wonderful sons, Thulasizwe and Mulunga Soko, and my mother who is also my mentor, Mrs. Sophie Mugala Soko.

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TABLE OF CONTENT

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

ACRONYMS

AIDS	Acquired immunodeficiency syndrome
ART	Antiretroviral Therapy
ANC	Antenatal Care
CDC	Centers for Disease Control and Prevention
CHAZ	Churches Health Association of Zambia
GCWA	Global Coalition on Women and AIDS
Global Fund	The Global Fund to fight AIDS, Tuberculosis and Malaria
Global Plan	Global Plan to Stop TB, 2011–2015
GCWA	Global coalition on Women and AIDS
ICF	Intensified Case Finding
HIV	Human Immunodeficiency Virus
HMIS	Health Management Information System
LTFu	Lost to Follow-up
MDG	Millennium Development Goal
MoH	Ministry of Health
NAC	National AIDS Council
NGO	Nongovernmental Organization
PEPFAR US	President's Emergency Plan for AIDS Relief
PMTCT	Prevention of Mother –to-child transmission (of HIV)
P-M of Fu	Patient Month of Follo-up
STI	Sexually Transmitted Infection
TB	Tuberculosis
UN	United Nations
UNAIDS	Joint United Nations Programme on HIV/AIDS
UNGASS	United Nation General Assembly Special Session
UNZA	University of Zambia
USAID	United States Agency for International Development
WHO	World Health Organization

CHAPTER ONE: INTRODUCTION

1.1 Background

1.1.1 Global Perspective of HIV/AIDS

Human Immune Virus/Acquired Immunodeficiency Syndrome (HIV/AIDS) is probably the most challenging and pressing health issue of our time. Current estimates show that over 36.7(36.7-39.8) million people are now living with HIV (WHO, 2015). An estimated 2 million people are being newly infected, and 1.2 million people are dying of HIV – related causes (WHO, 2015).Despite the availability of antiretroviral therapy, the provision of this treatment continues to pose a big challenge for various reason as the rapid expansion of Anti-retroviral Treatment (ART) programmes in settings with weak health systems is associated with high mortality and loss of patients to follow-up (Mills et al, 2006). Globally, remarkable progress has been made in improving access to ARVs, 15 million out of 15 million people target (100%) for MDG 6 was achieved (UNAIDS 2015). Sub-Saharan Africa which constitutes of 65% of HIV infections globally increased access from 50,000 to 10.7 million between 2002 and 2014 (UNAIDS 2015).

1.1.2 Global Perspective of Antiretroviral treatment

Despite significant success in scaling up ART programs worldwide, many people living with HIV (PLHIV) start ART late in the progression of HIV infection, resulting in high rates of early mortality on ART (Rosen, 2010). Currently, the majority of PLHIV remain undiagnosed and many do not access HIV care and treatment despite a positive test.

1.1.3 Theoretical frame work

PLHIV are lost at every step along the continuum of care, particularly in the period between HIV diagnosis and initiation of ART. It is now recognized that poor retention of patients in care, especially in the pre-ART period (Steps 2-3 on the continuum of care) illustrated in figure 0.1– is a major driver of this poor program performance and increased morbidity and mortality.

Retention in HIV care' can be defined as continuous engagement from diagnosis in a package of prevention, treatment, support and care services. 'Retention in care' can be defined from the moment of initial engagement in care, when a person with HIV is linked successfully to services. These services include assessment for eligibility, initiation on ART and retention in lifelong

ART care. However, in other studies and reports it sometimes includes the period from diagnosis to successful linkage to care.

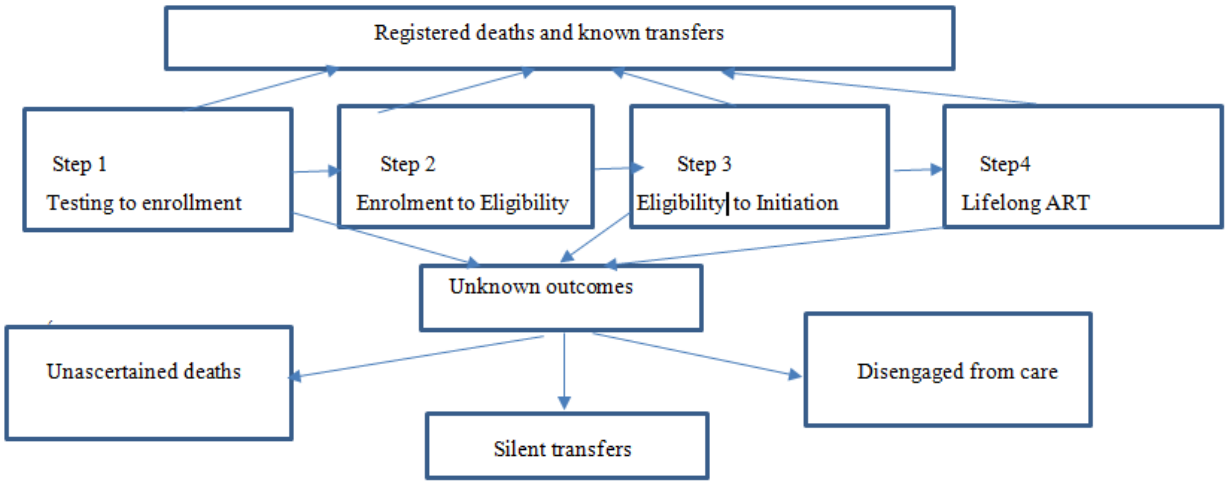

Figure 1: Continuum of Care Framework

1.1.4 HIV/AIDS Status and Treatment in Zambia

One in every eight people in Zambia is living with HIV, and life expectancy is at 58.1 years. Part of the increment is as a result of a considerable improved access to antiretroviral treatment (UNDP, 2013). By the end of 2013, over 60% of people in Zambia were in need of ART (UNAIDS 2015).

Considering the huge increase in the number of people eligible for treatment under these new guidelines, Zambia has shown commitment to increasing ART coverage. Between 2010 and 2013, 5.6 million newly infected people were put on ART across the world. Four percent (4%) were in Zambia alone (UNAIDS, 2015). It is thought that 80% of Zambians are still on treatment after one year. Efforts need to be stepped up to ensure people who start treatment continue to take it as uninterrupted as possible to avoid illness, drug resistance and further transmission (NAC, 2014).

The Ministry of Health has further increased access to treatment by creating 68 new antiretroviral therapy (ART) sites in addition to supplying drugs to all existing ART sites nationwide in 2013 (UNAIDS, 2014). This was coupled with a UN led efforts of new targets for HIV treatment scale-up beyond 2015 of the first 90% of all people living with HIV knowing their HIV status, the second 90% of all people with diagnosed HIV infection receiving

sustained antiretroviral therapy and the third 90% of all people receiving antiretroviral therapy for viral load suppression.

Out of the 60% of the people in need of ART in Zambia, only 33% of children are receiving antiretroviral treatment, this serves as a challenge in attaining the 90-90-90 target and epidemic control. The gap was also seen in a publication that stated that by 2007, Zambia's national ARV default rate stood at 30% (Nakasanya, 2010). High attrition rate or poor retention was linked to poor viral suppression, increased morbidity and mortality. Zambia needs to step up its effort to ensure people who start treatment, continue without interruption, this is to avoid prolonged illness, drug resistance and further transmission (UNAIDS 2015).

1.1.5 Weak Programmatic Systems

Further, the rapid expansion of ART programs in settings with weak health systems is associated with high mortality and loss of patients to follow-up (Mills et al, 2006) due to poor monitoring of the HIV program. There seem to be ample evidence suggesting that inadequate retention and non-adherence to ART are associated with outcomes such as morbidity, mortality and drug resistance. Differential risks of transmission and poor retention in care, particularly related to LTFU can be devastating for patient's lives, and also facilitates the occurrence of virologic failure, which in turn could lead to an increased chance of HIV transmission (Montaner, 2010).

WHO (2011) reported that significant investment has been made to improve monitoring of cohorts of patients initiating ART, including retention rates. However, reported programme data are still incomplete and associated outcomes may be subject to biases *(*Mahy M et al, 2010*)*. Importantly, few countries are able to produce consistent data on the full national cohort of patients initiating ART. For 2010, only Malawi and Ethiopia, among high-burden countries, were able to produce estimates of ART retention at 12 months based on data from over 90% of patients started during 2009. As such, reported data may not be representative of national programmes. Thus the present study is conducted an analysis of the current proportion of retention in care which may help health care practitioners, program managers and policy makers to improve the management of HIV-infected people on cART.

1.2 Statement of the Problem

Patient retention is critical to reducing transmission of HIV, through effective adherence to ART and the linkage to HIV prevention services (UNAIDS 2015). However, challenges to retention in resource-limited settings are numerous, and although there are some common issues at all stages, various factors contribute differentially at each stage along the continuum. The problem of retention in among patients with HIV is further complicated by the fact that meaningful measurement of retention is a formidable challenge, particularly in high burden countries with generalized epidemics.

The scale of the global roll out of HIV/AIDS care means that comprehensive information to capture outcomes of the enormous numbers of patients in ART care cannot easily be achieved (WHO, 2011). The speed of the rollout, including rapid decentralization also means that many patients access care at increasingly peripheral sites – and this movement is often poorly captured with inadequate monitoring system inaccurately providing a picture of the proportion of retention in care in health facilities (WHO, 2015). This results in inaccurate inferencing of factors that are affecting retention of HIV patients. Deaths are informally and incompletely reported.

To date, unscientific assessments of 'retention' frequently being reported represent a poor proxy of proportions and factors of retention in care. Future strategies to optimize retention require investment in methods to better ascertain patient outcomes (e.g., universal identifiers, regional integration of clinic databases that accurately provide measurement of proportion in retention and, sampling based tracking studies).

Zambia has not been exempted from these challenges. The country has seen a rapid scale up of the ART programs, with no national follow-up study to determine the proportion of retention of HIV patients in ART Care among health institutions. Currently there is limited information on the proportion of retention in care among HIV patients on ART in Zambia. And even with the few health facilities that are able to compute retention, the statistical methods being used are not scientifically proven to accurately analyze retention of HIV patients in ART care thereafter conduct an analytical comparison of proportions and factors of retention among health institutions. The results of this study are expected to infer factors affecting retention of HIV patients in health facilities as these have a significant bearing on the measurement of retention.

The analysis of retention will contribute in determining the quality of care, optimal viral suppression and the improvement of life for people living with HIV/AIDS. This is because retention is a key indicator that will guide Zambia in positioning itself in identifying sustainable interventions to improve ART care.

1.3 Study Objectives

WHO (2011) reported that Retention is often lower once ART has been commenced and studies have shown significant levels of LTFU on ART particularly during the first 1–2 years, largely due to death and silent (non-documented) transfers and self-disengagement from care. However there is limited programme data on ART retention. In view of these findings, it was the aims of the study to determine proportion of retention of HIV patients and conducting an analysis factors associated with retention in selected health institutions in Zambia.

1.4 Research Questions

1.2.1 What is the proportion of retention in HIV patients in ART care in health care facilities in Zambia?

1.2.2 What are the main factors associated with retention in care of HIV patients as part of attaining the primary ART goals in the selected health care facilities in Zambia from 2013 to 2015?

1.5 The Main Objective

To determine proportion of retention among HIV patients in ART care and factors that may be associated with retention in Zambia from 2013 to 2015.

1.6 The Specific Objectives

This study intends to:

1. To determine proportion of retention among HIV Patient in ART care in selected health care facilities in Zambia
2. Compare proportions of retention in HIV Patient in care between selected periods and key variables affecting retention in health care facilities in Zambia

3. To examine factors associated with poor retention among HIV Patients in ART care in health care facilities in Zambia.

1.7 Significance of Study

The need to scale up provision of ART should correlate with the need to monitor and ensure retention in care of these patients. It is however evident that programme data are still incomplete and associated outcomes may be subject to biases with few countries being able to produce consistent data on the full national cohort of patients initiating ART and for the most recent calendar period.

There is also need for statistical evidence to evaluate performance and identify sustainable measures that will aid health institutions retain patients in care. Having information on retention will help to:

- Understand how the ART program is performing based on statistical evidence.
- Know areas in ART clinics needing additional evidence through research to enhance ART retention.
- Ascertain whether the ART program is context relevant and whether it needs adjustments in its quest to improve retention in care.

Hence this study was able to have a potential effect on understanding of interventions on patient retention and its associated factors. The study was able to contribute to information needed for policy performance in general by providing addition evidence on related dynamics associated with retention. The study was also able to further contribute to public health understanding on the measurement of retention by determining the proportion of retention on HIV patients in ART care on HIV patients in care in health facilities in Zambia through a comparative analysis.

CHAPTER TWO: LITERATURE REVEIEW

2.1 Global Perspective

WHO carried out a survey of retention issues in 22 countries in Africa, Asia, Latin America and Europe (WHO, 2011). There was a consistent high level of LTFU across all countries, particularly during the first 2 steps in the continuum of care. The duration after the last scheduled clinic appointment to define LTFU ranged from 1–6 months in this cohort. The common key retention challenges included:

- Poverty related: including taking time off work and caring for family, transport costs
- Logistics: Distance, opening hours
- Health service delivery factors: Perceived poor quality of services, health workers attitudes
- Monitoring: Poor monitoring and tracking of patients

Poor monitoring and tracking of patient has been highlighted as one of the key challenges in retention, this is reflected by Mills E J (2006) during a study that showed comparative differences in Adherence to ART. With a sample size of 7,110, the study aimed at determining the comparative effectiveness of different interventions for improving ART adherence in HIV and infected people living in Africa. The findings from this systematic review and meta-analysis showed that overall, from studies globally, 62% of adolescents and young adults were adherent to ART during the time defined by the study or through viral suppression. The study still brought out the fact that there are no other global estimates of retention of adherence in this group of adolescent and young adults reflecting the challenges in monitoring and tracking of patients. The study shows that there is a lack of markers, even surrogate markers between diagnosis and treatment in care.

Additional work is needed to address this gap; if the success or failure of this step is not measured, it may not be clear to programme planners that they need to focus specifically on improving linkages to care (WHO, 2012). Apollo, (2014) in a study to determine improvement in health status, retention and factors associated with attrition among HIV infected patients on ART found that there was need to strengthen earlier diagnosis and treatment to further improve treatment outcomes. Whilst decentralization improves ART coverage it should be coupled with strategies aimed at improving patient retention (Apollo, 2014).

2.2 Gaps in the Assessment of Retention

The rapid expansion of ART programmes in settings with weak health systems is associated with high mortality and loss of patients to follow up (Mills, 2006). Studies have shown that loss to follow-up and death rates from ART care vary across primary health care facilities and hospitals (Wondu, 2015). With a sample size of 2,356, the study was able to highlight the need for countries to strengthen the need of measuring retention by observing that higher death rate and a lower LTFU rate occur in health centers than in hospitals and this had to be measured across the country.

The study by Rasschaert (2012) with a sample size of 12,004 shows a gap in consistency in short term and long term retention measurement among institutions. The study highlights that in order to better understand the reasons of attrition and adapt the ART delivery care models accordingly, it is advisable to analyze short and long term retention, in order to adapt intervention strategies accordingly (Rasschaert 2012). And currently retention on ART beyond 12 months of initiation and pre- ART retention are not assessed (WHO, 2015).

WHO (2015) through the UNGASS highlights that there are currently two indicators that primarily measure coverage and only one that measures retention on ART at 12 months, which is "Percentage of adults and children with HIV known to be on treatment 12 months after initiation of antiretroviral therapy"(WHO, 2015). This is a gap shown by many countries as retention in care and adherence to ART are critical elements of HIV care interventions and are closely associated with optimal individual and public health outcomes and cost effectiveness (Stricker, 2013). With a sample size of 6,833, Stricker (2014) was able to show that Inadequate retention and adherence lead to decreased health outcomes (morbidity, mortality, drug resistances, risk of transmission) and cost effectiveness (increased costs and lower productivity).These studies have shown that few studies document long-term (>5 years) retention rates on ART(WHO, 2015).

Scott (2013) in a study on retention in care and outpatient costs for children receiving ART in Zambia was able to find that retention in care vary widely by site and taking advantage of such opportunities will help ensure that targets for treatment coverage can be met.

Assessment and comparison of retention by site (health facility) and eventually at a national level provides an opportunity to the use of information to support continuous quality improvement efforts in terms of programme effectiveness and efficiency as well as staff ownership and empowerment (WHO, 2015).

Challenges faced by health facilities include, frequent dependence on referral between services rather than service integration. Existing HIV clinic registries may not have monitoring indicators for HIV treatment integration and data collection is often inconsistent (WHO, 2015). WHO (2015) further highlighted that the generation of comparable data depends on consistent use of clearly defined indicators with clear definition of variables such as LTFU. Challenges to effective monitoring of retention include unwieldy paper-based registries in the face of large patient volume, crossover from one type of clinic to another without linkages between the two or more health facilities, lack of infrastructure, multiple monitoring systems and overburdened healthcare systems. One other factor that has led to non-availability of information on retention has been additional workload for already overstretched healthcare systems and limiting quality results (WHO, 2011). Proposals have been made that additional workload may be offset by utilization of randomized sampling methods (Apollo, 2011), electronic recording and monitoring systems and better communication systems (WHO, 2011). Priority areas for intervention include development of clear contextual retention definitions and establishment of a single straightforward healthcare system. These can be utilized in all settings regardless of available infrastructure, and reduction of staff workload through a simple user-friendly electronic medical record in various health facilities. Monitoring and tracking patient linkages is a key element of HIV programme evaluation and improving retention at all points along the continuum of care (Osler, 2009).

CHAPTER THREE: RESEARCH METHODS

3.1 Research design

A mixed design approach was applied using a patient survey and a nested retrospective cohort design. The method comprised of health facility survey and a nested retrospective cohort study which was conducted in order to determine proportion and factors associated with HIV patients who are retained in HIV Care. (1) A patient survey was conducted using aggregated secondary data to determine proportion among patients that retained on ART and those that missed ARV pickup in 90 days and (2) a nested retrospective cohort design was used to determine factors that affected retention among patients in ART care and the respective variables affecting retention. The data being analyzed was aggregated data made available in the electronic medical record to develop a statistical model. The test for one proportion was also done in order to test the hypothesis that an observed proportion is equal to a pre-specified proportion. The observed proportion was expressed as a percentage. This model of predictor variables could help identify individuals who may be at higher risk of dropping out of care. Identification of specific factors that contribute to retention provided insight to guide interventions to ensure fully effective service planning.

3.2 Research Design and Sample Selection

3.2.1 Study sites

The study was conducted in 16 selected health facilities from the 10 provinces of Zambia all providing ART. The facilities included 15 public and 01 private health facilities in both urban and rural areas.

3.2.2 Study Population

All HIV+ Pediatrics and Adults enrolled in the ART program in Zambia beginning 2013 - 2015. The accessible population should have attended ART Clinic during the stated period. All HIV positive patients receiving care were sampled from health institutions in the targeted ART facilities in Zambia.

3.2.3 Sample Size

A total of 61,111 HIV positive patients participated in the study. The assumption for the selection of this sample size was based on the previous study done by CIRDZ and UNZA in 2007 that estimated that the national ARV default rate was at 30% (Nsakanya, 2010).

A sample size of 2500 was required to detect a 20% reduction in proportion of HIV patients with missed pharmacy pick up for at least 90 days at an 80% power with 5% level of significance using Pearson chi-squared test.

When the sample size was increased to 4000 the power was over 90% under similar assumptions as shown in figure 0.2

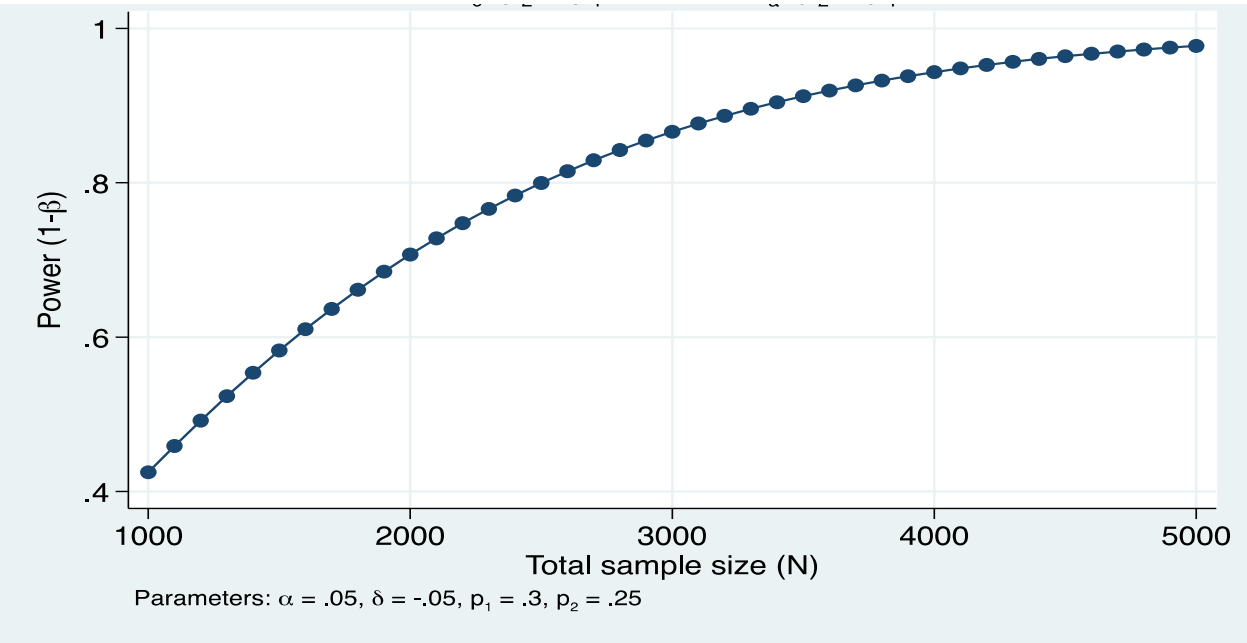

Figure 2: Sample Size: Estimated power of a two-sample proportion test

3.3 Design Part A.

Survey research design comprised of facility examination of ART patients files. The sampled design determined a population of 61,111 HIV-infected individuals who had been receiving treatment care including ARV pickup within 90 days and those that missed within the same period. Those that missed were separated from sample selection due to their inactive medical utilization status and were later separately analyzed to determine the proportion of the patient status. The population was identified from the clinic's electronic medical record system (SmartCare®). A patient was defined as inactive if they had not received treatment for more 90 days.

3.3.1 Outcome

Primary - Proportion of HIV Care who retained for ARV pickup within 90 days in the period under review.

3.3.2 Variables

The following variables was used for this design: time since start cART at study entry ('date of the last known pharmacy refill visit' minus 'date of cART initiation'), and time since HIV diagnosis at start cART ('date of cART initiation' minus 'date of HIV diagnoses). These variables defined the dependent variables which included; Retention, Lost to Follow-up, Mortality, Stopped ARV uptake and unknown ARV uptake.

Independent variables comprising social demographic variables included at enrolment in HIV care included: age, sex, and HIV-status was considered as potential predictors of attrition.

Other additional variables detailing the rationale for addition predictors for selecting these patients include: dates of HIV diagnosis, enrolment in HIV care and cART initiation.

3.3.3 Criteria

Inclusion criteria was included; (1) patients recruited were HIV positive Pediatrics and Adults, and (2) HIV patients who should have been initiated and commenced on ART during the study period. The exclusion Criteria will include; (2) Incomplete patient data not matching the health institutional aggregated HIV patient level capacity was excluded. This data included patients that passed through the facility to collect drugs without completing the electronic system registration form with key exposure variables that contain demographic variable associated with missing ARV pick-up.

3.3.4 Analysis

Historical outcome were determined using approaches that took into account person months of follow up.

a. Retention rates analysis including Adjusted Retention rate
b. Cohort Lost to Follow- up analysis
c. Cohort mortality analysis

These method examined retention of specific cohorts followed for the same length of time. They allowed for 12 and 36 month retention rates including trends comparison among health facilities which was the method that identified sites with retention issues requiring more in-depth investigation. These sites took person time on ART into account allowing for direct comparison across cohorts or sites. This is illustrated further in figure 2.0

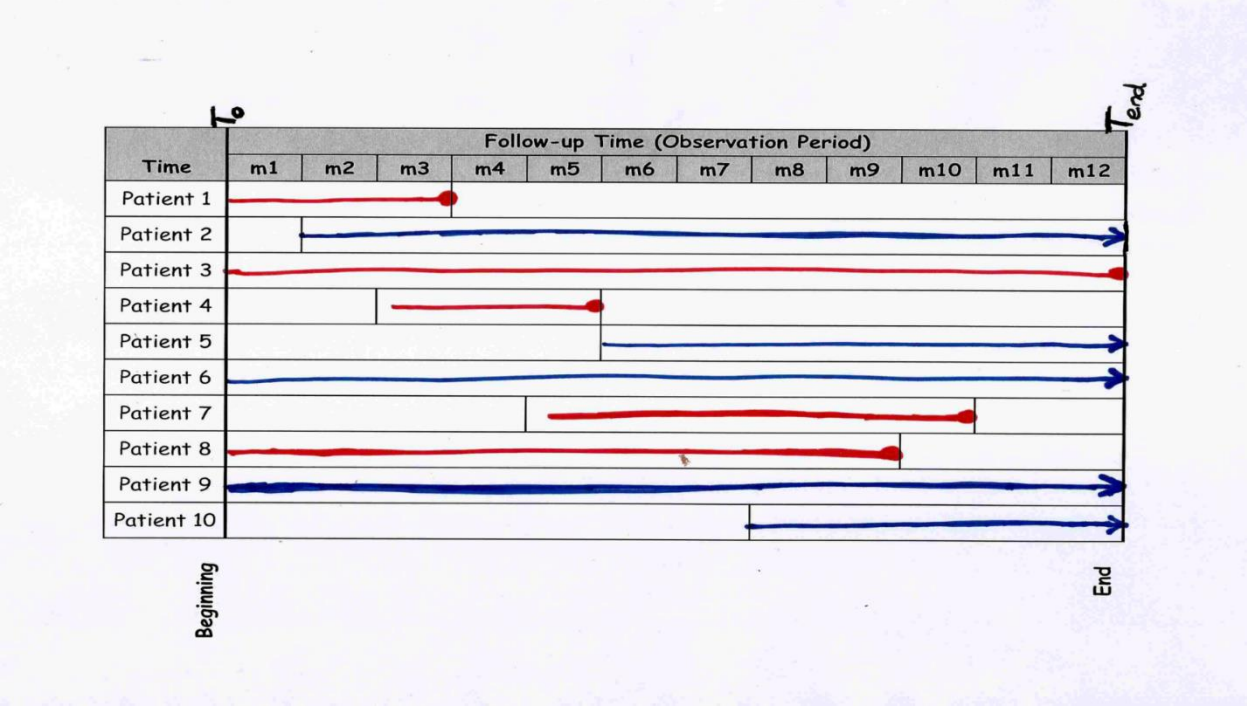

Figure 3: Patient month of follow-up

Based on this extraction, proportion in retention among HIV patients in Care in Zambia from 2013 to 2015 was then calculated. For outcome of comparison, chi-square test and p-value were used to compare retention derived from the computation between patients in the selected health institutions.

3.4 Design Part B.

3.4.1 Nested Retrospective Cohort design

The second approach used to address the research question was to conduct a retrospective cohort analysis of aggregated data using results from the survey in design part A. The nested retrospective cohort design analyzed retained patients to determine factors that were associated with poor retention from the surveyed data. The data was then analyzed using a two proportional statistical model devised to predict factors that are associated with poor retention. The design

facilitated data extraction and analysis of aggregated surveyed data of patients that consistently picked drugs and those that missed drug pick-up from health institutions for more than 90 days within the study period. The study period of focus for the analysis of data stretched between 12 months and 36 months of all patients that were active for that period.

3.4.2 Outcome

Secondary - Proportion of retention in HIV Patient in care between health care facilities (Public and Private) and associated factors affecting retention in Zambia

3.4.3 Variables

Independent variable in the analysis was associated with non-adherence to medication or regular HIV care. Demographic variables included gender, age, and location based on self-report at registration. Location was coded as being either urban or rural setting.

Dependent variables such as Retention were determined if they were affected by the independent variables when extracted from the medical record.

3.4.4 Eligibility Criteria

The inclusion criteria for this design included; (1) began HIV treatment not less than 3 months ago, (2) HIV patients who were re-activated within the reporting period and have a regular HIV care provider, (3) had switched health facilities providers one or more times in the past 2 years, (4) has gone 3 months or more without seeing an HIV provider in the past year, (5) missed or rescheduled one or more of every three HIV appointments in the last year, (6) self-reported life issues interfering with HIV medical care once or more in the past year.

3.4.5 Analysis

This study analysis was based on 3 years of data collected from patients who received primary HIV medical care from both public and private health institutions. A patient's use of primary medical care was followed from January 1, 2013 up to December 31st 2015. The outcome variable of interest was retention as measured by time in care. Anyone who did continue care up until December 31, 2015 was defined as having the event of interest; the sampled patients from the health facilities was determined to be retained during the defined period. This cohort was further refined to censor competing exposure risks which included death within a year of last appointment or moving out of the catchment area leaving patients who should stay in the

program. This step was performed because the primary interest was factors that may predict retention that could be impacted by clinicians and/or outreach interventions marking the end point as survival. Patients who remained in care up until December 31, 2015 were defined as active.

A missed appointment rate was calculated by creating a ratio between missed appointments and the date of visits as per ART forms (Initial History and Physical form, Clinical follow-up, Short Visit and Pharmacy form. Each patient visit was recorded into SmartCare by Data Entry clerks and heath facility staff. All appointments were classified by the appointment status into Next Pharmacy/or Clinical Appointment. Length of time in care may vary for individuals who were lost to follow-up; Control for this was by creating a ratio versus absolute accounting of missed appointments using the Patient Status form. A ratio of missed appointments was calculated. The missed appointment rate was analyzed for the entire cohort with a chosen point for analysis

3.5 Data Collection Method /Procedures

Data collection was based on extraction from SmartCare, an approved Electronic Health Record System implemented by the Ministry of Health. SmartCare is a C-sharp software that uses relational database software system known as Microsoft SQL built specifically for patients' medical record management. Using the extraction from SmartCare data was then computed to determine the proportion of HIV patients in care who were retained and those that missed ARV pick up in 90 days. This was tabulated and entered in an electronic form that was designed to collect data in readiness for analysis using the selected statistical package.

The extracted dataset used Crystal Report Professional 9.0, removing patient identifiers, and then converting and importing data into Stata/SE 13.0 (Stata Corp, 2013) data formats for further data analysis. Data was broken down into selected variables for further analysis.

3.6 Data management

Data management was done using Microsoft’s SQL relational database embedded in SmartCare built specifically for patients' medical record management. An analysis dataset was created using Microsoft SQL Management Studio that used Crystal Report Professional 9.0. Management studio was able to remove patient identifiers, then converting and importing data into Stata 13.0 data formats for further data management and analysis

CHAPTER FOUR: RESULTS

4.1 Results Overview

4.1.1 Health facilities Sample and details

Sample characteristics: A total of 61,111 HIV positive patients participated in the study. A total adult population of 21,512 male and 34,521 female had been initiated on ART. A total of 5,078 pediatric were ART care.

4.1.2 HIV/AIDS Patient Care Status

The study showed that retention for the period 2013-2015 (36 month) stood at 69.3% at (95% CI: 68.9, 69.6). The finding were that male adult retention stood at 66.1% (95% CI: 65.5, 66.8) while female adult retention was at 71.8 (95% CI: 71.3, 72.3) and pediatrics at 66% (95% CI: 63.7, 66.3) as presented in table 1.0. These findings were statistically significant with a p-value of $p<0.0001$. The study also showed mortality at 40/1000 p-m of fu (CI: 39.2, 41.3) while LTFu was registered at 97/1000 p-m of fu (95% CI 95.4, 98.7).

4.1.3 Results of Factors affecting Retention

The result shows that the two factors affecting retention are LTFu and mortality. Proportional mortality rate was the measure of mortality applied in analyzing deaths given the sampled population. Table 2.0 summarizes results from respective health institutions. The results shows that mortality amongst male adults was recorded at 52.1/1000p-m of fu (CI: (50, 54.1) while female adults were recorded at 32.7/1000/p-m of fu (95% CI: 31.4, 33.9). Pediatric results were recorded at 43/1000 p-m of fu (95% CI: 39.5, 47.3). Mortality among males was high compared to female adults and pediatrics. LTFu amongst male adults was recorded at 104.2./1000 p-m of fu (CI: 101.4, 107) while female adults were recorded at 91.5/1000 p-m of fu (CI: 89.4, 93.5). Pediatrics was recorded at 106/1000 p-m of fu (CI: 100.2, 112). Pediatric LTfu was recorded the highest compared to both male adults and female adults as presented in table 3.0. The most attributed reason of drop out was LTFu, and followed by mortality. These results were statistically significant with a $p<0.0001$.

4.1.4 Retention 12 Month vs 36 Month

The 12 months retention was also reviewed to compare with the 36 month retention. In table 4.0 it showed that the 12 month retention consistently showed an improved retention of 80% (CI: 80.39, 81.6).

The test for one proportion showed a significant different with the 36 month retention (2013-2015) of 69.3% with a Z statistics of 32.6 and p-value of p<0.0001. This showed a significant different between the two proportion.

Table 1: Results of Retention and Attrition

P-m of fu	Zambia (n=61,111)	95% CI	MoE	P-Value
Population	131,181			
Retention (%)	69.3	69.6 - 68.89	0.71	p<0.0001
Mortality (1000/m of fu)	40	41.3 - 39.2	2.1	
LTFu (1000/m of fu)	97	98.7 - 95.4	3.3	
Attrition	18,786			
P-m of fu	**Male (n=21,512)**	**95% CI**	**MoE**	
Population	45,456			
Retention (%)	66.1	66.8 -65.5	1.3	p<0.0001
Mortality (1000/m of fu)	52.1	54.1-50.0	4.1	
LTFu (1000/m of fu)	104.2	107-101.4	5.6	
Attrition	7,284			
P-m of fu	**Female (n=34,521)**	**95% CI**	**MoE**	
Population	75,297			
Retention (%)	71.8	72.3-71.3	1	p<0.0001
Mortality (1000/m of fu)	32.7	33.9-31.4	2.5	
LTFu (1000/m of fu)	91.5	93.5-89.4	4.1	
Attrition	9726			
P-m of fu	**Peds (n=5,078)**	**95% CI**	**MoE**	
Population	10,428			
Retention (%)	66	66.3-63.7	2.6	p<0.0001
Mortality (1000/m of fu)	43.4	47.3-39.5	7.8	
LTFu (1000/m of fu)	106	112-100.2	12	

Attrition	1,776

Table 2: Health facility outcome results

Characteristic	**Health Facilities: Southern Province**			
		Chikuni		
Gender	N=	36 months Retention %	LTFu/p-m of fu/1000	Mortality/ p-m of fu/1000
Male (Adult)	934	77.4(CI:74.7,80.1)	22.8(CI:16.5,29.1)	63.2(CI:52.9,73.5)
Female(Adult)	1582	81.9(CI:80,83.8)	26.1(CI:21,31.2)	40(CI:33.7,46.2)
Pediatric (All)	276	83.7(CI:79.3,88.1)	22.5(CI:11.2,33.7)	39(CI:24.3,53.6)
Characteristic	**Health Facilities: Copperbelt/Northern Province**			
		St.Theresa		
Gender	N=	36 months Retention %	LTFu/p-m of fu	Mortality/p-m of fu/1000
Male (Adult)	1390	56.3(CI:53.7,58.9)	122.7(CI:110.2,135.2)	78.8(CI:68.5,89.1)
Female(Adult)	2235	62.4(CI:60.4,64.4	109.9(CI:100.7,119.1)	50.9(CI:44.5,57.4)
Pediatric (All)	281	53.7(CI:47.9,59.6)	156.5(CI:126,187.1)	57.1(CI:37.6,76.6)
Characteristic	**Health Facilities: Lusaka Province**			
		Mtendere		
Gender	N=	36 months Retention %	LTFu/p-m of fu/1000	Mortality/p-m of fu/1000
Male (Adult)	1530	73.2(CI:71,75.4)	70.9(CI:62.3,79.5)	48.7(CI:41.5,56)
Female(Adult)	2515	80.4(CI:78.9,82)	54.8(CI:49,60.6)	29.3(CI:25,33.6)
Pediatric (All)	331	81(CI:76.7,85.2)	37.1(CI:23.9,50.4)	42.2(CI:28.1,56.3)
Characteristic	**Health Facilities: Eastern Province**			
		St.Francis		
Gender	N=	36 months Retention %	LTFu/p-m of fu	Mortality/p-m of fu/1000
Male (Adult)	6433	71.8(CI:70.7,72.9)	82.6(CI:78.1,87)	40.7(CI:37.5,43.9)
Female Adult)	9951	77.6(CI:76.8,78.4)	68(CI:64.8,71.2)	26.6(CI:24.5,28.6)
Pediatric (All)	1131	73.4(CI:70.8,76)	84.6(CI:73.7,95.6)	33.3(CI:26.3,40.3)
Characteristic	**Health Facilities: Western Province**			
		Mwandi		
Gender	N=	36 months Retention %	LTFu/p-m of fu/1000	Mortality/p-m of fu/1000
Male (Adult)	1251	59.6(CI:56.9,62.4)	128(CI:114.8,141.2)	70.5(CI:60.4,80.6)
Female(Adult)	1919	63.8(CI:61.6,65.9)	125.4(CI:115,135.7)	46.8(CI:40.2,53.4)
Pediatric (All)	373	62.2(CI:57.3,67.1)	130.4(CI:106.5,154.4)	46.1(CI:32.2,61)
Characteristic	**Health Facilities: Western/NorthWestern Province**			
		Yuka		
Gender	N=	36 months Retention %	LTFu/p-m of fu/1000	Mortality/p-m of fu/1000
Male (Adult)	1080	60.4(CI:57.5,63.3)	159(CI:143.5,175.3)	46.1(CI:37,55.2)

Female(Adult)	1901	64(CI:61.9,66.2)	141.7(CI:130.5,153)	38.9(CI:32.7,45.2)
Pediatric (All)	187	59.9(52.9,66.9)	156(CI:118.1,193.9)	56.7(CI:27.9,43.8)
Characteristic	**Health Facilities: Luapula/Muchinga Province**			
		Lubwe		
Gender	N=	36 months Retention %	LTFu/p-m of fu/1000	Mortality/p-m of fu/1000
Male (Adult)	789	48.2(CI:44.7,51.6)	218.5(CI:197.3,239.8)	62(CI:49.6,74.5)
Female(Adult)	1159	53.6(CI:50.7,56.5)	203.3(CI:186.3,220.2)	43.4(CI:34.8,52)
Pediatric (All)	162	46.9(CI:39.2,54.6)	249.1(198.9,299.3)	52.6(CI:26.7,78.6)
Characteristic	**Health Facilities:Central Province**			
		St. Pauls		
Gender	N=	36 months Retention %	LTFu/p-m of fu/1000	Mortality/p-m of fu/1000
Male (Adult)	377	47.5(CI:42.4,52.5)	220.7(CI:189,252.4)	79.1(CI:58.5,99.8)
Female(Adult)	542	54.6(50.4,58.8)	198.9(CI:174.2,223.6)	42(CI:29.6,54.4)
Pediatric (All)	88	58(CI:47.6,68.3)	178.7(CI:116.4,240.9)	68.7(CI:27.6,109.8)
Characteristic	**Health Facilities: Southern Province**			
		Macha		
Gender	N=	36 months Retention %	LTFu/p-m of fu/1000	Mortality/p-m of fu/1000
Male (Adult)	2268	76(CI:74.3,77.8)	74.7(CI:67.5,81.9)	31.8(CI:27,36.7)
Female (Adult)	4327	78.9(77.7,80.2)	73.9(CI:68.7,79.1)	18.8(CI:16.1,21.5)
Pediatric (All)	1061	58.7(CI:55.8,61.7)	94.1(CI:81.6,106.6)	35.8(CI:27.9,43.8)
Characteristic	**Health Facilities:Northern Province**			
		Ilondola		
Gender	N=	36 months Retention %	LTFu/p-m of fu/1000	Mortality/p-m of fu/1000
Male (Adult)	136	74.3(CI:66.9,81.6)	34.2(CI:13.4,55)	78.6(CI:47.8,109.5)
Female (Adult)	223	81.2(CI:76,86.3)	36.9(CI:20.2,53.7)	41(CI:23.4,58.6)
Pediatric (All)	28	75(CI:59,91)	18(CI:17,53)	108.1(CI:26.4,189.8)
Characteristic	**Health Facilities: Lusaka Province**			
		Coptic		
Gender	N=	36 months Retention %	LTFu/p-m of fu/1000	Mortality/p-m of fu/1000
Male (Adult)	1852	74.3(CI:66.9,81.6)	212.1(CI:198.7,225.6)	38.7(CI:32.4,45.1)
Female (Adult)	2767	60.9(CI:59.1,62.7)	171.8(CI:161.9,181.7)	20(CI:16.4,23.7)
Pediatric (All)	369	46.9(CI:41.8,52)	238.6(CI:206.4,270.9))	31.3(CI:18.1,44.5)

Characteristic	Health Facilities: Eastern Province			
		Kanyanga		
Gender	N=	36 months Retention %	LTFu/p-m of fu	Mortality/p-m of fu/1000
Male (Adult)	351	61(CI:55.9,66.1)	103.6(CI:81.3,126)	82.6(CI:62.4,102.8)
Female (Adult)	540	68.9(CI:65,72.8)	110.5(CI:92.2,128.8)	35.4(CI:24.6,46.1)
Pediatric (All)	70	65.7(CI:54.6,76.8)	108.8(CI:58.5,159.2)	68.(CI:27.3,108.7)
Characteristic	**Health Facilities: Western Province**			
		Sichili		
Gender	N=	36 months Retention %	LTFu/p-m of fu/1000	Mortality/p-m of fu/1000
Male (Adult)	534	43.4(CI:39.2,47.6)	198.9(CI:173.3,224.6)	114(CI:93.6,134.4)
Female (Adult)	959	54.1(CI:51,57.3)	180.6(162.6,198.6)	61(CI:49.8,72.2)
Pediatric (All)	150	47.3(CI:39.3,55.3)	255.8(CI:200.4,311.1)	67.1(CI:35.3,98.8)
Characteristic	**Health Facilities: NorthWestern Province**			
		Mukinge		
Gender	N=	36 months Retention %	LTFu/p-m of fu/1000	Mortality/p-m of fu/1000
Male (Adult)	945	71.4(CI:68.5,74.3)	46.5(CI:37.5,55.5)	77.8(CI:66.3,89.2)
Female (Adult)	1395	77.5(CI:75.3,79.7)	45.3(CI:38.1,52.5)	48.1(CI:40.7,55.5)
Pediatric (All)	250	73.6(CI:68.1,79.1)	53.3(CI:34.4,72.1)	64.3(CI:43.7,84.9)
Characteristic	**Health Facilities: Muchinga Province**			
		Chilonga		
Gender	N=	36 months Retention %	LTFu/p-m of fu/1000	Mortality/p-m of fu/1000
Male (Adult)	947	62.2(CI:59.1,65.3)	127.1(CI:111.8,142.4)	67.9(CI:56.4,79.5)
Female (Adult)	1458	60.5(CI:58,63)	123(CI:110.7,135.4)	49(CI:40.9,57.1)
Pediatric (All)	183	65(CI:58.1,71.9)	106(CI:74.1,137)	72.5(CI:45.7,99.4)
Characteristic	**Health Facilities:Central Province**			
		Mpunde		
Gender	N=	36 months Retention %	LTFu/p-m of fu/1000	Mortality/p-m of fu/1000
Male (Adult)	695	78(CI:74.9,81.1)	53.9(CI:42.3,65.4)	50.4(CI:39.2,61.6)
Female (Adult)	1048	82.8(CI:80.5,85.1)	45.7(CI:37.1,54.3)	32.5(CI:25.2,39.8)
Pediatric (All)	138	81.9(CI:75.5,88.3)	47.9(CI:23.4,72.3)	37.6(CI:15.8,59.4)

Table 3: Adults and Pediatrics Retention Analysis

	Retention										
	Male Adults (n=21,512)			Female Adults (n=34,521)			Peads (n=5078)			Chi-squared	p-Value
Health facilities	MA Retn	95% CI		FA Retn	95% CI		Peds Retn	95% CI			
Chikuni	77.4	80.1	74.7	81.9	83.8	80.0	83.7	83.7	83.7	2.4	p<0.1208
St.Theresa	56.3	58.9	53.7	62.4	64.4	60.4	53.7	53.7	53.7	3.4	P<0.0637
Mtendere	73.2	75.4	71.0	80.4	82.0	78.9	81.0	81.0	81.0	3.1	p<0.0803
St.Francis	71.8	72.9	70.7	77.6	78.4	76.8	73.4	73.4	73.4	22.5	P<0.0001
Mwandi	59.6	62.4	56.9	63.8	65.9	61.6	62.2	62.2	62.2	0.035	p<0.8509
Coptic	51.1	53.4	48.9	60.9	62.7	59.1	46.9	46.9	46.9	65.3	p<0.0001
Sichili	43.4	47.6	39.2	54.1	57.3	51.0	47.3	47.3	47.3	0.115	p<0.7349
Kanyanga	61.0	66.1	55.9	68.9	72.8	65.0	65.7	65.7	65.7	0.016	p<0.8992
Lubwe	48.2	51.6	44.7	53.6	56.5	50.7	46.9	46.9	46.9	0.957	p<0.3280
Mukinge	71.4	74.3	68.5	77.5	79.7	75.3	73.6	73.6	73.6	0.076	p<0.7832
Chilonga	62.2	65.3	59.1	60.5	63.0	58.0	65.0	65.0	65.0	0.983	p<0.3213
Ilondola	74.3	81.6	66.9	81.2	86.3	76.0	75.0	75.0	75.0	0.117	p<0.7325
St.Pauls	47.5	52.5	42.4	54.6	58.8	50.4	58.0	58.0	58.0	1.53	p<0.2162
Mpunde	78.0	81.1	74.9	82.8	85.1	80.5	81.9	81.9	81.9	0.183	p<0.6686
Macha	76.0	77.8	74.3	78.9	80.2	77.7	58.7	58.7	58.7	171.8	p<0.0001
Yuka	60.4	63.3	57.5	64.0	66.2	61.9	59.9	59.9	59.9	52	p<0.0001
Overall	66.1	65.5	66.8	71.8	71.3	72.3	66.0	63.7	66.7	42.8	P<0.0001

Table 4: Twelve Month Retention

Characteristic	12 Month Retention %		95% CI		z statistic	p-value
Age (Years)	N=16468					
<15	1076	77%	74.70%	79.18	6.5	p<0.0001
15+	12,209	81%	80.36%	81.62	31.97	p<0.0001

Further investigation was conducted to determine comparison results by gender in the selected health facilities. The study revealed that male retention in all health facilities was low in comparison with female retention with a statistically significant of p-value of $p<0.05$ in all selected health facilities as summarized in table 5.0. An exception was with Yuka, Chilonga and Ilondola that recorded a p-value of $p>0.05$.

The rest of the results showed that there was a statistically significant difference between male adult retention and female adult retention. The chi-squared test showed that these finding were not by chance with a statistically significant p-value of $p<0.05$ and low margin of error. These findings were important in order to determine the main factor contributing to reduced retention.

4.1.5 Adults and Pediatric Retention

The study as earlier highlighted investigated the difference between adult retention and pediatrics. The results are shown in table 3.0. The overall results showed a statistically significant different between adult retention and pediatric with a p<value of 0.0001 and a low chi-squared results. Table 3.0 recorded no statistical difference between adult and pediatric retention in some health facilities. Results of Chikuni and Mtendere Mission hospitals showed pediatrics improved retention in comparison with adult's retention proportions but with no statistical significant levels.

These findings were further presented in a chart to gain a clear understanding on what was happening.

Adjusted Retention by population group in figure 4.0 showed that male adult retention was recorded consistently lower in all health facilities. Adjusting for retention was done to take into consideration the impact of factors to retention. This was followed by mortality by population group in figure 5

Table 5: Male and Female Adult Results

	Retention									
	Male Adults (n=21,512)				Female Adults (n=34,521)				Chi-squared	P-Value
Health facilities	MA Retn	95% CI		MoE	FA Retn	95% CI		MoE		
Chikuni	77.4	80.1	74.7	2.7	81.9	83.8	80.0	1.9	7.5	p<0.0062
St.Theresa	56.3	58.9	53.7	2.6	62.4	64.4	60.4	2.0	13.3	P<0.0003
Mtendere	73.2	75.4	71.0	2.2	80.4	82.0	78.9	1.6	28.4	p<0.0001
St.Francis	71.8	72.9	70.7	1.1	77.6	78.4	76.8	0.8	70.7	p<0.0001
Mwandi	59.6	62.4	56.9	2.7	63.8	65.9	61.6	2.2	5.7	p<0.0172
Coptic	51.1	53.4	48.9	2.3	60.9	62.7	59.1	1.8	89.1	p<0.0001
Sichili	43.4	47.6	39.2	4.2	54.1	57.3	51.0	3.2	16.3	p<0.0001
Kanyanga	61.0	66.1	55.9	5.1	68.9	72.8	65.0	3.9	5.9	p<0.0152
Lubwe	48.2	51.6	44.7	3.5	53.6	56.5	50.7	2.9	5.5	p<0.0193
Mukinge	71.4	74.3	68.5	2.9	77.5	79.7	75.3	2.2	11.2	p<0.0008
Chilonga	62.2	65.3	59.1	3.1	60.5	63.0	58.0	2.5	0.7	p<0.4034
Ilondola	74.3	81.6	66.9	7.3	81.2	86.3	76.0	5.1	2.4	P<0.1226
St.Pauls	47.5	52.5	42.4	5.0	54.6	58.8	50.4	4.2	4.5	p<0.0342
Mpunde	78.0	81.1	74.9	3.1	82.8	85.1	80.5	2.3	6.2	p<0.0126
Macha	76.0	77.8	74.3	1.8	78.9	80.2	77.7	1.2	20.3	p<0.0001
Yuka	60.4	63.3	57.5	2.9	64.0	66.2	61.9	2.2	3.8	p<0.0508

These population groups were further compared in performance by mortality group per 1000 p-m of fu. The result showed statistically significant mortality among male adults. This was followed by pediatrics that recorded statistically significant mortality levels apart from Ilondola hospital. The widen gap at Ilondola might have been due to reduced sample for pediatrics, but does not affect the overall result as presented in table 5.0. Mortality by group among female consistently

presented a better outlook recording statistically improved outcome in comparison with the male and pediatric group.

In further analyzing retention, Lost to Follow-Up by population group per 1000 patient months of follow-up was further examined as presented in figure 6.0. The results showed high LTFu among pediatrics in comparison with both male and female adults. These results showed significant levels of LTFu among pediatric grouping. This was followed by male adults that recorded high LTFu in comparison with the female adult populations. As shown in figure 5.0 this was statistically significant. Cumulative enrolled on ART was recorded for 36 months against active clients on ART to review the trend among health facilities as shown in figure 7.0. A total of 30,851 active clients were recorded.

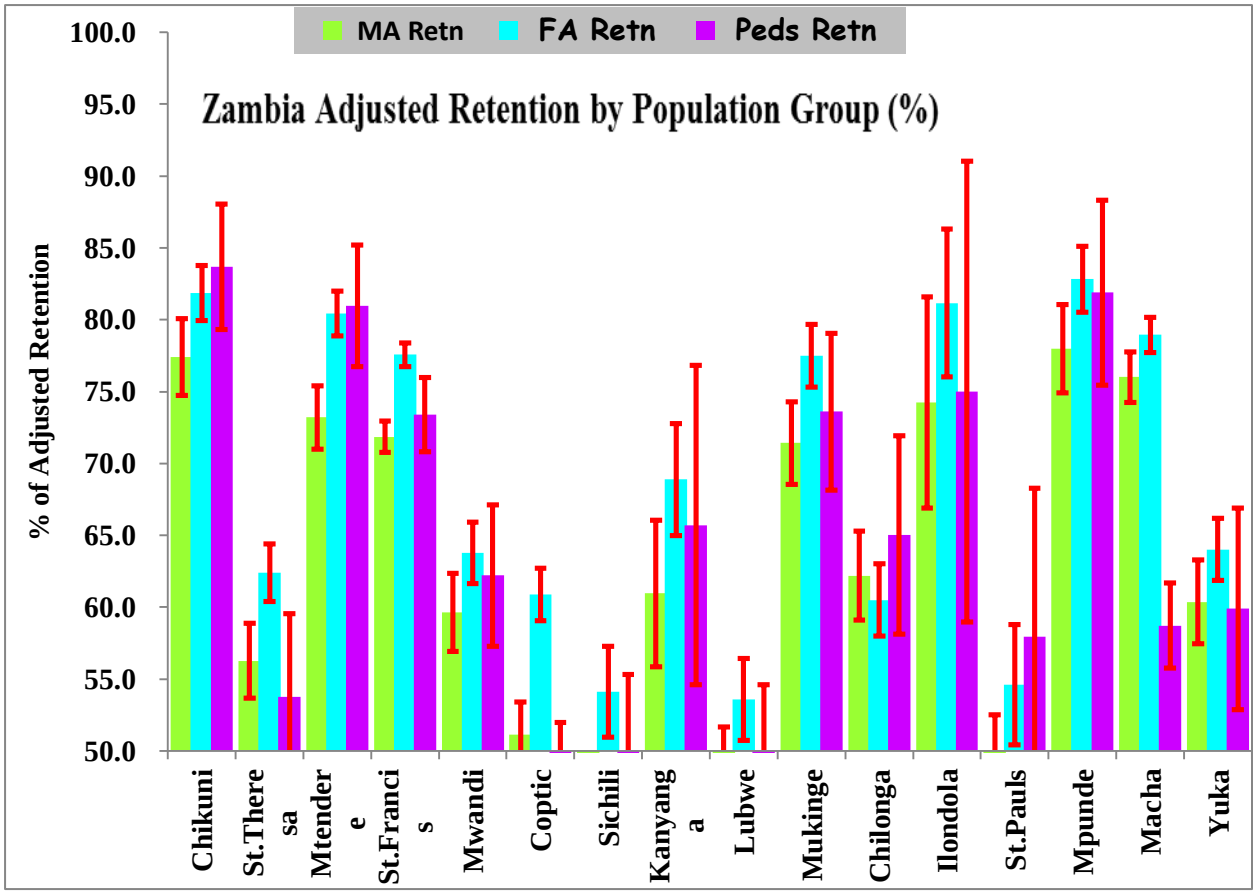

Figure 4: Adjusted Retention by Population

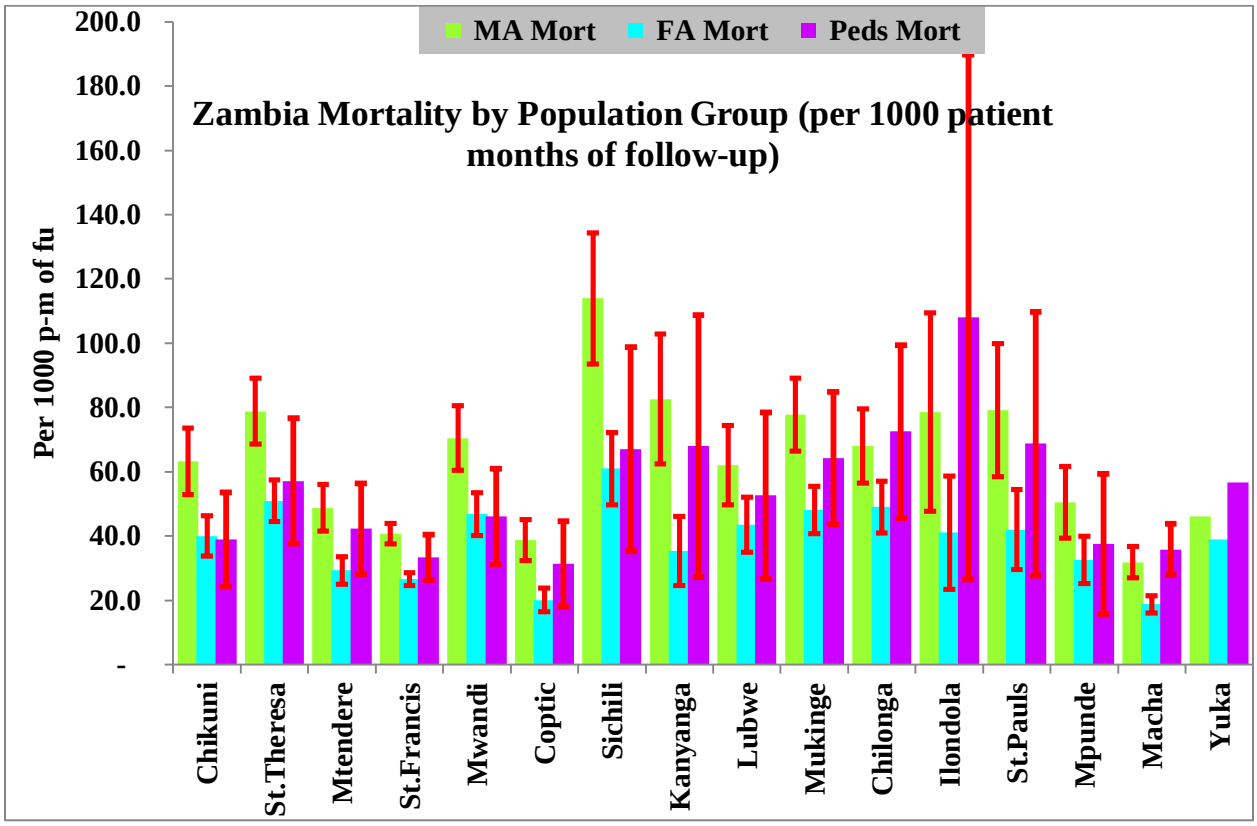

Figure 5: Mortality by Population Group

St. Francis Mission Hospital showed increased enrolment but reduced active clients retained. Across all health facilities 50% gap was seen recorded between cumulative ever enrolled clients and those retained. The 50% gap was examined for factors that lead to such a gap.

In evaluating drop outs by proportion as shown in figure 8.0., HIV clients who stopped and were unknown were not significant in comparison with LTFu which was high as recorded, followed by mortality. Clients transferred were the third highest reasons of drop out by proportion. The study showed that it was uncertain in its conclusion on whether clients transferred reached their respective destination and assumption was made that all client transferred where accounted for. Whether this has any effect to the overall attrition needs to further be investigated in future studies.

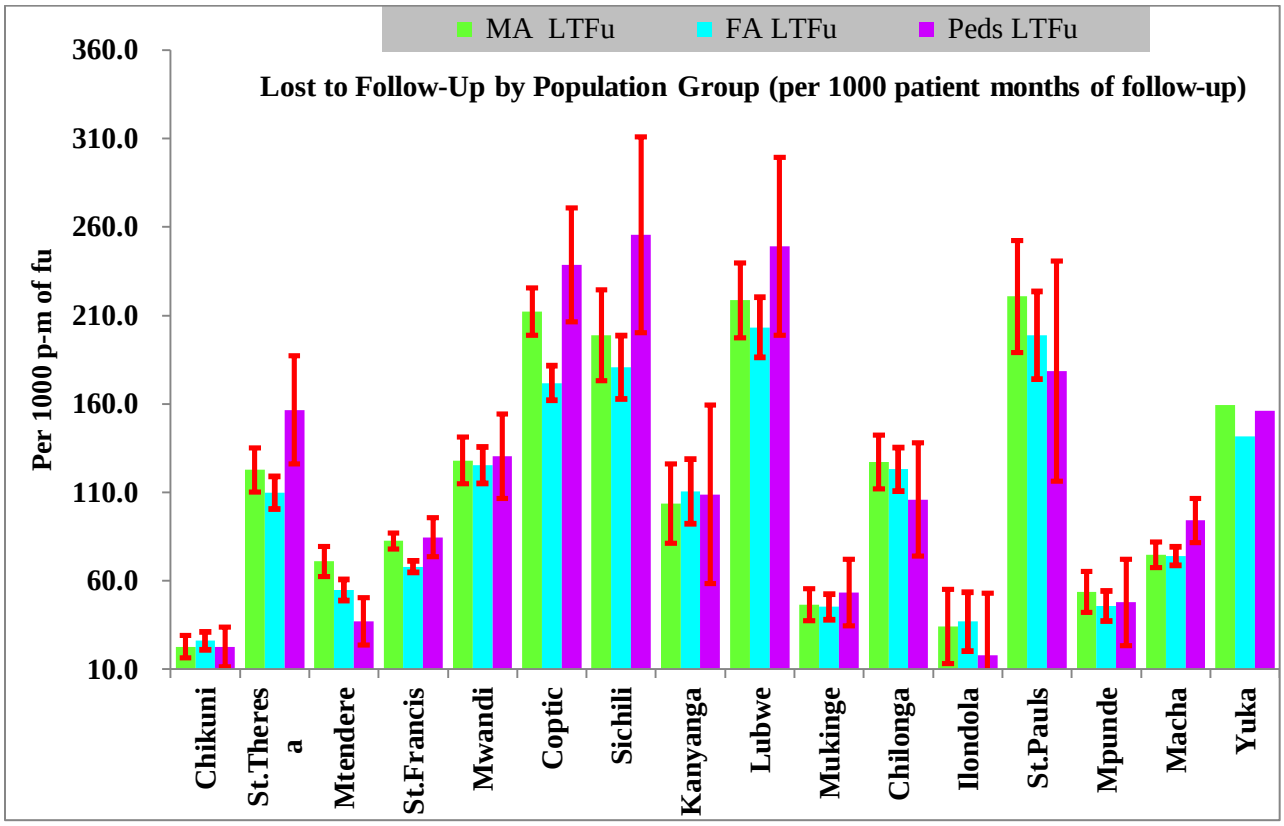

Figure 6: Lost to Follow-up by population Group

4.1.6 Factors associated with attrition

Coptic being an urban area setting, recorded the highest but being in urban might not be the factor that determined the high reason of LTfu as rural set up facilities such as Lubwe also recorded high LTFu. Figure 7.0 cumulative ever and active client in facilities such as Macha and Yuka also recorded high LTfu. In evaluating trends for adjusted retention among facilities in figure 9.0, the results show ranges of 50% to 80%. And these results were irrespective of whether facility was in an urban or rural setup. These results were statistically significant. Mortality trends showed ranges of 50 to 60 per 1000 patient months of fu with a high mortality in Sichili and low mortality at Coptic as illustrated in figure 10.0. LTFu was dynamic with facilities presenting as low as 25 per 1000 patient months of fu to as high as 212 per 1000 p-m of fu as shown in figure 11.

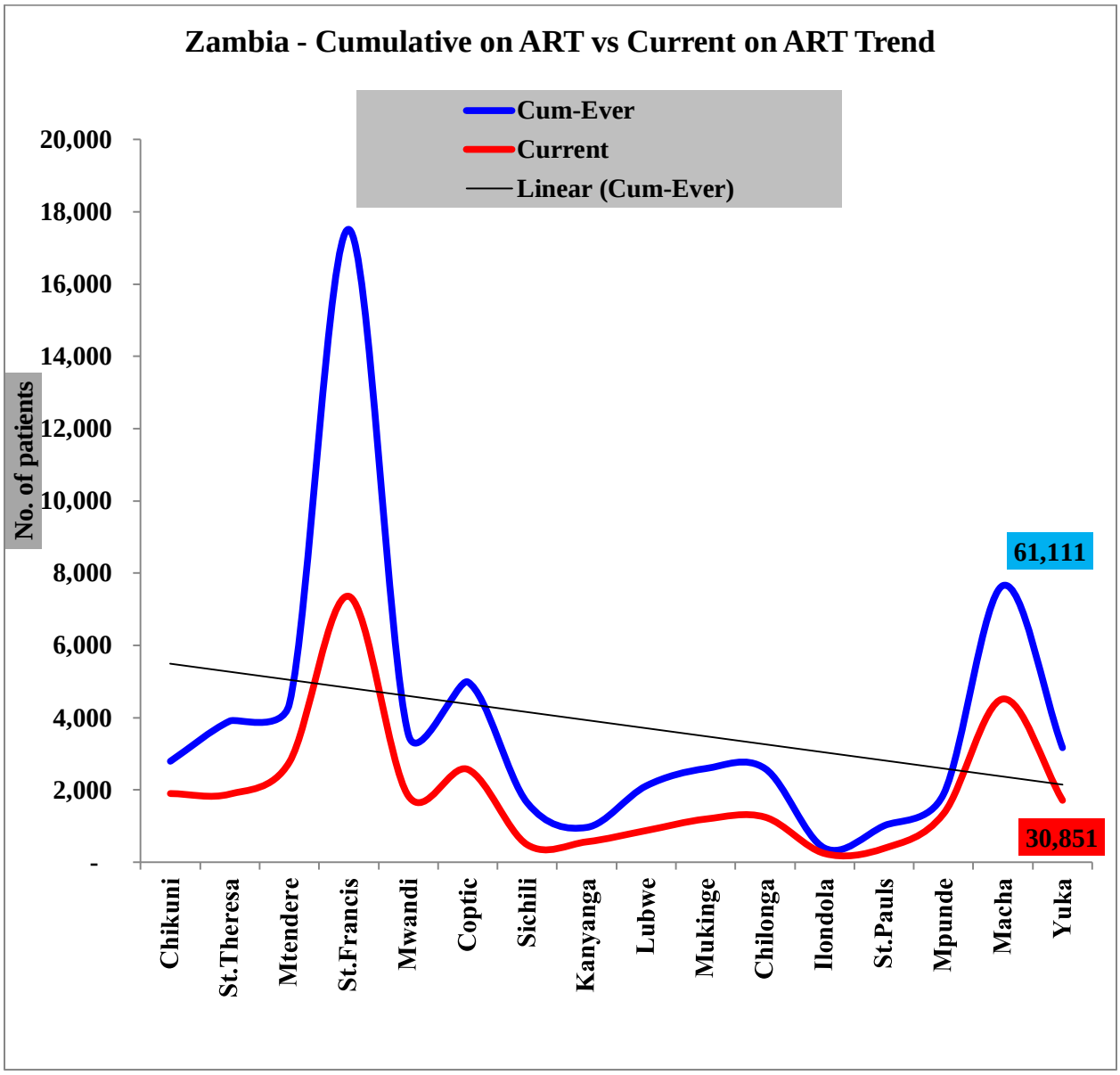

Figure 7: Cumulative on ART vs Active patients

The results showed that factors affecting retention are associated with Lost to follow up and mortality with the two factors significantly affecting male adults and pediatrics. Both male adults and pediatrics were associated with an increased risk of attrition (LTFu 104.2(101.4, 107), 106.2(100.2, 112.1) and Mortality: 52.1(50, 54.1), 43(39.5, 47.4)). Pediatrics showed high LTFu while male adults showed high mortality. This study has shown that male adults and pediatrics have emerged as key predictors of poor retention in almost all heath facilities.

Given the high likelihood that HIV+ positives children might have lost their parents who ought to provide absolute care ensuring that they are active with their drug uptake, the observed association between pediatrics and LTFu lacked primary care givers.

The likelihood that men travel for work, particularly in vast professions that might need them to be away from their place of residents, the observed association between male adults and loss to follow-up may be due to dynamic labor patterns.

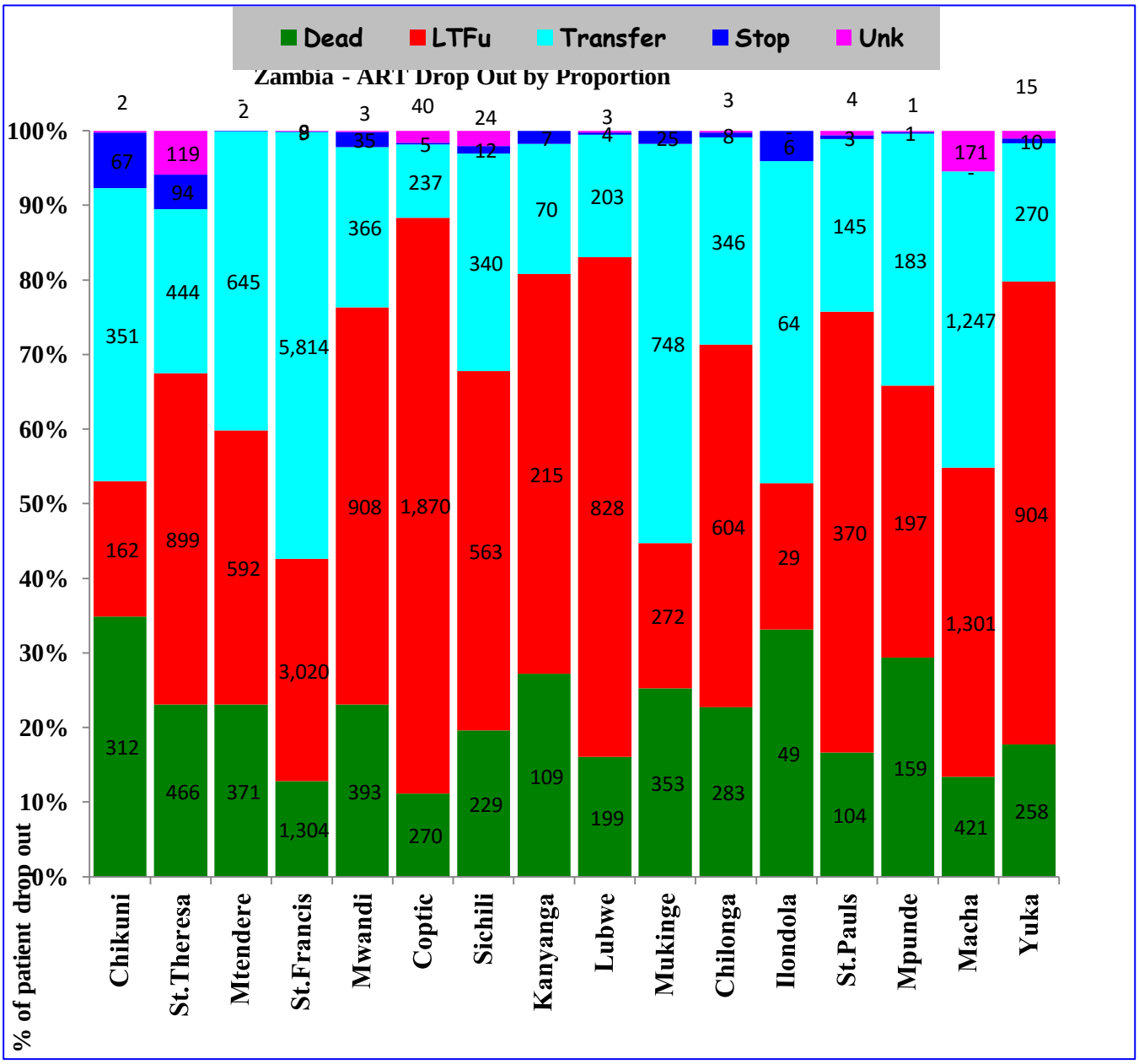

Figure 8: Drop out by population

There have been a number of studies that have presented results that determines factors associated with retention but Geng et al, (2011) stated that factors associated with retention in clinic may not always be an accurate proxy for retention. A number of these include transportation to clinic, poverty, social support, stigma and disclosure but certain models of care have been associated with greater retention. This is discussed in detail in Chapter Five.

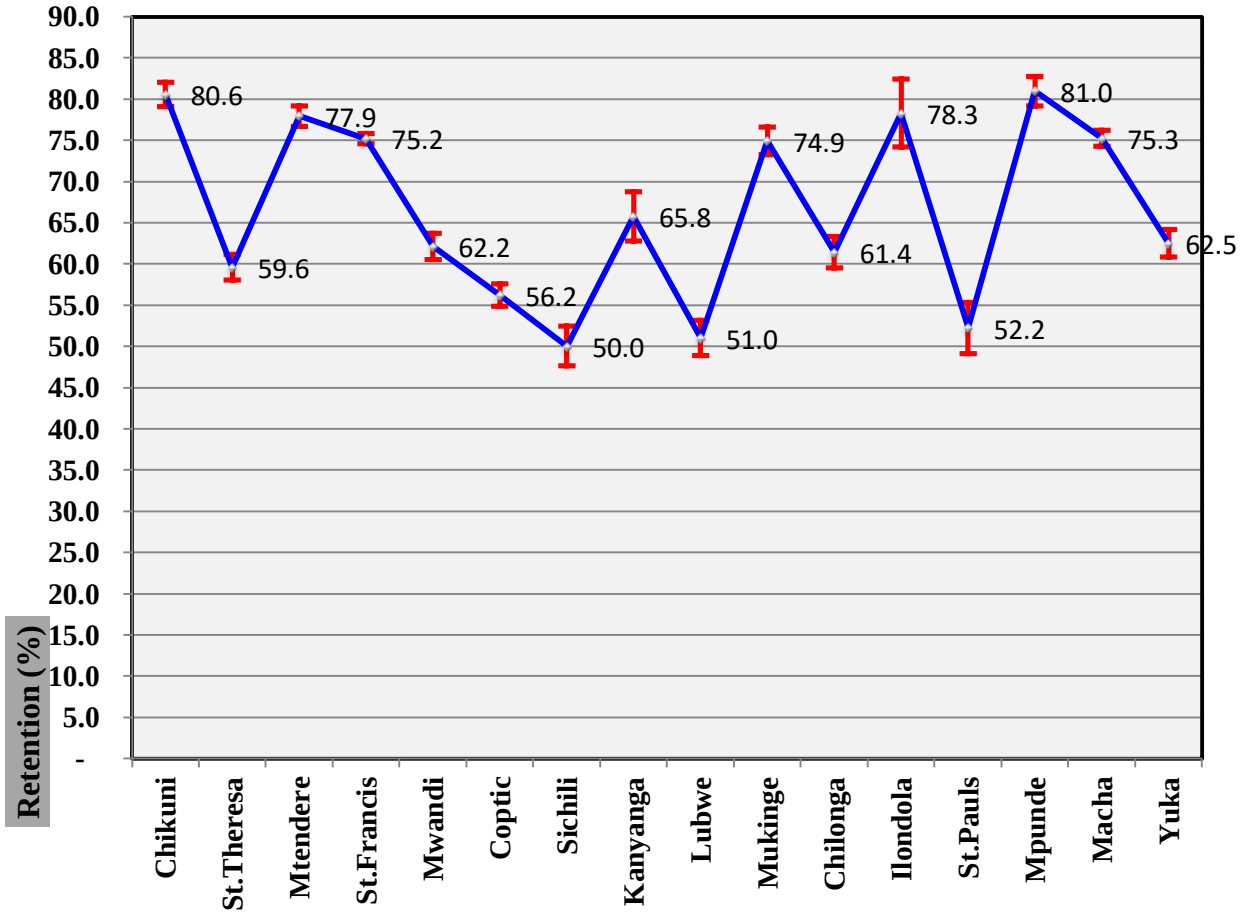

Figure 9: Adjusted Retention over-time

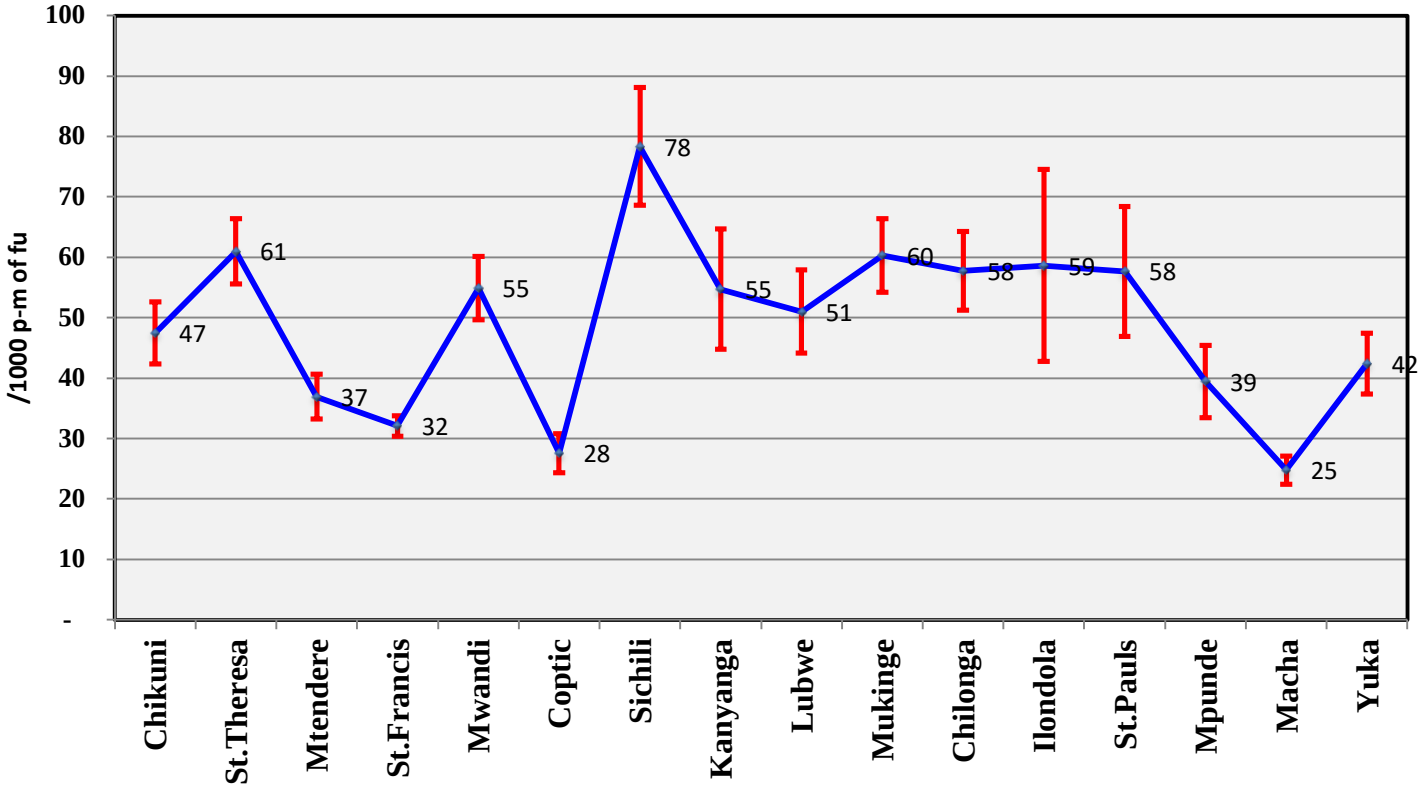

Figure 10: Mortality trends over-time

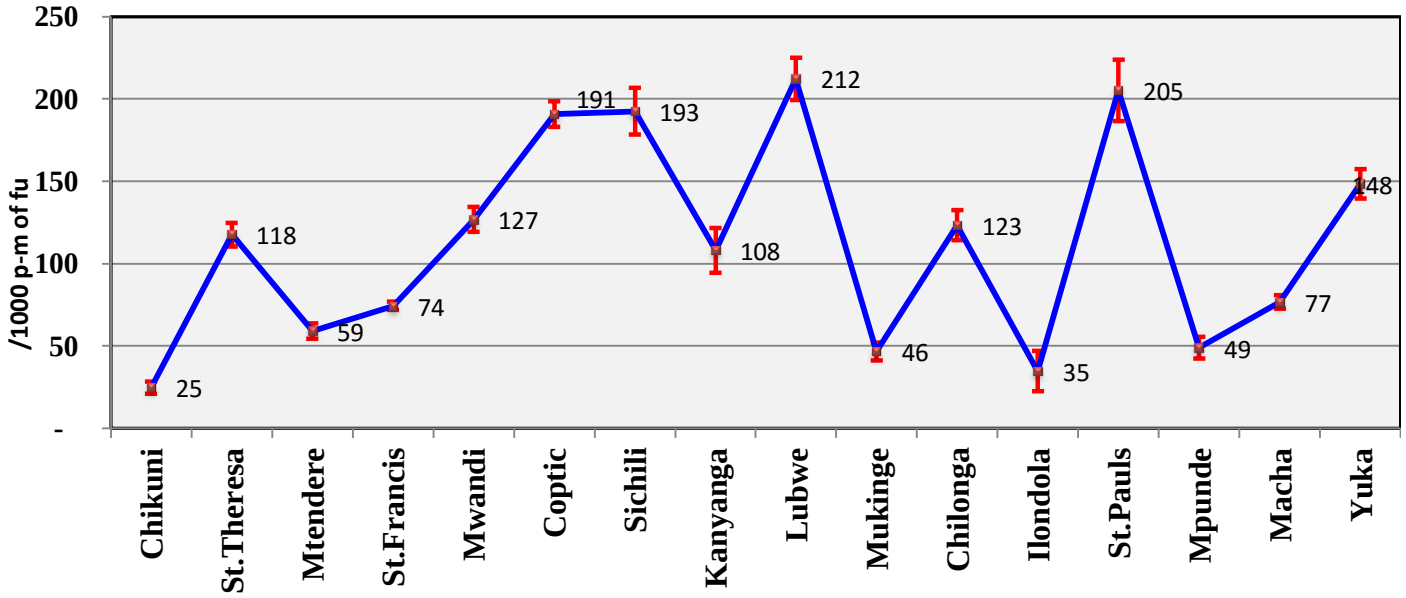

Figure 11: Lost to follow-up trends over-time

CHAPTER FIVE: DISCUSSION

5.1 Overall Review of Findings

Zambia faces similar challenges as other countries in the Sub-Saharan region with similar finding to the health care system. A study done by Tsisi Mutasa Apollo et al in 2014 found similar finding in Zimbabwe as in Sub-Saharan region. The study estimated by Fox and Rosen in a meta-analysis of published cohort data from 16 countries showed retention rates of ART patients at 6,12,24 and 36 months, were 86.1%,80.2%,70.0% and 64.6% respectively. The results in this study generalized at a national level in Zambia found similar 12 months retention at 80.4% and 36 months retention at 69.3%. Whilst these findings have similar finding to other Sub-Saharan Africa, it is hypothesized that due to Zambia being a land locked country with opened borders to other African countries, the findings would be worse.

5.2 Review of variables affecting Retention

The findings of this study quantified retention of HIV-infected patients in pediatric at 66% by using all aforementioned measurement methods. The study also quantified retention of HIV infected patients in male adults at 66.1% while female were quantified at 71.8 using aforementioned measurement method. LTFu were consistently at 90 to 106 per 1000 patient lost to follow up, this was, despite differences in the gender and age. The study showed that identifying which patients are at greatest risk for not being retained is important to target intervention efforts to those groups. In the HIV literature, demographic characteristics found through multivariate analysis to be associated with missed appointments included race (specifically, African American) younger age (Hortsman, 2010). The study shows that although these studies of clinical characteristics may seem contradictory, they actually reflect expected health care seeking behaviors. Patients may not attend their appointments because they do not feel sick, but they also may not attend because they feel sick. Which comes first and causes the other—the missed appointment or the worse health—is not clear.

Hence reviews of program strategies that have been associated with retention more than other need to be analyzed in-depth. These include strategies that directly affect demographic characteristics such as gender and age.

5.3 Factors affecting poor retention in diverse settings

When health care is decentralized and focused on delivering service at home based therapy level where direct contact with gender and age is established, chances of affecting male and pediatrics that have been associated with poor retention will reduce the risk of attrition. Such interventions have a greater effect compared with dealing with some socio-economical characteristics such as poverty and other social determinants (economical systems, physical environment, structural and societal factors). Male adults and pediatric being predicator variables affecting factors such as LTFu and Mortality in this study showed that they might not attend clinic because of conflicts with work schedules, lack of child care or transportation, family illness, and hospitalization (Norris, 1990). A study of HIV-infected women found that the three most common reasons for missing appointments were forgetting appointments, conflicting appointments, or feeling too sick to attend (Hortsman, 2010). This study showed that these characteristics associated with retention will necessarily vary between clinics but are important when prioritizing interventions for improvement. And better retention will be associated with the intervention that address direct demographic factors such as gender and age such as the introduction of the presence of peer support groups and outreach services. Massaquoi et al (2009) demonstrated that a centralized "hub" lost patients faster than a spoke site. Geng et al,2011 presented that in the rural district of Lusikisiki in South Africa, the rate of loss to follow-up among patients who started ART at decentralized sites was 8.8 fold lower than in centralized sites. These findings show that in order to cub the high LTFu and increased mortality, there is need to set up systems that will affect all genders at a community level which is at a decentralized level. Important to this fact is male and pediatric who from the results have shown difficult in attending clinics and pinking up drugs.

A study done by Apollo, (2010) showed that in other sub-Saharan African countries, retention of patients initiating ART at primary healthcare facilities in Zimbabwe was better than for those initiating ART at higher levels of care, in particular district/mission hospitals. In further analysis it was noted that there were more LFTUs in district/mission hospitals compared to primary care facilities. This study in its comparisons with health facilities showed no significant differences by health facilities compared between those in urban and rural sector in their various categorization levels. This study does not dispute the finding by Apollo, (2010) but rather encourages further studies to establish the real effect of health facilities to HIV retention with

respect to intensifying intervention that addresses gender and age in decentralized way like home based therapy.

5.4 Refocusing to what really affects retention

This study supports findings by reports by ART programmes in the sub-Saharan African that male adults were associated with relatively higher patient death or loss to follow-up (Apollo,2010).

This study has shown that more women (56.5%) proportionally than men(35%) retained on ART as reported by Southern African countries(Muula,2007). This study corresponds with the observation that male HIV patients in sub-Saharan Africa are more likely than females to have advanced HIV disease at ART initiation and to be at increased risk of LTFU and/or death (Mills, 2011). In many African settings, women have better access than men to HIV testing and treatment services through integration of routine ‘‘opt-out’’ provider-initiated testing and counselling in antenatal care settings (Staveteig, 2013). This study has shown that there is need to scale up through innovative strategies such as routine mobile facilities, home-based or work-place which may improve male participation in order to achieve earlier HIV diagnosis and retention in HIV and ART care.

Strategies aimed at improving linkage to pediatric care which should involve intensified follow-up will also help achieve retention and resultantly improve patient treatment outcomes. This study has shown the need for urgent intervention in the pediatric low retention which should be a concern by all health facilities as recorded in this study. The study shows that there is need to provide a strong link for children lacking biological mothers as primary caregivers who might have died, resulting in increased LTFu and mortality among children. The study has shown that HIV retention especially for men and pediatrics, need to be improved perhaps through the provision of services in non-traditional venues in order to achieve acceptable measures.

5.5 Limitation

Limitation to this study underestimated the true level of retention in care and conversely, retention might also have been overestimated because attrition (due to LTFU and death) was ascertained only once during the 36 month study period. Since LTFU may occur more than once

in the course of treatment for an individual patient, patient classified as “retained in-care” may have previously been LTFU. Future studies may need to prospectively ascertain patients’ status across the continuum of care for a better and more refined estimate. As much as the follow-up period in the present study is relatively acceptable, the results may not be applicable to longer follow-up periods than the 36 months study period. Finally, confounding due to unmeasured characteristics such as various age bands can’t be ruled out.

CHAPTER SIX: CONCLUSION AND RECOMMENDATION

6.1 Conclusion

The study showed that Zambia's retention in care stands at 69% with low retention in key demographic characteristic such as male adults and pediatrics that was recorded at 66%. The results from this study highlight WHO, 2011 report that optimizing retention in HIV care requires interventions at multiple levels of the health care system as well as implementation research. With LTfu at 97/1,000, the study showed that there are diverse challenges affecting HIV positive clients with no single approach likely to work for everyone in all settings. Having determined quantitatively factors affecting retention, the need to improve understanding and ways to address them becomes more attainable.

With pediatric retention at 66%, it showed that there are various barriers being experienced to guarantee access to health services. With male involvement also reported at 66%, interventions encouraging social support are seen to be approaches that will counter various constraints that act as barriers for such a key population.

The 12 month retention at 81% is relatively acceptable but there is a variance with the 36 month retention measured at 69%. In order to improve these statistics, overall findings support the implementation of several key strategies to improve retention in care. Daily clinics, provision of care in secondary level health facilities that can provide a more comprehensive range of services and home based are some of the key intervention that will address the male adult and pediatric as critical predictors affecting retention. This will become more crucial with continued scale up of ART to ensure no HIV client is left behind.

The study has shown reduced retention among male adults and pediatrics with LTFu and Death being key factors that affect these categories. The study also has shown significant behavioral response between male adults and female adults. There was also a general difference between adults and pediatrics. Overall findings support the implementation of several key strategies to improve retention in care: onsite and timely laboratory testing; flexible facility hours and daily clinics, provision of care in secondary level health facilities that can provide a more comprehensive range of services. This will become more critical with continued scale up of ART to ensure no HIV patient is left behind

6.2 Recommendation

If Zambia is to attain epidemic control, target populations have to fully realize the individual and public health benefits of ART. Health facilities must be both evidence-based and patient – centered, along each stage of the care-prevention continuum by consistently evaluating important outcomes such as retention.

Studies assessing retentions among ART patients have found that a focus on predictors such as gender and age are most likely to be effective interventions. It was the focus of this study to recommend that health facilities targeting the delivery of health care should use approaches such as home based therapy approach with a health professional-patient relationship which is more focused in curbing poor retention in health facilities. These recommendations suggest that quality improvement methods may be ideally suited for study of patient retention strategies through their focus on systems and processes of care. LTFu and mortality being key factors affecting retention should be dealt with using evidenced measures such as a focus to gender and age that are affected by diverse behavior characteristics. With the statistics that this study has been able to provide, intervention targeting an improvement to retention will then be more focused and measurable.

REFERENCES

Apollo,T.M, Shiraishi,R.W., Takarinda, K.C.,Dzangare,J.,Mugurungi,O.,Murungu,J. Abu Abdul-Quader,A.A, Woodfill,C.J.I (2014). Patient Retention, Clinical Outcomes and Attrition-Associated Factors of HIV-Infected Patients Enrolled in Zimbabwe's National Antiretroviral Therapy Programme, 2007-2010.10.1371-journal.pone.0086305. http://journals.plos.org/plosone/article?id=10.1371/journal.pone

Ministry of Health, Department of Planning (2010).Annual Health Statistical Bulletin .Lusaka

Central Statistical Office (2013-14). Zambia Demographic Health Survey Zambia. Government Printers: Lusaka.

Center for Disease Control and Prevention (CDC)(2015). Factors Increasing the Risk of Acquiring or Transmitting HIV.CDC-INFO.Antlanta,USA.

Chipimo, P. and Fylkesnes, K. (2013). Human Immunodeficiency Virus Infection and Co-Morbid Mental Distress, Lusaka. InTech: 127-132

Chipimo, P.J. (2007). Mental Distress and the Impact of HIV: Data from a Population- Based Survey, Zambia.

Geng,E.H, Glidden,D.V., Bwana,M.B., Musinguzi,N.,Emenyonu,N.Muyindike,W., Christopoulos,K.A.,Neilands,T.B.,Yiannoutsos,C.T.,Deeks,S.G.,Bangsberg,D.R. and Martin,J.N.(2011). Retention in Care and Connection to Care among HIV-Infected Patients on Antiretroviral Therapy in Africa: Estimation via a Sampling-Based Approach: 1-10

Horstmann E, Brown J, Islam F, Buck J, Bruce AD. Retaining HIV-infected patients in care· Source: PubMed.

https://www.researchgate.net/publication/41396855

Rosen, S. (2019). Patient retention in antiretroviral therapy programs upto three years on treatment in Sub-Sahara Africa. Tropical Med Int Health; suppl: l-15

Giordano, T.P (2007). Retention in Care; a challenge with HIV Infection. PMID

Bangsberg, D.R (2000). Adherence to protease, HIV-1 and development of drug resistance in an indegent population. PMID:Vol 14(4)

Mahy M. (2010). Estimation of Anti-retroviral Therapy Coverage: Methodology and trends. Current Opinion in HIV AIDS, 2010, 5:97-102.

Mills E.J., Bakanda C., Birungi J., Chan K., Hogg R.S.,(2011). Male gender predicts mortality in a large cohort of patients receiving antiretroviral therapy in Uganda. J Int AIDS Soc 14: 52.

Montaner, JS., Lima VD., Barrios R., Yip B., Wood E, Kerr T, Shannon K, Harrigan PR, Hogg RS, Daly P, Kendall P.(2010). Association of highly active antiretroviral therapy coverage, population viral load, and yearly new HIV diagnoses in British Columbia, Canada Lancet.

Mugavero,MJ,Lin,HY,Willig,J.H.,Westfall,A.O.,Ulett,K.B.,Routman,J.S.,Abroms,S.,Raper,J.L., Saag,M.S., Allison,J.J.,(2009). Missed visits and mortality among patients establishing initial outpatient HIV treatment. Clin Infect Dis.

Tassie J.M.(2011). Evaluation of Three Sampling Methods to Monitor Outcomes of Antiretroviral Treatment Programmes in Low- and Middle-Income Countries. PloS One

Mills EJ et al.(2006).Adherence to antiretroviral therapy in sub-Saharan Africa and North America: a meta-analysis. JAMA 296: 679–690.

Muula AS, Thabale JN, Siziya S, Makupe CM, Umar E, et al. (2007) Gender distribution of adult patients on highly active antiretroviral therapy in southern Africa. BMC Public Health 7: 63.

Nachega JB et al (2010) Antiretroviral therapy adherence and retention in care in middle-income and low-income countries: current status of knowledge and research priorities. Curr Opin HIV AIDS 5: 70–77.

National HIV/AIDS/STI/TB Council (2014). NASA-2012.

www.nac.org.zm/sites/default/files/publications/zambia_2012_en.pdf

Nsakanya R. (2010). Paient's Psycho-Social, Treatment and Health Service Factors Affecting ART Adherence in Choma (Zambia). Lusaka.

Rasschaert,F .Koole,O. Zachariah,R.Lynen,L. Manzi,M. and Damme,W.V (2012). Short and long term retention in antiretroviral care in health facilities in rural Malawi and Zimbabwe. BMC Health Services Research:12-444

Scott,C.S. Iyer,H.Bwalya,D.L,McCoy,K. Meyer-Rath,G. Moyo,C.,Bolton-Moore,C. Larson,B. and Rosen,S, (2013). Retention in Care and Outpatient Costs for Children Receiving Antiretroviral Therapy in Zambia: A Retrospective Cohort Analysis.

https://doi.org/10.1371/journal.pone.0067910 . Accessed 28 October 2016.

Staveteig S, Wang S, Head SK, Bradley SEK, Nybro E (2013). Demographic Patterns of HIV Testing Uptake in Sub-Saharan Africa. DHS Comparative Reports No. 30. Calverton, Maryland, USA:ICF International.p.39–47.Available:

http://www.measuredhs.com/pubs/pdf/CR30/CR30.pdf . Accessed 28 October 2016.

Stricker, S., Fox,K., Baggaley, R; Negussie, E., Pee, S., Grede, N. and Bloem, M, (2014) Retention in Care and Adherence to ART are Critical Elements of HIV Care Interventions.

UNAIDS (2013). "Working in partnership: intensifying national and international responses to AIDS in Africa, A framework for action". Draft discussion document; Geneva, Switzerland.

UNAIDS/WHO (2013). Report on the global HIV/AIDS epidemic. Fact Sheet.

www.unaids.org/sites/default/files/media.../UNAIDS_Global_Report_2013_en_1.pdf.

UNAIDS/WHO (2014). Report on the global HIV/AIDS epidemic. Press Release.

www.unaids.org/en/.../pressreleaseandstatementarchive/2014/july/20140716prgaprep.

UNAIDS/WHO (2015). Report on the global HIV/AIDS epidemic. Press Release. Geneva, Switzerland.

http://www.unaids.org/en/resources/presscentre/pressreleaseandstatementarchive/2015/july/20150714_PR_MDG6report . Accessed on 19 August, 2016.

UNDP (2013). Africa MDG Report 2013 Summary.

http://www.undp.org/content/dam/uganda/docs/Africa%20MDG%20report%202013%20summary_EN.pdf.

Teshome,W.,Belayneh,M.,Moges,M. Mekonnen,E. Endrias,M. Ayele,S .Misganaw,T. Shiferaw,M and Tesema,T.,(2015). Do loss to follow-up and death rates from ART care vary across primary health care facilities and hospitals in south Ethiopia? A retrospective follow-up study

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4455856/

World Health Organization (2012).Retention in HIV Programmes meeting report 13-15.

whqlibdoc.who.int/publications/2012/9789241503686_eng.pdf Accessed on 19 August, 2016.

World Health Organization (2015). Fact Sheet Media Centre, HIV/AIDS. http://www.who.int/mediacentre/factsheets/fs360/en/ .Accessed on 20thAugust, 2016.

World Health Organization (2013). Today's evidence, tomorrow's agenda.

www.who.int/gender/women_health_report/full_report_20091104_en.pdf . Accessed on 19 August, 2016.

WHO, UNICEF, UNFPA and World Bank. (2010). Trends in Maternal Mortality Estimates. Accessed on 20 August, 2016. www.who.int/reproductivehealth/publications/monitoring/9789241503631/en/.

APPENDICES

Appendix 1: Male Adult Ever on ART Results

CODE HMIS	Health Facilities	Districts	Province	Country	MA BEG	MA Start	MA Cum-Ev	MA Current
102	Chikuni	Monze	Southern	Zambia	711	223	934	624
103	St.Theresa	Masaiti	Copperbelt	Zambia	978	412	1390	623
104	Mtendere	Chirundu	Lusaka	Zambia	1164	366	1530	906
105	St.Francis	Katete	Eastern	Zambia	5153	1280	6433	2600
106	Mwandi	Mwandi	Westeren	Zambia	900	351	1251	618
107	Coptic	Lusaka	Lusaka	Zambia	1410	442	1852	866
108	Sichili	Sesheke	Western	Zambia	388	146	534	140
109	Kanyanga	Lundazi	Eastern	Zambia	262	89	351	195
110	Lubwe	Samfya	Luapula	Zambia	587	202	789	310
111	Mukinge	Kasempa	Northwestern	Zambia	731	214	945	411
112	Chilonga	Mpika	Muchinga	Zambia	628	319	947	427
113	Ilondola	Chinsali	Northern	Zambia	94	42	136	81
114	St.Pauls	Kapiri	Central	Zambia	259	118	377	140
115	Mpunde	Kapiri	Central	Zambia	436	259	695	485
116	Macha	Choma	Southern	Zambia	1668	600	2268	1338
117	Yuka	Kalabo	Western	Zambia	707	373	1080	566
117	Zambia	Kalabo	Western	Zambia	16076	5436	21512	10330

Appendix 2: Male Adult Drop-out Results

CODE HMIS	Health Facilities	Districts	Province	Country	MA DO	MA Stop	MA TO	MA Dead
102	Chikuni	Monze	Southern	Zambia	310	26	99	136
103	St.Theresa	Masaiti	Copperbelt	Zambia	767	34	159	208
104	Mtendere	Chirundu	Lusaka	Zambia	624	0	214	167
105	St.Francis	Katete	Eastern	Zambia	3833	3	2022	597
106	Mwandi	Mwandi	Westeren	Zambia	633	14	128	174
107	Coptic	Lusaka	Lusaka	Zambia	986	2	81	137
108	Sichili	Sesheke	Western	Zambia	394	3	92	106
109	Kanyanga	Lundazi	Eastern	Zambia	156	4	19	59
110	Lubwe	Samfya	Luapula	Zambia	479	1	70	90
111	Mukinge	Kasempa	Northwestern	Zambia	534	8	264	164
112	Chilonga	Mpika	Muchinga	Zambia	520	1	162	124
113	Ilondola	Chinsali	Northern	Zambia	55	2	20	23
114	St.Pauls	Kapiri	Central	Zambia	237	0	39	52
115	Mpunde	Kapiri	Central	Zambia	210	0	57	74
116	Macha	Choma	Southern	Zambia	930	0	386	162
117	Yuka	Kalabo	Western	Zambia	514	4	86	94
117	Zambia	Kalabo	Western	Zambia	11182	102	3898	2367

Appendix 3: Female Adult Ever on ART Results

CODE HMIS	Health Facilities	Districts	Province	Country	FA BEG	FA Start	FA Cum-Ev	FA Current
102	Chikuni	Monze	Southern	Zambia	1207	375	1582	1078
103	St.Theresa	Masaiti	Copperbelt	Zambia	1578	657	2235	1150
104	Mtendere	Chirundu	Lusaka	Zambia	1870	645	2515	1644
105	St.Francis	Katete	Eastern	Zambia	7946	2005	9951	4295
106	Mwandi	Mwandi	Westeren	Zambia	1397	522	1919	1024
107	Coptic	Lusaka	Lusaka	Zambia	2040	727	2767	1544
108	Sichili	Sesheke	Western	Zambia	651	308	959	299
109	Kanyanga	Lundazi	Eastern	Zambia	382	158	540	325
110	Lubwe	Samfya	Luapula	Zambia	822	337	1159	502
111	Mukinge	Kasempa	Northwestern	Zambia	1054	341	1395	680
112	Chilonga	Mpika	Muchinga	Zambia	928	530	1458	737
113	Ilondola	Chinsali	Northern	Zambia	144	79	223	143
114	St.Pauls	Kapiri	Central	Zambia	371	171	542	202
115	Mpunde	Kapiri	Central	Zambia	648	400	1048	754
116	Macha	Choma	Southern	Zambia	3117	1210	4327	2684
117	Yuka	Kalabo	Western	Zambia	1248	653	1901	1053
117	Zambia	Kalabo	Western	Zambia	25403	9118	34521	18114

Appendix 4: Female Adult Drop-out Results

CODE HMIS	Health Facilities	Districts	Province	Country	FA DO	FA Stop	FA TO	FA Dead
102	Chikuni	Monze	Southern	Zambia	504	38	217	150
103	St.Theresa	Masaiti	Copperbelt	Zambia	1085	56	245	227
104	Mtendere	Chirundu	Lusaka	Zambia	871	1	379	171
105	St.Francis	Katete	Eastern	Zambia	5656	5	3425	624
106	Mwandi	Mwandi	Westeren	Zambia	895	17	200	184
107	Coptic	Lusaka	Lusaka	Zambia	1223	2	141	112
108	Sichili	Sesheke	Western	Zambia	660	8	220	107
109	Kanyanga	Lundazi	Eastern	Zambia	215	3	47	40
110	Lubwe	Samfya	Luapula	Zambia	657	3	119	94
111	Mukinge	Kasempa	Northwestern	Zambia	715	15	401	154
112	Chilonga	Mpika	Muchinga	Zambia	721	7	145	133
113	Ilondola	Chinsali	Northern	Zambia	80	4	38	20
114	St.Pauls	Kapiri	Central	Zambia	340	2	94	42
115	Mpunde	Kapiri	Central	Zambia	294	1	114	74
116	Macha	Choma	Southern	Zambia	1643	0	732	184
117	Yuka	Kalabo	Western	Zambia	848	6	164	144
117	Zambia	Kalabo	Western	Zambia	16407	168	6681	2460

Appendix 5: Pediatric Ever On ART Results

CODE HMIS	Health Facilities	Districts	Province	Country	Peds BEG	Peds Start	Peds Cum-Ev	Peds Current
102	Chikuni	Monze	Southern	Zambia	214	62	276	196
103	St.Theresa	Masaiti	Copperbelt	Zambia	211	70	281	111
104	Mtendere	Chirundu	Lusaka	Zambia	253	78	331	216
105	St.Francis	Katete	Eastern	Zambia	831	300	1131	463
106	Mwandi	Mwandi	Westeren	Zambia	274	99	373	194
107	Coptic	Lusaka	Lusaka	Zambia	274	95	369	158
108	Sichili	Sesheke	Western	Zambia	88	62	150	43
109	Kanyanga	Lundazi	Eastern	Zambia	52	18	70	42
110	Lubwe	Samfya	Luapula	Zambia	114	48	162	62
111	Mukinge	Kasempa	Northwestern	Zambia	179	71	250	101
112	Chilonga	Mpika	Muchinga	Zambia	120	63	183	80
113	Ilondola	Chinsali	Northern	Zambia	16	12	28	15
114	St.Pauls	Kapiri	Central	Zambia	46	42	88	39
115	Mpunde	Kapiri	Central	Zambia	82	56	138	101
116	Macha	Choma	Southern	Zambia	773	288	1061	494
117	Yuka	Kalabo	Western	Zambia	123	64	187	92
117	Zambia	Kalabo	Western	Zambia	3650	1428	5078	2407

Appendix 6: Pediatric Drop-out Results

CODE HMIS	Health Facilities	Districts	Province	Country	Ped DO	Peds Stop	Peds TO	Peds Dead
102	Chikuni	Monze	Southern	Zambia	80	3	35	26
103	St.Theresa	Masaiti	Copperbelt	Zambia	170	4	40	31
104	Mtendere	Chirundu	Lusaka	Zambia	115	1	52	33
105	St.Francis	Katete	Eastern	Zambia	667	1	367	83
106	Mwandi	Mwandi	Westeren	Zambia	179	4	38	35
107	Coptic	Lusaka	Lusaka	Zambia	211	1	15	21
108	Sichili	Sesheke	Western	Zambia	107	1	28	16
109	Kanyanga	Lundazi	Eastern	Zambia	28	0	4	10
110	Lubwe	Samfya	Luapula	Zambia	100	0	14	15
111	Mukinge	Kasempa	Northwestern	Zambia	149	2	83	35
112	Chilonga	Mpika	Muchinga	Zambia	103	0	39	26
113	Ilondola	Chinsali	Northern	Zambia	13	0	6	6
114	St.Pauls	Kapiri	Central	Zambia	49	1	12	10
115	Mpunde	Kapiri	Central	Zambia	37	0	12	11
116	Macha	Choma	Southern	Zambia	567	0	129	75
117	Yuka	Kalabo	Western	Zambia	95	0	20	20
117	Zambia	Kalabo	Western	Zambia	2670	18	894	453