FACTORS INFLUENCING VIRAL LOAD SUPPRESSION AMONG ADOLESCENTS ON ANTIRETROVIRAL THERAPY. A CASE STUDY OF JINJA REGIONAL REFERRAL HOSPITAL, UGANDA

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DECLARATION

Student's Declaration:

I _____, hereby declare that the work entitled **factors influencing Viral Load Suppression among adolescents on Antiretroviral Therapy in Jinja Regional Referral Hospital, Uganda**is my original work. I have not copied from any other students' work or from any other sources except where due reference or acknowledgement is made explicitly in the text, nor has any part been written for me by another person.

_____   _____

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APPROVAL

Supervisor's approval:

This dissertation has been submitted to the International Health Sciences University for review with my approval as the student's Supervisor.

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DEDICATION

This work is dedicated to my beloved husband Dr. Atuhurra and my brother Dr. Tumwesigye who offered in valuable advice and support. I also would like to dedicate it to the Dr. Hillary Alima and Francis Ocen, staff of the Strengthening Uganda's Systems for Treating AIDS Nationally (SUSTAIN) for encouraging me to persue the topic and enlightened me on the state of developments in the area of Viral load testing in Uganda.

May God reward you abundantly!

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OPERATIONAL DEFINITIONS

In this study the following terms were defined as follows;

Adolescent: the term adolescent *means* a person aged 10-19 years. There are two groups of adolescents living with HIV, those infected perinatally and those who acquire HIV during adolescence. Often, the adolescents have different and overlapping needs and challenges such as transitioning of HIV care, and specific psychosocial needs (MOH, 2011).

Anti-Retro Viral therapy: simply refers to treatment of people infected with HIV using anti-HIV drugs. The standard treatment consists of a combination of at least three drugs (often called "highly active antiretroviral therapy" or HAART) that suppress HIV replication (WHO, 2013).

Viral Load: In our study, viral load was the term used to describe the amount of HIV circulating in the body. It is measured in terms of the number of copies of HIV per milliliter of blood, or copies/ml. Sexual transmission is thought to be extremely uncommon when blood viral load is below 1000 copies/ml (Attiaa et al., 2009).

Viral Suppression: refers to the aim of ART to maintain viral load below the level of detection of available assays. For purposes of this study, viral load suppression was used to describe an adolescent who was found with a viral load below 1000 copies.

ABBREVIATIONS AND ACRONYMS

AIDS	Acquired Immuno Deficiency Syndrome
ART	Antiretroviral Therapy
CD4	Cluster of Differentiation 4
CPHL	Central Public Health Laboratories
DBS	Dry Blood Spot
HC	Health Centre
HIV	Human Immuno Deficiency Virus
MoH	Ministry of Health
PLHA	People Living with HIV/AIDS
PNFP	Private Not for Profit
RRH	Regional Referral Hospital
UNAIDS	United Nations Program on HIV/AIDS
VL	Viral Load
WHO	World Health Organization

ABSTRACT

Introduction

Jinja RRH is one of the public health care facilities offering free HIV care and treatment services in Jinja district. In 2015, the hospital started monitoring adolescent outcomes using viral load tests an effort to meet the third 90 of the UNAIDS 90-90-90 strategy.

Objective of the study

The main objective of the study was to assess the factors influencing viral load suppression among adolescents on ART in Jinja Regional Referral Hospital

Methodology

A cross sectional study design was used. A total of 238 adolescents on ART who had at least one viral load result recorded in their files at Jinja RRH participated from August to September 2016. Quantitative methods of data collection using a researcher administered questionnaires and Qualitative methods using key informant guide were utilized.

Results

The independent variables including knowing HIV status categories, getting support from family members, CD4 initiation, counseling evidence and WHO staging were a predictor of viral load suppression among adolescents aged 10-19 years at Jinja RRH.

Conclusion

The proportion of adolescents achieving viral load suppression at Jinja RRH is lower (59%) than the national level 75%. VL suppression among adolescents aged 10-19 years at Jinja RRH ART clinic is predicted by family knowledge of adolescent's HIV status, getting support from family members, CD4 initiation, counseling evidence and WHO staging.

Recommendations

Jinja Regional hospital should ensure that counselors work with adolescent and their close family members to ensure successful positive sero status disclosure. The hospital also needs to improve services to be adolescent friendly through age specific triaging and provision of privacy.

The MOH and government should ensure Policy guidelines on pre-regimen counseling and adolescent friendly service design are revised and enforced. In addition, viral load testing should be made accessible to all adolescents through an effective referral system.

CHAPTER ONE: INTRODUCTION

1.1 Introduction

This chapter introduces the study area citing key findings and gaps from available information. It is comprised of the background to the study, statement of the problem, objectives, research questions, significance and the conceptual framework. This assisted the researcher to acquire accurate information on factors influencing Viral Load Suppression among adolescents on Antiretroviral Therapy in Jinja Regional Referral Hospital, Uganda.

1.2. Background to the Study Area

Global estimates of people living with HIV at the end of 2015 had reached 33.3 million worldwide; of these, 17 million people were enrolled on ART(WHO, 2016). The figures represent an increase from 12.9 million people that received ART by end of 2013(UNAIDS, 2014).ART drugs are likely to prevent HIV transmission/acquisition, including through pre-exposure prophylaxis and post-exposure prophylaxis that achieves viral suppression. Therefore, increasing access to ART has proven to reduce AIDS-related mortality rates, even in countries where HIV prevalence is high(WHO, 2012).

Considering the HIV infection in different age groups, the adolescents who were living with HIV AIDS had reached 2.1 million in 2015 according to the(UNAIDS, 2015); two thirds of these infections were among adolescent girls.(Idele et al., 2014), further adds that, AIDS-related deaths are not decreasing among the adolescent age group i.e.a 50% (71,000 in 2005 - 110,000 in 2012) increase in AIDS-related deaths was recorded among adolescents contrary to a 32% decrease in other age groups. Given this increasing trend, AIDS was ranked the second most common cause of death among adolescents globally (UNAIDS, 2014). However, AIDS related deaths can only

reduce if there is at least 65% reduction in AIDS-related deaths among adolescents worldwide (UNAIDS, 2015)**.**

Results on viral suppression among adolescents also suggest that ART outcomes for adolescents both from high income and low- incomes settings tend to be worse than for adults(WHO, 2014). Similarly, several studies conducted in Europe and South America comparing viral suppression between adolescents and adults have shown low levels of VL suppression among adolescents than the adult population.

In Africa, where the burden of HIV epidemic is heavily felt, over 7.5 million people received ARTby the end of 2012,an increase from 50 000 people recorded over a decade earlier. At the same time, about 12.3 million people were eligible for ART in 2012 (WHO, 2013). In fact, two out of three global regions found with the majority number of new HIV infections (2000–2013) among adolescents aged 15–19 were located in Africa (i.e. Eastern and Southern Africa with 150,000; western and central Africa with 50,000 new infections).

Unlike the global picture, AIDS in Africa is the number one cause of death among adolescents. According to data from Western Africa, disclosure of HIV status continues to affect ART outcomes for adolescents alongside several factors including the managing transition process from childhood to adulthood, access to appropriate adherence counseling and support among others.

Going by the incidence and prevalence of HIV infection, Sub Saharan Africa is the most hit region by the HIV pandemic in the world. In 2013, the region was home to 83%of adolescents living with HIV globally. This is because almost half of all HIV positive adolescents in the world were in six countries (Ethiopia,India, Kenya, Nigeria, Tanzania and South Africa). The AIDS-

related deaths in this region though declining were still high with 790 000 deaths recorded among all age groups (UNAIDS, 2015).

By gender, the greatest burden of HIV is manifested among adolescent girls and young women, with HIV incidence and prevalence among this category twice as more as recorded in young men (WHO, 2016).

Studies conducted in select countries in Sub Saharan Africa such as in Rwanda indicate that 86% of the people receiving ART virally suppressed 18 months from initiation on ART; in Senegal, about 80% of PLHAs on ART were achieving viral suppression after five years. Similar findings were recorded in South Africa where significant decline in community viral load was noted when ART was scaled up (WHO, 2013). However, adolescent specific information on viral load suppression remains scanty in the African region.

In Uganda, while various initiatives have been put in place to increase screening for HIV among the population such mandatory HIV testing for pregnant mothers, only 1.5 million HIV positive individuals were identified by the end of 2014 (Uganda HIV &AIDS country progress report). Of these, 750,896 (50% coverage) were active on ART by Dec 2014.

By ranking, Uganda was among the top 20 high burden countries contributing 5% (3000 of 60,000) of AIDS related deaths among children 10-19 years recorded globally (UNICEF, 2014).

According to Idele, HIV prevalence in Uganda is highest(almost double) in adolescent girls aged 15–19 years (3.0%) than in boys of the same age (1.7%). Overall, the number of adolescents living with HIV was 110,000 (49,000 boys, 65,000 girls) in 2013 and this continues to increase. Like in Sub Saharan and African regions, the Uganda national ART guidelines released in 2014 reported the adolescent patient population being the only category where HIV related deaths are

increasing. The increase was attributed to poor prioritization of adolescents in national HIV plans, limited access to HIV testing and treatment services and lack of systems to support adolescents to continue ART (MOH, 2014).

There is limited specific information about viral load suppression among adolescents in Uganda, a gap this study is trying to address with focus on adolescents receiving ART in Jinja district. Jinja district located in east central Uganda and is home to 244,548 (nearly half of the districts population) children below 18 years(UBOS, 2016). The HIV prevalence in the region is 4.1% compared to 7.3% at national level according to the Uganda HIV& AIDS country progress report, 2014.

Jinja district consists of 67 healthcare facilities both owned by the government and private not for profit organizations (PNFP). Among the government owned, there are 34 HC IIs, 12 HC IIIs, 5 HC IVs and 2 hospitals; the PNFP sector supports 9 HC IIs, 12 HC IIIs and 1 hospital. Jinja regional referral hospital id the only referral hospital in the district which serves as a referral hub for 29 lower healthcare facilities in the region. The hub handles s*pecialized laboratory tests* like chemistry, CD4, CBC; samples which are received from the lower facilities through a hub rider for processing at the hub. However, some laboratory samples which cannot be run at the hub (such as viral load) are further referred to the National Reference Laboratory for processing and upon receiving results, are later dispatched to lower facilities.

Better planning, monitoring and health outcomes for adolescents would improve if countries commit to ensuring systems for accurate data capture according to internationally recognized age groups (UNAIDS, 2015).

1.3 Statement of the Problem

According to the Uganda viral load dashboard, the proportion of adolescents achieving viral suppression country-wide is 75.3% lower than the WHO recommended target of 90%.Despitethe scale-up of HIV testing and treatment and related interventions including making supplies and medicines available and affordable, so little is known about factors influencing viral load suppression among adolescents on anti-retroviral therapy – the age group that has remained an outlier in the AIDS response.

In June 2016, Jinja Regional referral hospital hadup to 397 adolescents (10-19 years) enrolled on antiretroviral therapy. Since the hospital started monitoring treatment outcomes using viral load tests in 2015, there was no readily published data on the proportion of adolescents who have achieved viral suppression among the key indicators reported on in the hospital quarterly report of April-March 2016.

The absence of such information has consequently impacted on the treatment outcomes, continued delays in identification and switching of failing clients to more effective regimens hence continuous manifestation of adolescents with opportunistic infections, deaths and emergency of drug resistant HIV strains which are easily transmitted through sexual intercourse. It's suspected that the socio-demographic characteristics of the adolescents on ART, the ART regimen they are on, as well as the client related could be possible influencers to their viral load suppression while on ART. This study, therefore, aimed to find out the proportion of HIV positive adolescents achieving viral suppression and assesses the factors influencing viral load suppression among adolescents who have been on ART for 6 months or more months at Jinja regional Referral Hospital in Jinja district.

1.4 Study Objectives

1.4.1 General Objective

To assess the factors influencing viral load suppression among adolescents on ART in Jinja Regional Referral Hospital.

1.4.2 Specific Objectives

1. To determine the proportion of adolescents who attain VL suppression following 6 months or more months of ART in Jinja RRH ART Clinic.

2. To identify the socio-demographic factors influencing VL suppression among adolescents on ART in Jinja RRH ART Clinic.

3. To assess the ART regimen related factors influencing VL suppression among adolescents on ART in Jinja RRH ART Clinic.

4. To assess the client related factors influencing VL suppression among adolescents on ART in Jinja RRH ART Clinic.

1.5 Research Questions

1. What is the proportion of adolescents who attain VL suppression following 6 months or more of ART in Jinja RRH ART Clinic?

2. What are the socio-demographic factors influencing VL suppression among adolescents on ART in Jinja RRH ART Clinic?

3. What are the ART regimen related factors influencing VL suppression among adolescents on ART in Jinja RRH ART Clinic?

4. What are the client related factors influencing VL suppression among adolescents on ART in Jinja RRH ART Clinic?

1.6 Significance of the Study

This study aimed to assess the proportion of adolescents taking ART in routine healthcare settings who achieved viral suppression to inform the need for interventions to improve HIV outcomes in an age group that may be at high risk of treatment failure.

Failure to achieve and maintain viral load suppression is associated with high rates of HIV transmission. In this study, we strived to point out specific factors that influence VL suppression among adolescents 10-19 years in Uganda given the significant absence of literature on VL among the age-group under study globally, in Africa and Uganda respectively. More so, low rates of suppression among a section of adolescents cannot be ruled out among the factors influencing increased new HIV infections among adolescent and young women and girls in sub Saharan Africa as well as high AIDS related deaths among HIV infected adolescents globally.

Currently, more HIV infected children are growing into adolescents therefore the need for vast knowledge on how to keep them healthy and alive while averting drug resistance issues coupled with high HIV transmission rates among the age group. The findings would be necessary to influence policy hence focus on creating programs and interventions that encourage the adolescents living with HIV/AIDS to achieve and live with undetectable levels of the HIV virus. Similarly, it would contribute knowledge to compare factors influencing viral load suppression and outcomes among adolescents in Uganda with those in Africa and other parts of the world.

1.7 Conceptual Framework

Socio-demographic factors

→ Age

→ Sex/Gender

→ Family members

→ Religion

→ Education level

ART Regimen-related factors

→ Age at initiation of regimen

→ Type of regimen at initiation

→ Change of regimen

→ Duration on current regimen

VIRAL LOAD SUPPRESSION AMONG ADOLESCENTS ON ART

(VL 1000 copies and below)

Client-Related factors

→ Perceived confidentiality

→ Convenience in scheduled appointments

→ Adolescents overall satisfaction
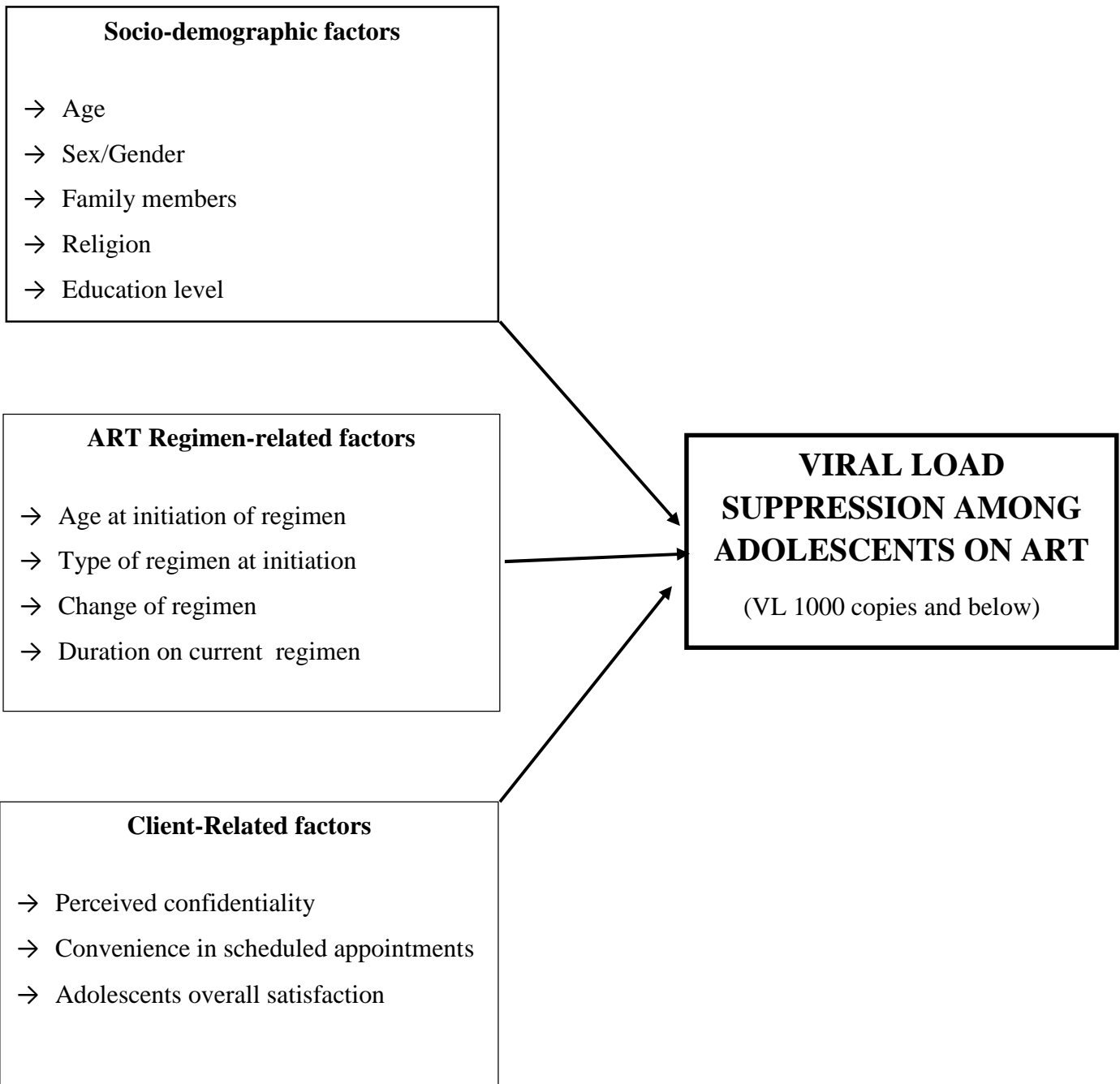
The conceptual framework illustrates the relationship between the independent and dependent variables and how they influence viral load suppression among adolescents on ART. In this study, the dependent variable is viral load suppression. The background factors including age, gender, religion, education level, family members, and intermediate factors such as ART regimens (both previous and current) age of initiation and duration on current regimen; as well as client-provider factors might affect adolescents' viral load suppression rates.

CHAPTER TWO: LITERATURE REVIEW

2.0 Introduction

This chapter reviews existing literature on factors contributing to Viral Load Suppression among Adolescents on Antiretroviral Therapy from different sources. It therefore, consists of reviewed literature socio-demographic factors, ART regimen related factors and Client–related factors influencing VL Suppression among Adolescents on ART in other parts of Uganda and elsewhere in the world.

2.1: Proportion of Viral Load suppression among adolescents on ART

Viral load is recommended as the preferred monitoring approach to diagnose and confirm ARV treatment failure (WHO, 2013). The Global Health Sector Strategy on HIV recommends that 90% of people living with HIV know their HIV status; 90% of people diagnosed with HIV receive antiretroviral therapy; and that 90% of people living with HIV, and who are on treatment, achieve viral load suppression. These include adolescent (WHO, 2016).

According to Carmona et al., (2013), the proportion of people who suppressed viral load (<1000 copies/ mm3) doubled over from less than 40% to about 80% between 2004 and 2011 in two cites of South Africa. Further still, in Rwanda, 86% PHLAs on ART achieved viral suppression 18 months from initiation on ART treatment while in Senegal, up to 80% PHLAs on 1[st]line regimen recorded viral suppression five years from start of treatment (WHO, 2013).

In another study in South Africa, the rate of virological failure in adolescents and young adults was 8.2% and 5.0%, respectively. This indicates a significantly higher rate of virological failure in adolescents compared to young adults (Nglazi et al., 2012). In peer review six studies that

reported on viral load suppressions indicated an increase in the proportion of adolescents with viral suppression 12 months after ART initiation from 27% to 89% (Ferrand et al., 2016).

A study in Northwestern Uganda, indicated that at 12 and 24 months, 75% and 72% of patients, respectively, had undetectable HIV RNA (<400 copies/ml). However, the age consideration for the study was between 15 years and above and did not focus on adolescents only (Ahoua, et al., 2009). More still, children (0-18 years) were almost twice as likely to have viral failure as compared with adults in a study conducted by(Kamya et al., 2007).

In general, there is limited literature on viral suppression among adolescents, both globally and nationally in Uganda.

2.2: Socio-demographic characteristics of adolescents on ART influencing VL suppression

2.2.1 Age of adolescent on ART and its influence on VL suppression

Various studies have indicated viral load suppression to be associated with the age of the patients. In Uganda for example,(Kamya et al., 2007) concluded that viral suppression was more common in adults compared to children at 86% and 74% respectively.

According to a special report by Michigan Department of Community Health, it was revealed that HIV infected youth (13-24 years) are more likely to be in care but less likely to achieve viral load suppression(MDCH, 2014).

In another study, older adolescents were more likely to have an unsuppressed viral load at 6 Months while young adolescents were more likely to have an unsuppressed viral load at 12 months. Young adolescents had the highest rate of virological failure at 6.3% as compared to older adolescents at 3.8%(Evans et al., 2013).

In my study I shall assess the influence of age of an adolescent on ART attending Jinja RRH in Uganda, on the suppression of their Viral Loads.

2.2.2 Sex/Gender of adolescent on ART and its influence on VL suppression

In Swaziland, viral load suppression was not associated with gender (Jobanputra et al., 2015). However, (Kamya et al., 2007) in Uganda reported independent predictors of viral failure including male gender with an Odds Ratio of 2.44.

(Davies et al., 2012) also reported in his study that the viral load response to ART is gender-specific, however the study did not specify the gender disparities and viral load suppression rates.

In a study conducted by(Beer et al., 2014) whose results were presented at the 9th international conference on HIV treatment, prevention and adherence held in 2014, 31% of women in care in the United States were not virally suppressed, compared to 26% of men.

2.2.3 Family composition and influence on VL suppression of an adolescent

Chronically ill youngsters may be less mature and because of their state, caregivers tend to be more protective of them, ensuring that they take their medication, attend their clinic visits, and collect their medication regularly. However, some may also come from poor socioeconomic backgrounds or others who have been orphaned by AIDS start running child-headed households(Evans et al., 2013). These characteristics may lead to psychosocial problems, skipping drugs in order to fend for their families thereby affecting long term treatment outcomes. (Evans et al., 2013)elaborated that establishment of more specialized adolescent health care clinics in some countries like South Africa are providing targeted counseling, testing, and treatment in line with the needs of HIV positive adolescents and young adults.

(Janssen et al., 2009) in his study conducted in Cambodia reports a higher risk of failure in children/adolescents with no parents compared to those with at least one parent further stressing the importance of family composition in VL.

2.2.4 Religion of an adolescent and its influence on VL suppression

Studies in Africa have reported that people after them being diagnosed with HIV became more religious and consequently sustained good adherence. However, according to the study conducted in Kampala, some patients discontinued ART because they claimed to be cured from HIV after prayers(Gare et al., 2015). The research further reveals that about 10 per cent of the participants in the study narrated that 'going to church' was a way to avoid getting HIV; But 31% others disclosed to have been getting support for adhering to ART from church.

Churches are of great importance in giving hope to the hopeless; they play either positive or negative role in HIV treatment programs. However, very often clinicians and counselors listen to tales of staunch religious people believing to have been healed by God and therefore abandon their medication only to relapse resulting in high viral load to poor adherence in the long run.

2.2.5 Education status/level of an adolescent and its influence on Viral load suppression

According to the US study conducted at an HIV Clinic between June and September 2007, lower education attainment was associated with lower self-reported medication adherence as compared to patients with higher education levels completed (33% versus 23%; $p < 0.05$) and having a viral load greater than 400 copies per milliliter(Shacham et al., 2010).

2.3 ART Regimen related factors influencing VL suppression among adolescents

2.3.1 Age at initiation of regimen and its influence on VL suppression

In British Columbia, a prospective study revealed that among1,305 HIV-1-infected persons on ART, younger age tends to be independently associated with viral rebound after initial viral suppression(Mujugira et al., 2016).

But according to(Evans et al., 2013), young adolescents (10-15 years) are more likely to achieve a favorable immunological response at 6 months after ART initiation as well as a high likelihood of detectable viral load at 12 months or fail virologically. His study further found out that short- and long-term virological outcomes of HIV infected adolescents who started on ART were poorer than those observed in adults, given only 59% and 24% of the subjects meeting the study criteria of virological success following 24 weeks and 3 years, respectively.

2.3.2 Type of regimen at initiation and its influence on VL suppression

For maximal viral load suppression and avoidance of drug resistance, adherence to ART is greatly important. According to (Davies et al., 2012) use of Nevirapine and Ritonavir (used as a single drug) was associated with increased risk for failure compared to Efavirenz based regimens.

For (Edison et al., 2014b), who conducted a study in Georgia, found out that not only were persons at an early stage for example stage 1 disease at diagnosis less likely to have viral suppression than those at stage 3 but also, clients with stage 2 disease were less likely to have viral suppression than those with stage 3 disease, even though ART was recommended for both stages.

2.3.3 Change of regimen and its influence on VL suppression

Drug-resistance from treatment failure as well as among people newly infected with HIV are already becoming an "increasing concern" (WHO, 2012). Ministry of Health reports that

approximately 11.6% of patients at three ART sites have shown evidence of drug resistance (MOH, 2014).

Also reports from the Pharm Access African Studies to Evaluate Resistance (PASER) conducted between 2008 and 2012 discovered that more Ugandans who have never taken ART had a higher HIV transmitted drug resistance than in other African countries, having risen from 8.6% to 12% over the five year period.

2.3.4 Duration on current regimen and its influence on VL suppression

The high level of adherence required for successful long-term viral suppression has been clarified by a number of studies. (Machtinger and Bangsberg, 2006)in his study among patients recruited from clinics at a Veterans Affairs medical center and the university of California hospital, among patients whose baseline VL was undetectable, there was no patient with adherence >=95% who had viral failure compared with 41% of those with <95% adherence.

Similar in British Columbia, a study following 886 treatment naïve individuals estimated pharmacy refill data adherence having followed up the individuals prospectively for a median of 19 months after starting ART. Of the 502 individuals at the 95-100% adherence rate, 84% achieved plasma viral loads <500 copies/mL, whereas only 64% of the 64 people with 90% to <95% adherence rate achieved this level of suppression.

2.4 Client-related factors and influence of VL suppression

2.4.1 Perceived confidentiality and its influence on VL suppression
Studies from the United States have suggested that HIV positive adolescents and young adults who attend healthcare services in adult-oriented HIV clinics are less likely to start ART, achieve viral suppression and adhere on treatment compared to HIV-infected adults.

More so, there is a growing number of adolescents entering care in adult-oriented HIV clinics in public healthcare facilities, but there are few criteria to guide clinic staff on potential strategies to treat adolescents and young adults within these settings. The adult oriented HIV care model may not meet the specific needs of adolescents and young adults as they face unique challenges in the management of HIV(Evans et al., 2013). This is in line with Uganda National Adolescent health policy which emphasizes that in order for adolescents to access and use the adolescent health services available, services must be conducive to the young people, accessible, private, and confidential, of good quality but also offer facilities for recreation – a requirement that is highly lacking in healthcare facilities in Uganda and Africa (MoH, 2011).

2.4.2 Convenience in scheduled appointments and its influence on VL suppression

Clinic visit or adherence to scheduled appointments is a retention measurement that is resultant from missed clinic visits. It involves the use of visits scheduled as well as visits missed or attended to assess one's adherence to ART by most clinicians. According to (Crawford, 2012),a study evaluating Retention in Medical Care against its impact on the Health Outcomes of PLHAs categorized visit adherence into three groups: 0% – 79%; 80% – 99%; and 100%. Only 20% of the individuals had 2 or more "no show" visits, and 63% achieved VL suppression in a median of 308 days from entry in to care. The results of the study therefore call for discussions between clinicians and PLHAs to agree on a convenient date which clients will not default hence improving treatment outcomes.

2.4.3 Adolescents overall satisfaction and its influence on VL suppression

According to WHO guidelines, adolescents currently access HIV services through several service delivery points, including adults HIV clinics, antenatal care clinics as well as mother-baby care points of paediatric units. This is because health systems have not yet implemented

specialized care spaces/clinics to provide adolescent-specific services therefore must gather the confidence to access healthcare services including ART with their older counterparts (WHO, 2013).

2.5 Research Gap

Most of the research studies cited in this research study were conducted in the countries namely, United States, Brazil, South Africa, Cambodia, Georgia and less in Uganda, Kenya etc. Relying on results from these may over/under represent viral suppression outcomes for the PLHA especially among adolescents in Uganda due to varying care and treatment settings, socio-demographic factors and interventions. The issue of adolescents being left out in the AIDS response stands out. Very few studies concentrated on the age bracket of 10-19 years as more attention was given to adolescent and young people such as 15- 24 years or children 0-14 years and adults hence leaving a gap in assessing treatment outcomes/factors influencing suppression in the 10-19 adolescent category. Although several studies have been carried out on factors influencing VL suppression among adolescents on ART, it is evident that the concept of mass viral load testing is fairly new in Africa with the trials among African countries piloted in 2013. Besides, none of these studies was piloted in Jinja RRH, hence leaving a research gap, both contextual and theoretical, which this study intends to address.

CHAPTER THREE: METHODOLOGY

3.1 Introduction

This chapter highlights the study methodology, study designs and data collection techniques. The chapter also indicates the proposed sample size and data analysis plan among other elements.

3.2 Study Design

Data was collected on the study population at a single point in time to examine the relationship between viral load suppression and possible explanatory factors. Since risk factors and the outcome (viral load suppression) were measured simultaneously, a cross-sectional study design was deemed the most appropriate and therefore used.

The design included both qualitative and quantitative data collection techniques to address the study objectives and research questions. The qualitative design further provided insights into motivations, opinions and reasons for some of the behaviors that influence compliance to health services including adherence support which greatly influences viral suppression.

3.3 Sources of data

3.3.1 Primary data Sources: The main sources of data for the outcome variable were the viral load register (HMIS 095), individual HIV care/ART cards and electronic medical records (open MRS). For the independent variables, data was collected using questionnaires and interview guides through interactions with individual participants and key informant groups. Additional data was extracted from the patient's paper based or electronic files.

3.3.2 Secondary data Sources: We utilized mainly two sources (Open MRS, viral load register and ART cards) to get data on this variable to address the challenge of incomplete records in some of the data sources.

3.4 Study population

The study population were all the adolescents 10-19 years receiving HIV care at Jinja Regional Referral Hospital. These mainly included adolescents who had been on ART for at least 6 or more months prior the study period. The study also considered responses from caretakers of adolescents and health service providers working in the HIV clinic at Jinja RRH.

3.5 Sample size calculation

Given the population size of 397 adolescents (10-19years) who were receiving ART at Jinja RRH's Nalufenya children' and adult HIV clinic, only 238 adolescents had accessed a viral load test in the past two years. We therefore decided to study all the adolescents whose files contained viral loads results hence purposive sampling.

Sloven's formula;

$$n = \frac{N}{(1 + N e^2)}$$

Where;

n = the sample size

N= Total population estimate (397 adolescents on ART in Jinja RRH)

e = is level of confidence (error of margin i.e. 5% = 0.05)

1 is a constant in the formula

Therefore;   n = $\underline{397}$ = 199

$(1 + 397 \times 0.05^2)$

None response rate of 5% i.e. 199 x 5% = 9.95

Therefore, n = 199+ 9.95 = 208.95 which is approximately 209adolescents

The study however, involved a sample of 238adolescents on ART who had accessed a viral load test and results returned.

3.6 Sampling procedure

Purposive sampling was used to select 238 participants from the total eligible adolescents enrolled on ART in Jinja RRH. A sampling frame (list of all eligible adolescents) was obtained from the in data officer at the ART clinic who generated a list of eligible adolescents from the electronic system.

3.7Study variables

The study variables included the following;

3.6.1 Dependent variables

Viral load suppression among adolescent clients who have been on treatment for 6 months or more using the current MoH viral load monitoring guideline with a cutoff of <1000copies/mL.

3.6.2 Independent variables include;

Socio-demographic factors (Age, Sex/Gender, Family members, Religion, and Education level) for the study subjects.

ART Regimen related factors (Age at initiation of regimen, Type of regimen at initiation, Change of regimen and Duration on current regimen)

Client related factors (Perceived confidentiality, Convenience in scheduled appointments, and Adolescents overall satisfaction)

3.7 Selection criteria

3.7.1 Inclusion criteria

All clients aged 10-19 years who had been on ART for 6 months or more and had accessed at least one viral load test were eligible for enrollment into study.

3.7.2 Exclusion criteria

The following category of clients were excluded from the study;

Adolescents whose outcome status could not be ascertained (no record of viral load results)

Adolescents with mental incapacitation and inability to respond to the questionnaire

Adolescents who declined to participate (no informed consent/assent)

Adolescents who were too sick to respond

3.8 Data collection techniques

Data collection techniques for the study included the following;

Data abstraction from the adolescents' files was carried out using a data extraction tool to capture information on age, gender, duration on treatment, viral load suppression status, and adherence to treatment, appointment keeping and ART regimen of each client.

Questionnaire guided face-to-face interviews were also conducted to collect additional data on factors including socio-demographic and client related that were believed to influence viral load suppression. Both the interviews and data abstraction were conducted by trained research assistants. *Key informant interviews* were also held with healthcare providers to explore the health facility related factors that contributed to viral suppression.

3.9 Data collection tools

3.9.1 *Data abstraction tool*

A data abstraction guide was developed based on the variables of the study. The abstraction tool was aligned to HIV care client cards to collect data that is captured in the routine health information management system and records. The tool was validated before being used in the study.

3.9.2 **Semi-structured questionnaire**

A semi-structured questionnaire including both open ended and close ended questions was developed, pretested and used to guide and collect data during the interviews. The tool was later administered by the research assistants with consent from the study subjects.

3.10 Plan for data analysis

Data from study tools was coded, entered into a predesigned excel spreadsheet and cleaned. Statistical analyses were performed using SPSS Version 20 software. Descriptive analyses were performed to summarize data with continuous variables like age, viral load, using mean and their corresponding standard deviations or median with their corresponding inter-quartile ranges. Categorical variables including sex, viral suppression, and religion among others were summarized as proportions/percentages.

At bi-variate level, Chi square tests were used to determine any possible association between dependent and independent variables at 95% confidence level.

In addition, logistic regression analysis was conducted at multi-variate level to determine which factors were independently associated with viral suppression. Only significant variables (p-value

less 0.05) or those with a p-value of 0.05 and less at bi-variable level were included in the final model. All variables with p-value less 0.05 from our multivariable analysis were taken as independent predictors of viral load suppression in this population.

Results from the study were mainly presented in tables and figures with narratives for each.

3.11 Quality control issues, minimizing errors and eliminating bias

In an effort to ensure the quality of data collected is not compromised, the following quality control measures were considered;

Training of research assistants: the principal investigator identified research assistants with health background who worked at Jinja RRH's HIV Clinics. These were oriented on HIV care, study purpose and the methodology. The orientation also focused on how to use data collection tools to ensure the research assistants collected valid, accurate but also reliable data.

Pretesting of the tools: All tools developed were pretested for validity and accuracy in capturing the required data sampling adolescents who attended the HIV clinic on a random day. Using the triangulation method, several tools i.e. data abstraction tool, questionnaire, viral load register and the online Open MRS database were used to collect the data in line with the objectives. In addition there were two different teams that participated in the data collection exercise to increase on reliability; one team for the data abstraction tool and the other questionnaires. At the end of each day during the data collection period, at least 5 copies of each filled tool were sampled for review to ensure accuracy and consistency/ early detection of errors. The tools were pretested in a similar environment like Jinja RRH to ensure they collect the data intended for the study.

3.12 Ethical Considerations.

Ethical considerations were generated to address any possible issues that could arise and cover the rights of subjects and the ethical implications.

Ethical approval was sought from IHSU Degree Research and ethics committee.

This was followed by a clearance letter from the Dean of Institute of Public Health and Management.

For all participants interviewed, we sought an informed consent for respondents aged 18 years and above, or an informed assent from parents/caretakers for underage participants (below 18 years) was considered for enrolment in the study.

To ensure confidentiality, study participants were assigned numbers/codes. All information collected was used only for the purpose of this study and kept away from reach of unauthorized persons.

3.13 Plan for dissemination

A dissertation report was written at the end of the study, copies of the report would be shared with the University, Jinja district as well as Jinja Regional referral hospital. Abstracts would also be prepared and submitted to relevant local and international conferences and a manuscript submitted for publication in peer review journals to allow for wider sharing.

3.14 Study Limitations

Because of part of the study was based on the respondent's memory, it was difficult to control for memory lapse as information could not be verified for accuracy. The data tools were also not completely/erroneously filled since they were liable to human error hence giving inaccurate

findings. More other factors and interventions not related to HIV like community/environment in which they come from, cultural beliefs, knowledge and attitudes-not covered by this study played a big role in helping adolescents achieve VL suppression.

CHAPTER 4: RESULTS

4.0. Introduction

This research study was conducted in Jinja referral hospital among adolescents aged 10-19 years. A total of 200 adolescents (including caretakers) voluntarily participated in the study.

This chapter is presented into three main sections: First, it presents data on frequency distribution of socio demographic, ART regimen and client-related factors. The second section comprises of the analysis and comparison of data using chi square test to measure the levels of association between individual predictor variables and viral load suppression among adolescents. At 95% level of confidence, a statistical relationship between dependent and independent variables were ruled out using p-value if it's greater than 0.05 (no significant relationship exist); otherwise, statistical relationship would exist if less than 0.05.The third section presents findings on the effect of a combination of various selected variables that have significant association with dependent variable at bivariate analysis.

4.1: Proportion of adolescents who attained Viral Load suppression

Figure 1: Proportion of adolescents who attained viral load suppression status

Proportion of adolescents who attained VL suppression. n=200
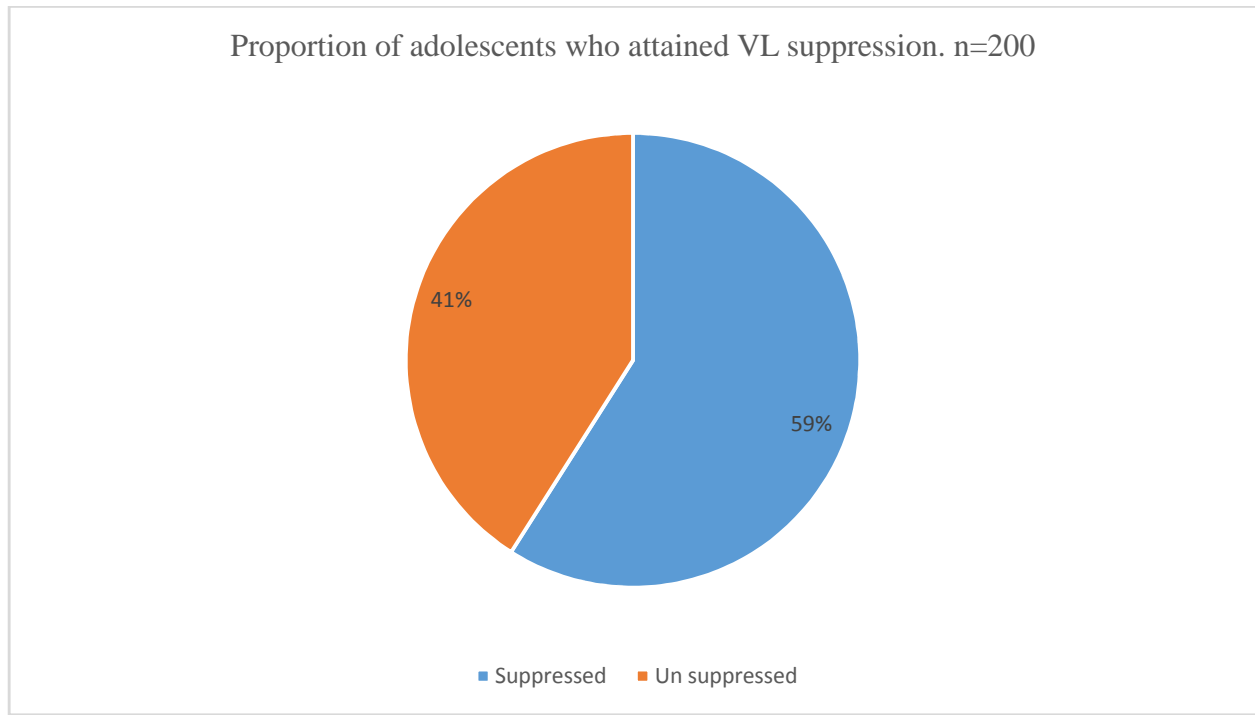
Figure 1 above shows that most adolescents 119 (59%) had a suppressed viral load while 81 (41%) had unsuppressed viral load.

4.2: Socio-demographic factors influencing viral suppression among adolescents

Table 1 describes the socio demographic characteristics of the respondents. Results in the table represent descriptive analysis of demographic factors of adolescents enrolled on ART treatment at Jinja referral hospital. Majority 102(51%) were males. Most 144(72%) were aged 10-14, followed by 50(25%) in age group 15-18 and the least represented 6(3%) were aged 19 years. The Majority of adolescents 117(58.5%) did not have both parents while 83(41.5%) had one parent.

In regard to family member knowledge of the respondent's HIV status, the majority of adolescents 158(79%) said all their family members know their status while 42(21%) responded otherwise. More than three quarters 157(78.5%) got support from their family members while 43(21.5%) did not. Majority 148(74%) believed in God's healing their condition/illness compared to 52(26%) who did not. Nearly half, 95(47.5%) had ever been prayed for to deliver them from HIV while 105(52.5%) have never. Almost all 93(%) continued their medication following the prayer of deliverance from HIV.

Anglicans constituted the major proportion 66(33.0%), followed by 59(29.5%) Moslems, 53(26.5%) Roman Catholics, and the least 22(11.0%) were Pentecostal/Evangelical.

The distribution of the respondents with reference to education level shows that the most 152(76.0%) of the participants had attained ordinary level of education, while 39(19.5%) attained Advance level education and only 9(4.5%) had primary education.

Table 1 Univariate analysis of Socio-demographic characteristics of the respondents

Variables		Frequency (n=200)	Percentage (%)
Gender	Male	102	51.0
	Female	98	49.0
Age	10-14	144	72.0
	15-18	50	25.0
	19 years	6	3.0
Do you have both parents	Yes	83	41.5
	No	117	58.5
Family members	Father	60	13.2
	Mother	109	24.0
	Brother	100	22.0
	Sister	108	23.8
	Uncle	36	7.9
	Aunt	41	9.0
All members know your status	No	42	21.0
	Yes	158	79.0
Do family members support you	No	43	21.5
	Yes	157	78.5
Kind of Support	Accommodation	147	25.6
	Education	153	26.6
	Feeding	152	26.4
	Basic requirements	123	21.4
Family member taking same medicines	Yes	135	67.5
	No	65	32.5
Religion	Roman Catholics	53	26.5
	Anglican	66	33.0
	Moslem	59	29.5
	Pentecostal	22	11.0
Do you believe in God healing you	No	52	26.0
	Yes	148	74.0
Ever been prayed for to be delivered HIV	No	105	52.5
	Yes	95	47.5
Taken medicine after prayers	Yes	93	46.5
	No	107	53.5
Education level	Primary	9	4.5
	O-level	152	76
	Advance level	39	19.5
	Total	200	100.0

Source: Primary data

Table 2:Bivariate analysis of Socio-demographic characteristics of the respondents

Variables			Suppression Status		X^2	P. Values
			Yes	**No**		
Gender		Male	61 (51.3)	41(50.6%)	0.008	0.0906
		Female	58(48.7%)	40(49.4%)		
Age		10-14	87(73.1%)	57(70.4%)	0.432	0.806
		15-18	28(23.5%)	22(27.2%)		
		19 years	4(3.4%)	2(2.5%)		
Parents		Yes	48(40.3%)	35(43.2%)	1.64	0.686
		No	71(59.7%)	46(56.8%)		
Family members	**Father**	No	84(70.6%)	56(69.1%)	0.048	0.826
		Yes	35(29.4%)	25(30.9%)		
	Mother	N	48(40.3%)	43(53.1%)	3.16	0.075
		Yes	71(59.7%)	38(46.9%)		
	Brother	No	58(48.7%)	42(51.9%)	0.187	0.66
		Yes	61(51.3%)	39(48.1%)		
	Sister	No	56(47.1%)	36(44.4%)	0.133	0.716
		Yes	63(52.9%)	45(55.6%)		
	Uncle	No	98(82.4%)	66(81.5%)	0.025	0.875
		Yes	21(17.6%)	15(18.5%)		
	Aunt	No	96(80.7%)	63(77.8%)	0.248	0.619
		Yes	23(19.3%)	18(22.2%)		
All members know your status		No	18(15.1%)	24(29.6%)	6.111	**0.013***
		Yes	101(84.9%)	57(70.4%)		
Do family members support you		No	19(16.0%)	24(29.6%)	5.331	**0.024***
		Yes	100(84%)	57(70%)		
Kind of support	**Accommodation**	No	27(27.7%)	26(32.1%)	2.191	0.094
		Yes	92(77.3%)	55(67.9%)		
	School/education	No	22(18.5%)	25(30.9%)	4.107	0.061
			18.5%	30.9%		
		Yes	97(81.5%)	56(69.1%)		
	Feeding	No	23(19.3%)	25(30.9%)	3.517	0.45
		Yes	96(80.7%)	56(69.1%)		
	Basic requirements	No	39(32.8%)	38(46.9%)	4.07	0.54
		Yes	80(67.2%)	43(53.1%)		
Family member taking same medicines		Yes	3 (42.9%)	30(63.8%)	21.23	0.268
		No	4 (57.1)	17 (36.2%)		
Religion		Roman Catholic	38(31.9%)	15(18.5%)	5.106	0.164

	Anglican	34(28.6%)	32(39.5%)		
	Muslim	34(28.6%)	25(30.9%)		
	Pentecostal	13(10.9%)	9(11.1%)		
God healing	No	26(21.8%)	26(32.1%)	2.632	0.139
	Yes	93(78.2%)	55(67.9%)		
Deliverance from HIV	No	67(56.3%)	38(46.9%)	1.704	0.123
	Yes	52(43.7%)	43(53.1%)		
Taken medicine after prayers	Yes	55(46.2%)	38(46.9%)	0.009	0.923
	No	64(53.8%)	43(53.1%)		
Level of education	Primary	4(3.4%)	5(6.2%)	1.734	0.42
	Ordinary	89(74.8%)	63(77.8%)		
	Advance level	26(21.8%)	13(16.0%)		
Total		119	81		
		100.0%	100.0%		

Statistically significant variables with 95% confidence

Table 2 presents results of association between socio demographic factors and suppression of viral load among adolescents aged 10-19 at Jinja regional referral hospital. The study findings reveal that knowing of HIV status of the respondents by their family members has significant relationship with their viral load suppression with ($X^2$6.111 p-value 0.013). In addition, adolescents being supported by their family members suppress viral load ($X^2$5.331 p-value 0.024).

4.3: ART regimen related factors influencing Viral Load suppression among adolescents

Table 3 shows ART regimen of adolescents. The majority 177(85.55%) were children, 15 (7.5%) were in a never married category, and the least 8(4%) were married. By entry point, majority 150 (75%) came from TB unit, followed by YCC 40(20%) and the least 10 (5%) were from eMTCT care point.

In regard to ART regimen at initiation, most adolescents 82(41%) were initiated on D4T/3TC/NVP followed by 60(30%) on AZT/3TC/NVP, 29(14.5%) on AZT/3TC/EFV and 29(14.5%) ABC/3TC/EFV.

Treatment failure was experienced among 30 (15%) of the respondents while 170 (85%) did not. Counseling before regimen change was done among 18(9%) of the respondents and evidence of counseling was recorded among 7(14%) of respondents.

Table 3: Univariate analysis of ART regimen related factors

Variables		Frequency (n=200)	Percentage (%)
Entry point	e MTCT	10	5
	TB	150	75
	YCC	40	20
Initial Viral load	Not detected	104	52.0
	<1000	27	13.5
	1001-10000	18	9.0
	10001 and above	51	25.5
Age at initiation	10-14	144	72.0
	15-19	56	28.0
Regimen-initiation	AZT/3TC/EFV	29	14.5
	AZT/3TC/NVP	60	30
	ABC/3TC/EFV	29	14.5
	D4T/3TC/NVP	82	41
Treatment failure	Yes	30	15
	No	170	85
Counseling before regimen change	Yes	18	9
	No	182	91
Evidence of counseling	Yes	7	3.5
	No	193	96.5

Source: Primary data

Table 4: Appointment keeping behavior for 12 months before the latest Viral Load

Variables		Frequency (n=200)	Percentage (%)
Record of appointment	Good	147	73.5
	Poor	53	26.5
Adherence	Good	111	55.5
	Don't know	37	18.5
	Poor	52	26
WHO stage in 12th month	Don't know	22	11
	Stage 1	161	80.5
	Stage 2	5	2.5
	Stage 3	10	5
	Stage 4	1	0.5
WHO stage in 1st month	Don't know	34	17
	Stage 1	142	71
	Stage 2	6	3
	Stage 3	15	7.5
	Stage 4	2	1
Nutrition status at 12 months	Not taken	28	14
	Normal	159	79.5
	Moderate acute malnutrition	13	6.5
Nutrition status at 1 month	Not taken	34	17
	Normal	149	74.5
	Moderate acute malnutrition	17	8.5
Weight	0-20 kg	127	63.5
	21-30 kg	30	15
	31-40 kg	43	21.5
Opportunistic infection	Yes	46	23.0
	No	134	77.0
	Not detected	104	52
CD4 at initiation	<1000	27	13.5
	1001-5000	18	9.0
	5001 above	51	25.5
	Total	200	100

Source: primary data

The study findings reveals that only 46(23.0%) of the respondents had opportunistic infections unlike the majority 134(77.0%) who were not diagnosed with any infection.

Records of appointment showed 147(73.5%) respondents had good appointment records, while 53(26.5%) had poor appointment records.

With adherence to ART regimen, majority 111(55.5%) were adherent, 52 (26%) poorly adhered and the least 37(18.5%), adherence records were not available. Records on WHO staging revealed that the previous month just before the latest VL, majority adolescents 161(80.5%) were in stage 1, followed by 10 (5%) in stage II, 5 (2.5%) in stage III and only one was in stage IV. On other hand, WHO staging on the 1st month of the 12 months before the latest VL was as follows; 142 (71%) were in stage I, 15 (7.5%) in stage II, 6 (3%) in stage III, 2(1%) in stage IV and no record of WHO staging among 34 (17%) respondents.

The nutrition status of adolescents was observed for the past one year before the latest VL; at the beginning of the year, 149 (74.5%) had normal nutrition status, 17 (8.5%) moderate acute malnutrition and 34 (17%) had not been evaluated. Nutrition status on the 12th month of observation, showed that the majority 159(74%) had achieved normal nutrition status, 13(6.5%) had moderate acute malnutrition and 28(14%) had no record of nutrition status.

The study considered an average weight for all the 12 months before the latest VL. The majority 127(63.5%) of adolescents had an average weight of 0-20kg, followed by 43(21.5%) who weighed 31-40Kg, and the least 30(15%) weighed 21-30 Kg. Initiation CD4 count was recorded; adolescents whose CD4 cells fell between 501-1000 were 18 (13.5%), 100-200 (23%) and 201-500 (12%).Majority 104 (52%) had no CD4 results recorded at initiation.

The most adolescents (52%) had undetectable initial viral load, (13.5%) had viral load of less than 1000 copies, 25.5% had above 10,001copies and the least 9% had 1001-10000 copies.

Table 5: Bivariate analysis of ART Regimen factor influencing viral load suppression

Variables		Suppression Status		X^2	p-value
		Yes	No		
Marital status	Child	104(87.4%)	73(90.1%)	0.84	0.657
	Un married	9(7.6%)	6(7.4%)		
	Married	6(5.0%)	2(2.5%)		
Entry point	e MTCT	3(2.5%)	7(8.6%)	3.845	0.146
	TB	91(76.5%)	59(72.8%)		
	YCC	25(21.0%)	15(18.5%)		
Initial viral load	Not detected	62(52.1%)	42(51.9%)	2.304	0.512
	<1000	18(15.1%)	9(11.1%)		
	1001-10000	8(6.7%)	10(12.3%)		
	100001 and above	31(26.1%)	20(24.7%)		
Regimen-initiation	AZT/3TC/EFV	17(14.3%)	12(14.8%)	0.516	0.915
	AZT/3TC/NVP	35(29.4%)	25(30.9%)		
	ABC/3TC/EFV	16(13.4%)	13(16.0%)		
	D4T/3TC/NVP	51(42.9%)	31(38.3%)		
CD4 at initiation	Not done	32(26.9%)	25(30.9%)	9.412	0.024**
	0-200	21(17.6%)	25(30.9%)		
	201-500	13(10.9%)	11(13.6%)		
	501--1000	53(44.5%)	20(24.7%)		
Treatment failure	Yes	13(10.9%)	17(21.0%)	3.828	0.05**
	No	106(89.1%)	64(79.0%)		
New regimen	Not Applicable	106(89.1%)	64(79.0%)	3.856	0.145
	TDF/3TC/LPV/r	2(1.7%)	3(3.7%)		
	ABC/3TC/LPV/r	11(9.2%)	14(17.3%)		
Counseling-before Change of treatment	Yes	5(4.2%)	13(16.0%)	8.26	**0.004****
	No	114(95.8%)	68(84.0%)		
counseling evidence	Yes	2(1.7%)	5(6.2%)	2.88	0.09
	No	117(98.3%)	76(93.8%)		

**Statistically significant variables with 95% Confident interval

Table 5presents results of association between regiment factors and suppression of viral load among adolescents aged 10-19 years at Jinja regional referral hospital. The study findings reveal that CD4 count at initiation of treatment of treatment ($X^2$9.4212, p=0.024), treatment

failure($X^2$3.828, p=0.05) and Counseling before change of treatment($X^2$8.26, p=0.004) were associated with viral load suppression.

Table 6: Bivariate analysis of Appointment keeping behaviors affecting adolescent VL

Variables		Viral load Suppression		X2	P-value
		Yes	No		
Keeping appointment	Good	87(73.1%)	60(74.15)	0.023	0.879
	Poor	32(26.9%)	21(25.9%)		
Adherence	Good	67(56.3%)	44(54.3%)	4.17	0.124
	Don't know	17(14.3%)	20(24.7%)		
	Poor	35(29.4%)	17(21.0%)		
stage 2	Don't know	16(13.4%)	6(7.5%)	11.347	**0.023****
	WHO stage 1	98(82.4%)	63(78.8%)		
	WHO stage 2	0(0.0%)	5(6.3%)		
	WHO stage 3	4(3.4%)	6(7.5%)		
	WHO stage 4	1(0.8%)	0(0.0%)		
WHO stage 1	Don't know	24(20.3%)	10(12.3%)	3.135	0.535
	Stage 1	82(69.5%)	60(74.1)		
	Stage 2	4(3.4%)	2(2.5%)		
	Stage 3	7(5.9%)	8(9.9%)		
	Stage 4	1(0.8%)	1(1.2%)		
Nutrition status at 12 months	Not taken	18(15.1%)	10(12.3%)	1.231	0.54
	Normal	95(79.8%)	64(79.0%)		
	Moderate acute malnutrition	6(5.0%)	7(8.6%)		
Nutrition status at 1month	Not taken	24(20.2%)	10(12.3%)	2.529	0.282
	Normal	84(70.6%)	65(80.2%)		
	Moderate acute malnutrition	11(9.2%)	6(7.4%)		
Weight	0-20 kg	82(68.9%)	45(55.6%)		
	21-30 kg	14(11.8%)	16(19.8%)		
	31-40 kg	23(19.3%)	20(24.7%)		
Total		**119**	**81**		
		100.00%	**100.00%**		

*** Statistically significant variables with 95% confidence**

Error! Reference source not found.above presents appointment behaviors associated with viral load suppression among adolescents. Only latest WHO clinical stage of adolescent ($X^2$9.4212, p=0.024) influenced viral load suppression.

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4.4 Client related factors influencing VL suppression among adolescents

Table 7: Univariate analysis of Client related factors

Variables		Frequency	Percent
Attended to at same time with Adults	No	52	26.0
	Yes	148	74.0
Attended to at same time with children younger than 10 years	No	6	3.0
	Yes	194	97.0
Satisfied with health service provider	Satisfied	133	66.5
	Unsatisfied	65	32.5
	Don't know	2	1.0
Confidential information	Agree	147	73.5
	Disagree	50	25.0
	Don't know	3	1.0
Comfortable appointment days	Yes	172	86.0
	No	28	14.0
	Total	200	100.0

The study indicates that the most 148(74.0%) of the respondents had been attended to at the same time with adults while slightly greater than a quarter had not been attended with adults. In addition, the majority 194(97.0%) of the participants had been attended to at same time with children younger than 10 years while 6(3.0%) were not.

With satisfaction to provider services, more than a half 133(66.5%) of the adolescents were not satisfied with the services at the healthcare facility. More than a quarter 65(32.5%) were unsatisfied with health provider services at the health care facility and only 2(1.0%) did not know.

Out 200 participants, 147(73.5%) agreed that information concerning them is kept confidential at the clinic, exactly quarter 50(25.0%) disagreed about the confidentiality while 3(1.0%) did not know.

Table 8:Bivariate analysis of Client related factors

Variables		Suppression Status		X²	p-value
		Yes	No		
With Adults	No	32(26.7%)	20(24.7%)	0.121	0.728
	Yes	87(73.1%)	61(75.3%)		
With children	No	6(5%)	0(0.0%)	4.21	0.04**
	Yes	113(95.0%)	81(100.0%)		
Confidential information	Agree	86(72.3%)	61(75.3%)	0.946	0.814
	Disagree	31(26.1%)	19(23.5%)		
	Don't know	1(0.8%)	1(1.2%)		
Comfortable appointment days	Yes	102(85.7%)	70(86.4%)	0.02	0.888
	No	17(14.3%)	11(13.6%)		
Satisfaction	Satisfied	80(67.2%)	53(65.4%)	1.564	0.458
	Unsatisfied	37(31.1%)	28(34.6%)		
	Don't know	2(1.7%)	0(0.0%)		
Total		119	81		
		100.00%	100.00%		

*** Statistically significant variables with 95% confidence**

The client related factors were analyzed to determine their significant relationship with viral load suppression among adolescents aged 10-19 years at Jinja regional referral hospital. The study findings reveal that only those adolescents who have been attended to at the same time with children younger than 10 years influence their viral suppression, (X^2 4.21,p-value 0.04).

4.5 Multi-variate analysis of factors influencing viral load suppression among adolescents

In order to determine the effects of independent variables when jointly combined and level of viral loads suppression of adolescents of age 10-19 years, a binary logistic model was fitted and the results presented on table 9 below.

The dependent variable was dichotomous and categorized as 1- suppressed and 2- not suppressed. This dependent variable was regressed with independent predictor variables that have significant relationship at bivariate analysis. The independent variables includes knowing HIV status categories (1- yes, 2- no), getting support from family members (1-yes and 2-no), CD4 initiation (0- not done, 1- 0-200, 2-201-500, 3-501-1000 and 4-1001 and above), counseling evidence (1-yes and 2-no), and WHO staging (stage1 and stage 2).

The results obtained were reported using Odds ratio with corresponding Confidence interval at 95% level. The result shows that those adolescents who's CD4 at initiation was between 0-200 are more likely to have their viral load suppressed compared to their counterparts OR 1.376 CI (0.584, 3.242).

The likelihood that adolescents who had counseling evidence would have their viral load suppressed is 2.22 times more likely as compared to those who did not have counseling CI(0.188, 26.283)

There is 1.24 times higher chance that viral load suppression would occur among adolescent whose treatment had failed compared to those whose treatment were successful CI (0.33, 4.66).

With reference to WHO staging, the study indicates that adolescents who were at stage 3 are 3.7 times more likely to have viral load suppression as compared to those at stage 1 and 2.

Table 9: Summary of model findings

Variable	Odds ratio	95% C.I. for EXP(B)	
		Lower	Upper
Known_HIV Status(1)	0.453	0.131	1.565
Support(1)	0.496	0.14	1.758
CD4atinitiation(1)	1.376	0.584	3.242
CD4atinitiation(2)	0.85	0.295	2.444
Counseling before(1)	0.148	0.021	1.057
Counseling evidence(1)	2.222	0.188	26.283
Stage_12(1)	2.403	0.773	7.466
Stage_12(3)	3.765	0.561	25.28
Failed(1)	1.24	0.33	4.66

4.6 Qualitative data results

This section presents opinions of selected healthcare providers on the socio-demographic, ART regimen and client factors influencing viral load suppression gathered through conducting key informant interviews. The different health providers who participated in these interviews included HIV Clinical Care Coordinator, Clinicians, Nursing Officers, Counselors and Pharmacist.

On the socio-demographic factors, one of the key informers emphasized that;

"Majority of adolescents (almost over 80%) have single parents with others not staying with guardians even when both parents are alive. This affects suppression because some of them don't have treatment supporters to remind them. For example, school going children are more likely to forget their medicines when rushing for school or classes since they have no one to remind them.

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If one is staying with members who take same drugs, it's more likely that both take their medications at the same time. However, change of family members (moving from one caretaker to another) may affect their suppression if the caretaker has never been counseled or educated on the effect of adherence." [**KI, Jinja ART Clinic, Clinical Care Coordinator**]

This is in line with the findings of the study where majority adolescents did not have both parents. The presence of one or both parents, same family member taking ARVs as the adolescent and attending school is thought to have influence on viral load suppression of an adolescent.

The level of education of the caretaker or adolescent is believed to have an effect on adherence and viral load suppression especially for adolescents.

"*Most caretakers who are highly educated feel they know a lot and don't want to spend a lot of time being told what to do. They end up doing things contrary to the requirements. Those who are illiterate tend to be rigid and need a lot of effort to accept changes especially on number of pills. However with constant counseling, they are able to adjust. Middle class caretakers tend to readily accept all advice in case there is need for change*" [**KI, Nursing Officer, Jinja ART Clinic**].

This finding was also emphasized by one of the key informers who said;

"*As the adolescents grow older, due to fear of stigma, they fail to take their medicines in time or stop taking them. But they continue to pick the medicines from the health facility. At times where there is erroneous dispensing of wrong medicines, the educated patients easily notice and ask why they got different drugs. Illiterates come back when they have reacted to the medicines.*" **[KI, Counselor, Jinja ART Clinic].**

Religion is another socio demographic factor that has been associated with viral load suppression. On matters of religion, another informant had this to say;

> "*Born again individuals tend to abandon medicines after being prayed for. Sometimes they bring back their drugs claiming they were prayed for and they are now declared healed. However, there are Born-agains whose pastors advise that they continue with their medication even after prayers*" **[KI, Clinician, Jinja ART Clinic].**

Age at initiation on the ART regimen is also said to have effect on the viral load suppression of adolescents.

"*Adolescents who start medicines early adhere well in the start years. As they progress, they get tired of the medicines and easily default. But disclosure is one of the major concerns. If adolescents are not disclosed to early, first they start asking why they are taking medicines, try to experiment by not taking and are likely to default. Adolescents who start at a very early age, their adherence is better and they adhere completely if they have been disclosed to.*"[**Clinician, Jinja RRH ART Clinic**]

But one other informant believed age does not influence viral load suppression.

"*Irrespective of the age, if the adolescents start ART and adhere well for at least 6 months, they are likely to suppress. The earlier a person is initiated, the better in terms of viral load suppression.*

For example, the source of the infection also sets in into the picture: for those who acquire it from mothers, the earlier you start, the better. This is because the baseline of viral load is not very high therefore easy to suppress" [**KI, Clinical Care Coordinator, Jinja Children's Clinic**]

On the typeof regimen and viral load suppression, one informant had this to say;

"Some adolescents are scared by the size of the pill; the larger the size, the less some individuals adhere." [**KI, Jinja RRH, Pharmacist**]

Additional informants added;

"*Syrups are challenging; they spill/pour, other have a bitter taste and sometimes caretakers/adolescents take inaccurate measurements. Most of the children who were initiated on syrups documented the most failures and were switched to a second line compared to the generation without syrups. Children who are on Niverapine combination are not suppressing well- because they are already exposed to Niverapine the first six months of their life increasing chances of resistance. More children now being initiated on Kaletra than Niverapine and are doing well.*"[**KI, Clinician, Jinja RRH ART Clinic**]

On client factors, privacy during counseling has been emphasized as one of the forgotten but important factor that would influence adherence and suppression status.

"*I would rate our environment here as average. There is lack of space for counseling adolescents hence no privacy on adolescent information shared. However, the adolescents' file information is kept confidential and inaccessible without permission.*"[**KI, Clinician, Jinja RRH Children's Hospital**]

When asked if the appointment system is convenient to serve adolescent needs; one key informant said;

"*There is room for discussion if adolescents give realistic reasons. We discuss with adolescents attending boarding schools and fix an agreed appointment date. For those at schools and are*

stable, up to 3 months of medicine refills are given. We stills experience challenges with poor adherence and requests for longer refills still exist."[**KI, Counselor, Jinja RRH Children's Hospital**]

Viral load suppression is said to be better if staff have acquired training in delivery of adolescent services. On this subject, key informants narrated;

"*Only clinician has been trained in adolescent services at the children's hospital where majority adolescents are enrolled on ART. Those who were trained recently in adolescent services at the main hospital are not serving on the HIV clinic. There is still a gap to conduct targeted training in adolescent friendly services. Even for pharmacists, there were no special trainings on how to handle different age groups when dispensing drugs.*"

CHAPTER FIVE: DISCUSSION OF STUDY RESULTS

5.0 Introduction

This chapter presents discussions of the study findings in relation to problem statement and available literature review in line with study objectives. The discussions are arranged according to the following sub-sections: proportion of adolescents that attained VL suppression following 6 or more months of ART in Jinja RRH ART Clinic; Socio-demographic, ART regimen, and client related factors influencing VL suppression among adolescents.

5.1 Proportion of adolescents that attained VL suppression following 6 or more months of ART in Jinja RRH ART Clinic

The study found that 59% of adolescents had achieved a suppressed viral load. Viral load is recommended as the preferred monitoring approach to diagnose and confirm ARV treatment failure. Findings are in agreement with the study conducted in South Africa (Nglazi et al., 2012) which reported lower viral suppression levels among adolescents. This means that VL suppression among adolescents on ART treatment at Jinja RRH ART clinic have a critically low VL suppression in comparison to national VL level (71.7 for age group [10-15] and 71.3 among age group [15-20] years). Findings also suggest more interventions are needed to meet the WHO targets of 90%. Findings could also mean there is systematic failure in management of adolescents on ART at Jinja RRH ART clinic that require targeted research in areas of child social support, nutrition and client care provider relationship.

However, findings are in disagreement with findings in Rwanda, Senegal and South Africa indicate higher VL suppression of 86% and 80% respectively. But these studies were not age

specific and VL was observed over 18 months. Adolescent HIV program managers in Uganda should learn from success stories of these countries.

5.2 Socio-demographic factors influencing VL suppression among adolescents on ART in Jinja RRH ART Clinic

Family members' knowledge of the adolescents HIV status is associated with viral load suppression at Jinja RRH ART Clinic ($X^2$6.11, p=0.013). This is in line with reports from Tanzania(Buma et al., 2015) which indicated that early disclosure brings about courage for one to strive against the disease than looking for solution when it is late hence better adherence, immunity and viral load suppression outcomes.

Getting family support was associated with viral load suppression ($X^2$5.331, p=0.024). However no specific support was found to associate with VL suppression. This suggests that adolescents have different needs that are interdependent for the general well-being of adolescents on ART. A study in Cambodia (Janssen et al 2009) found higher risk of treatment failure in children who did not have at least one parent. They attributed this to support given by parents to adolescents. Adolescents need psychosocial support, nutrition, and financial support to lead their life while on treatment. Children as well need support to adhere to ART medication. Findings suggest that care givers should ensure that children who do not get family support are attached to social care organizations to follow up on opportunities to family support since it's the most sustainable.

Level of education was significantly associated with viral load suppression. A US study on adolescent adherence to medication (Shacham et al., 2010) found low self-reported adherence and having a viral load greater than 400 copies among patients with lower education in comparison to those with high education. Adolescents with higher education tend to understand

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and use instructions compared to their counterparts who are uneducated. Findings emphasize the need to have all adolescents in formal education regardless of their HIV status.

Unlike in other studies, age is not a determinant for viral load suppression as found in the study. This contradicts with another study in Uganda (Kamya et al 2007) who concluded that viral load suppression was more common in adults than children. Study variation could be explained by difference in target population as our study focused on only adolescents. This is an age group undergoing psychological and physiological changes in addition to being dependent on adult family members. Further research in reference to age is required.

However, other findings disagree with a study in the USA (MDCH, 2014) which concluded that older adolescents were more likely to have unsuppressed viral load at 6 months while younger adolescents were likely to experience viral load failure at 12 months. A difference could be because in our study, VL was not categorized at 6 months and twelve months while dates of second (latest) the viral load taken were not available.

Other demographic factors not associated with VL suppression were gender, religion and family composition. Similar findings have been reported in Swaziland and South Africa (Jobanputra et al 2015, Davies et al., 2012). This means that male and female adolescents have equal risk of viral load suppression failure regardless of composition of their family or religion.

5.3 ART regimen related factors influencing VL suppression among adolescents on ART in Jinja RRH ART Clinic

The study found that CD4 count at ART initiation is a predictor of viral load suppression. Adolescents with initiation viral load of 0-200 copies were 1.376 times (CI: 95% 0.584-3.242, P=0.009) likely to experience viral load suppression failure. In the study, adolescents who were

transferred into care on ART from other facilities were excluded in this analysis since baseline CD4 counts were not known. According to the study by(Hughes et al., 2011), virological failure 6 months after the start of ART was associated with lower subsequent CD4 cell counts, with greater CD4 cell count reduction for more recent virological failure and higher viral load.

Evidence of pre regimen change counseling was found to be a predictor of VL suppression. Adolescent whose files had records of counseling done were 2.2 times more likely to have VL suppression than those who verbally reported counseling. Counseling is a key component in client care right from pre-testing care. Findings are in agreement with(Dewing et al.) study conducted in the Western Cape, South Africa which evaluated the quality of counseling provided by lay ARV adherence counselors. It was clear that information was the primary technique used by counselors for managing non-adherence taking various forms including advice, expressions of concern, warnings and moralizing. Generally, advice related to strategies for overcoming barriers appeared to be appropriate to what was known about the clients' situation but nothing has been said on keeping records for counseling. The Ministry of Health and Jinja Regional Referral hospital should direct more effort to orienting, training, recruiting and supervising counselors to ensure records are kept for future reference by other healthcare staff in relation to supporting adolescent's adherence.

In a Swiss study(Greub et al., 2001) evaluated the impact of ART viral load and progression to AIDs or death and found that 90.7% treatment- naïve cohorts reached undetectable level compared to 70.3% among pretreated patients. Treatment rebound was registered among 20.1% treatment naïve and upto 40% among pretreated patients. This suggests that patients who have treatment failure are less likely to achieve VL suppression.

WHO clinical stage in the last 12 months was a predictor of viral load suppression. With reference to who staging, the study indicates that adolescents who were at stage III were 3.7 times more likely to have VL suppression as compared to those at stage I and II. Findings were in line with (Edison et al., 2014a) study conducted in Georgia during 2010 where disease stage at diagnosis was found to be a statistically significant indicator of viral suppression among clients retained in care. The study further suggested that the prevalence of viral suppression took a down ward trend with earlier disease stage at diagnosis; where fewer persons with stage 1 disease and stage II disease achieved viral suppression, compared with persons with stage III disease at diagnosis. This particularly emphasizes that clinical monitoring of clients should stepped up by the hospital management and therapeutic committee to ensure adolescents who present at stage III are immediately enrolled on ART.

A patient's history of viral suppression can provide important information about the risk of viral failure after a change in ARV. Adolescents who experienced treatment failure were 1.24 times more likely not to achieve VL suppression. Treatment failure disrupts optimally required level of the drug's active substance in circulation. Findings contradict with(Childs et al., 2015)study on outcomes after viral load rebound after first line treatment conducted in the UK and Ireland which found out that a third of children with virological rebound suppressed without switch but instead clinicians should consider the possibility of re-suppression with adherence support before switching treatment in children with HIV. Previous studies in Uganda have found 8.6%-12% of Ugandans who had never taken ARV drugs to be having HIV transmitted drug resistance.

This study found no association between ART adherence and VL suppression. Previous studies have attributed high viral load to poor regiment adherence rate. In a study in British Colombia, viral load of less < 500 copies were observed among 84% of individuals with adherence rate of

95-100% compared to 64% of those who had adherence level of 90-95%. Failure for ARVs to achieve undetectable SVL has been attributed to factors such as drug potencies, absorption and drug penetration (Erron JJ.2000, Liuzzi G, et al 2003) it's unclear whether these could be confounding factors on VL suppression among adolescents at Jinja RRH ART Clinic. Further studies in these are of research are required. A contradiction arising from this study could be attributed to response bias since adherence to ART at Jinja RRH ART clinic is determined by self-reporting.

5.4 Client related factors influencing VL suppression among adolescents on ART in Jinja RRH ART Clinic

Being attended to together with children less than 10 years was associated with viral load suppression among Adolescents (X^2 4.21 p=4.21). The majority 97% of adolescents were attended to together with children compared to 74% who were cared for together with adult. However this variable was not significant at multivariate level. Convenience and privacy is a key component in HIV client. This age group is a period of self-discovery and forming opinion of environment. Lower age group adolescent may consider they children while the upper are in transition to adulthood.

Findings contradict with a study in the US which found that adolescents and young people who attend who attend healthcare services in adult-oriented HIV clinics are less likely to start ART, achieve viral load suppression and adhere to ART. Earlier reports (Evans et al., 2013) indicated that adult oriented models of care for adolescents may not meet specific needs of adolescents and young people. However in Ugandan context, despite a National policy for adolescent's health providing for adolescent tailored services, more adolescents are being enrolled on adult oriented care.

Confidentiality, a key component of HIV care was not associated with adolescent VL suppression. However nearly three quarters (73.5%) agreed that their confidential information was being kept well by the Clinic. An optimal confidence is required to ensure compliance and adherence to ART and eventually achieve viral load suppression.

CHAPTER SIX: CONCLUSION AND RECOMMENDATIONS

6.1 Introduction

This chapter deals with the brief summary of factors influencing viral load suppression among adolescents aged 10-19 years old at Jinja RRH ART Clinic. It also comprises of the conclusion of study findings and implications to District management and recommendations.

6.2 Conclusion

Level of viral load suppression: viral load suppression level among adolescents aged 10-19 was 59%.

Socio-demographic factors: Family members' knowledge of the adolescents HIV status, family support, level of education and family support were associated with Viral Load suppression. Age, gender, family composition and religion were not associated with viral load suppression.

ART regimen factors: CD4 count at initiation, Evidence of regimen counseling and WHO clinical staging influenced viral load suppression. Initial viral load, age at ART initiation, and ART adherence did not influence viral load suppression.

Client related factors: Being attended to together with children less than 10 years was the only client related factor influencing viral load suppression.

6.3 Recommendations

From the findings of the study, we therefore recommend the following;

To Jinja Hospital administration and management

While adhering to confidentiality, program counselors should work with adolescents, their close family members to ensure successful positive sero status disclosure.

HAART related Services at the facility should be adolescent friendly through age specific triaging and provision of privacy.

HAART programs should develop social and economic support system for adolescents that include family members and well wishers to prevent treatment failure.

All counseling session records including pre-regiment change should be kept within client files.

Need to monitor suppression by age group to understand different needs and challenges that affect suppression

To Jinja District Health Office

Supervise and monitor the healthcare workers especially counselors to document session proceedings such that treatment plans can be developed for those in need of intensive adherence counseling

Plan to conduct mass sensitization about importance of adherence, family support for HIV positive adolescents on ART

To the government/Ministry of Health

Policy on pre-regimen counseling and adolescent friendly service design should be revised and enforced.

Viral load testing should be made accessible to all adolescents through an effective referral system, increasing number of health facilities with viral load testing equipment and trained personnel.

Adolescent clients should be managed based on clinical care such CD4 count and WHO clinical staging

Conduct orientation for counselors interacting with adolescents

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APPENDICES

APPENDIX 1: CONSENT FORM FOR QUESTIONNAIRE

Good day Sir/Madam

My name is _____ (mention your names). I am collecting data on behalf of Julian Natukunda, a student at the International Health Sciences University (IHSU) in Kampala. I do not represent the government or any political party.I would liketo study the factors influencing viral load suppression among adolescents aged 10-19 years at Jinja Regional Referral Hospital. All information gathered will be used for study purposes and results shared with the hospital to improve health outcomes for adolescents served by this hospital. Your identity and the information collected will be kept confidential and used for the purpose of this study only. This interview will take approximately 20 minutes however you can choose to not to take part or opt out at any time. Do you have any questions before we start the interview?

Risks:
The questions asked in the study are related to positive living with HIV and may cause some emotional discomfort, particularly if you or your family has been negatively affected by the illness.

Benefits:
Information obtained from your participation will help us to determine the factors responsible for your success or failure to suppress the virus from multiplying in your blood and therefore inform the healthcare providers about key steps to take to improve your overall treatment outcomes.

Consent:
I, the signing participant, certify that I have been informed about the details regarding this survey. I have had a chance to ask questions and my questions were fully answered. I understand the objectives, the procedure and benefits of the study. Also, I was given sufficient time to reflect on the information received. I decide voluntarily to participate in this study. I have been informed that I can revoke my consent at any time without providing justification or consequences. I understand that if I have questions about the study I can contact the responsible researcher at any time.

Participant's signature/thumb print_____ Date: _____

Care-taker's signature/thumb print _____ Date: _____

Interviewer's signature_____Date: _____

Contact persons: If you have any question regarding this survey, your rights or suffer any injuries, please contact Julian Natukunda, Tel. 0753 333 527.

APPENDIX II: QUESTIONNAIRE

Serial No:_____   Date:_____

If consent is secured, proceed with the interview and administer this tool by asking questions herein.

SECTION A: SOCIO-DEMOGRAPHIC CHARACTERISTICS(*Tick the correct answer from options given*)

Q1. Record the gender of the adolescent by ticking one of the options below.

1.Male ☐   2. Female ☐

Q2. How old are you?_____(in completed years)

Q3. Do you have both parents?

1.Yes ☐   2. No ☐

Q4. Which other members of the family do you stay with? (tick all that apply)

1. Father ☐
2. Mother ☐
3. Brother ☐
4. Sister ☐
5. Uncle ☐
6. Aunt ☐
7. Others (Specify):_____

Q5. Do all your members know your status?

1.Yes ☐   2. No ☐

Q6. If yes, do they support you?

1.Yes ☐   2. No ☐

Q7. If yes, in which ways do they support you?

1. Accommodation ☐
2. Education/school ☐
3. Feeding ☐
4. Basic requirements ☐
5. Others (Specify):_____

Q8. Is there any member from your family who takes the same medicines as you do?

1.Yes ☐   2. No ☐

Q9. What is your religion?

1. Roman Catholic ☐
2. Anglican/Protestant ☐
3. Moslem ☐
4. Pentecostal/Evangelical ☐
5. Others (Specify):_____

Q10. Do you believe in God healing your condition?

1.Yes ☐   2. No ☐

Q11. Have you ever been prayed for to deliver you from illness (HIV/AIDS)?

1.Yes ☐   2. No ☐

12. If yes, did you take your medicines as prescribed during the time or after you were prayed for?

1.Yes ☐   2. No ☐

13. What is the highest level of education attained?

1. Never gone to school ☐
2. Pre-primary ☐
3. Primary ☐
4. Ordinary level ☐
5. Advanced level ☐
6. Tertiary ☐

SECTION B: ART REGIMEN RELATED FACTORS

(See data extraction tool)

SECTION C: CLIENT-PROVIDER FACTORS

Q14. Have you been attended to at the same time with adults in the same clinic space?

1.Yes ☐   2. No ☐

Q15. Have you been attended to at the same time with children younger than 10 years in the same clinic space?

1.Yes ☐   2. No ☐

Q16. Do you feel the information concerning you in this clinic is kept confidential?

1. Strongly agree its kept confidential ☐
2. Agree ☐
3. I don't Know ☐
4. I disagree ☐
5. I strongly disagree ☐

Q17. Are you comfortable with the days when your appointments are scheduled?

1 .Yes ☐   2. No ☐

Q18. If yes, Why?

_____

_____

Q19. If No, Why?

_____

_____

Q20. Overall, do you feel satisfied with the provider services in this healthcare facility?

1. Very satisfied ☐
2. Satisfied ☐
3. Won't say ☐
4. Un satisfied ☐
5. Very unsatisfied ☐

APPENDIX III: DATA ABSTRACTION

Complete this form for HIV positive adolescents who has been on ART for 6 or more months and had a viral load test done.

A: SOCIAL DEMOGRAPHICS

A1: Gender/sex: 0. Female 1. Male	A2: Age in completed years	ART Card No:
A3: Date of Birth __(DD)__ / _(MM)__ / __(YYYY)__	**A4: Marital status** 0. Child 1. Never Married 2. Married	3. Living together 4. Divorced/ Separated **5.** Widowed

B.ART REGIMEN

B1: Care entry point: (TICK the number)			
1. eMTCT 2. TB	3. YCC 4. Out patient	5. SMC 6. Outreach	7. Others, specify:

B2. Date of 1st viral load was takenDD___/MM____/____YY	B3.Result_____copies (at VL)
B4. Latest viral load result:_____copies Below 1000 copies [ ] 1000 copies and above [ ]	B5. Suppression status:_____ (S=suppressed, NS=not suppressed)

B6	Date of initiation on ART _____	B7: Age at Initiation _____
B8	ART regimen at Initiation(*Tick from the options below*) 1. TDF/3TC/EFV 2. AZT/3TC/EFV 3. AZT/3TC/NVP 4. ABC/3TC/NVP 5. ABC/3TC/EFV 6. D4T/3TC/NVP 7. D4T/3TC/EFV 8. DD1/3TC/NVP 9. Other (Specify)_____	B9. CD4 at Initiation_____

B10.	**Failed on treatment?** 1.Yes 2. No	**B11. ART regimen changed to** **1.TDF/3TC/LPV/r** **2.AZT/3TC/LPV/r** **3.ABC/3TC/LPV/r** **4. Other (Specify)_____**
B12	**If yes, was the adolescent taken through intensive counseling before regimen change? Yes 2. No**	**B13. Is there evidence of counseling on the client's file?**
B14	**How long has the adolescent spent on 2nd line regimen?_____**	

B15 .Appointment keeping behaviour for 12 months before the latest VL:

Month No.	12	11	10	9	8	7	6	5	4	3	2	1
Appointment Kept (see codes below)												
Adherence (G=good, F=fair, P=poor)												
Wgt (kg)												
WHO staging (1,2,3,4)												
Nutrition status (SAM/MAM)												
OIs (see codes below)												
Illness and if **Other**, please specify _____	*Codes : **Z**-Zoster, **P**-Pneumonia, **D**-Dementia/Enceph, **Thrush**-Oral/vaginal, **COUGH**, **FEVER**,**DB**-Difficult breathing, **W**- weight loss, **UD**-Urethral discharge, **PID**- pelvic inflammatory disease, **U**-ulcers-mouth or other-,**GUD**- genital ulcer disease, **KS**- Kaposi sarcoma, **CCM**- Cryptococcal Meningitis, **IRIS**- Immune reconstitution inflammatory syndrome*											
Appointment keeping codes	**Good**- if client visit falls within 7 days before/after the scheduled date **Poor**- if client visits 7 days after scheduled date but before1 month **Lost**- if client visits the clinic 1-3 month after the scheduled date **LTFP**- if clients does not visit for 3 months or more											

APPENDIX IV: KEY INFORMANT GUIDE

The key informant questions will be administered to Head of the HIV Clinic (adult), In-charge Children's Clinic, and Clinical care coordinator, Community Linkages Coordinator, Clinicians and Nurses allocated to the HIV clinics at Jinja Regional Referral Hospital.

SECTION A:SOCIO-DEMOGRAPHIC FACTORS

1. Can you describe the nature/ kind of families of adolescents attending your clinic? Do you think this affects their adherence and eventually viral load suppression?
2. Do you think religion of the adolescents could have an effect on their viral load suppression?
3. Does one's level of education influence their adherence and treatment outcomes (in this case viral load suppression)?

SECTION B:ART-REGIMEN RELATED FACTORS

4. What would be your take on the effect of the following in regard to viral load suppression of an adolescent?
   i)   Age at initiation on treatment. Please explain?
   ii)   Type of regimen at initiation. Please explain?
   iii)   Duration on the regimen. Please explain?

SECTION C:CLIENT RELATED FACTORS

5. How would you rate confidentiality of adolescent records in this clinic? why?
6. Do you think appointments scheduled are convenient to the adolescents? Explain?
7. Are there specific staff trained/allocated to handle adolescent services?
8. Do you think adolescents attending the clinic are satisfied with your services? Why?
9. Do you have a specific day/clinic for adolescents? Explain? What other interventions have you put in place to serve the adolescents better?
10. If an adolescent missed their appointment and came on another day, would you attend to them? Do you attend to them with adults/children in the clinic on that day?

Thank you very much for participating in this discussion!

APPENDIX V: MAP OF STUDY AREA/ JINJA REGIONAL REFERRAL HOSPITAL

APPENDIX VI: INTRODUCTORY LETTER

IHSU INTERNATIONAL HEALTH SCIENCES UNIVERSITY
sanitas per scientiam

making a difference to health care

Dean's Office-Institute of Public Health and Management

Kampala, 3rd Aug 2016

THE DIRECTOR
JINJA REGIONAL REFERRAL
HOSPITAL

Dear Sir/Madam,

RE: **ASSISTANCE FOR RESEARCH**

Greetings from International Health Sciences University.

This is to introduce to you **Natukunda Julian** Reg. No. 2014-MPH-WKND-016 who is a student of our University. As part of the requirements for the award of a Masters Degree of Public Health, the student is required to carry out field research for the submission of a Research Dissertation

Julian would like to carry out research on issues related to: **Factors Influencing Viral Load Suppression Among Adolescents on ART. A Case Study of Jinja Regional Referral Hospital.**

I therefore request you to render the student such assistance as may be necessary for her research.

I, and indeed the entire University are thanking you in anticipation for the assistance you will render to the student.

Sincerely Yours,

Alege John Bosco
Ag. Dean, Institute of Public Health & Management
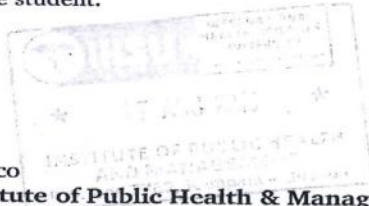
APPENDIX VII: CORRESPONDENCE LETTER

JINJA REGIONAL
REFERRAL HOSPITAL
P.O. BOX 43
JINJA

August 30, 2016

The Head of Department
Paediatrics
Jinja Regional Referral Hospital

Re: NATUKUNDA JULIAN

This is to introduce to you the above named student from Institute of Health
Policy and Management of International Health Sciences University. She
has come to Jinja Regional Referral Hospital to do a research on *"Factors
Influencing Viral Load Suppression among Adolescents on Antiretroviral
Therapy. A Case Study of Jinja Regional Referral Hospital Uganda"*.

Kindly assist her.

Dr. Ssenyonjo

FOR HOSPITAL DIRECTOR
★ 3 0 AUG 2016 ★
JINJA REGIONAL REFERRAL HOSPITAL
P. O. BOX 43, JINJA

Dr. Senyonjo Godfrey
FOR: CHAIRMAN RESEARCH COMMITTEE