

**FACTORS ASSOCIATED WITH ANTIRETROVIRAL THERAPY  
ADHERENCE AMONG ADOLESCENT LIVING WITH HIV – A CASE OF  
KIGOMA REGION**

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**A DISSERTATION SUBMITTED IN PARTIAL FULFILMENT FOR THE  
REQUIREMENTS OF THE DEGREE OF MASTER OF PROJECT  
MANAGEMENT OF THE OPEN UNIVERSITY OF TANZANIA**

**2018**

### CERTIFICATION

The undersigned certifies that he has read and hereby recommends for acceptance by the Open University of Tanzania a dissertation titled; "Factors Associated with Antiretroviral Therapy Adherence among Adolescent Living with HIV: A Case of Kigoma Region" in partial fulfilment for the requirement of the degree of Master of Project Management.

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Date

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### **DECLARATION**

I, Gerald Charles, do hereby declare that this dissertation is entirely my work and it has not presented to any other Institute of higher learning for a similar or other academic award. I have acknowledged all the sources or quoted used in this study.

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Signature

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Date

### **DEDICATION**

I dedicate this dissertation and the its results to all adolescents living with HIV in Tanzania especial younger ones who have no capacity of taking care of their own but depend on their caretakers for ART supervision and guidance. These ALHIV might face the ART adherence challenge if they get negative motivation or poor supervision. I have worked with HIV program for about 5 years including HIV prevention among adolescent girls and young women and gained the passion of finding different ways to improving the ART adherence among the HIV infected adolescents.

### **ACKNOWLEDGEMENT**

I would like to thank God for giving me the gift of life and the strength throughout my Master degree course and dissertation. I thank Maweni medical office in charge and all Maweni CTC staffs for their cooperation which enabled me to carry this study finding the factors affecting ART adherence among ALHIV. My special thanks to Dr. Raphael Gwahula for his guidance and supervision throughout my dissertation process. In addition, I am expressing my special thanks to the academic and administrative staff of the Open University of Tanzania for their support and co-operation during the course of my studies.

## ABSTRACT

It is estimated that 75% of the world ALHIV comes from 12 countries and Tanzania ranks number three among those countries (UNAID 2016). Between 2010 to 2015 Tanzania scale up ART coverage serviced for more than 25% (UNAID 2016) which lead to reduction of HIV/AIDS-related morbidity and mortality however the effectiveness of ART treatment depends on optimal ART adherence of  $\geq 95\%$  (WHO 2003; Chesney MA (2006); Many studies in Tanzania have focused on ART adherence among the adults and few studies covered the children and adolescents. This is cross section quantitative study to determine the level of adherence and factors associated with ART adherence among adolescent living with HIV aged 10-19 years who have been on ART treatment for at last 6 months at Maweni region hospital. ART adherence is measured by self-reporting of number of pill that ALHIV did not take for the past one week. Simple random sampling technique was used to obtain study participants and a structured questionnaire used for data collection. Binary logistic analysis used with Statistical Package for Social Sciences (SPSS) version 16.0. Results showed that independent variable "discrimination" is statistical significant associated with poor ART adherence of  $< 95\%$  (95% confidence interval and p-value of .026). Other variable within individual, social, medical and structural factors were not statistical associated with ART adherence. Social Cognitive Theory have proven to work in this study as discrimination is the negative influence which hinder ALHIV from learning good ART adherence behavior. The study recommend that more study to be done studying ART adherence among adolescent living with HIV in different setting composing of rural and urban areas with high sample size.

Keywords: ART adherence, Adolescents.

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### **LIST OF ABBREVIATIONS**

AIDS	Acquired immune deficiency syndrome
ALHIV	Adolescents Living with HIV
ART	Antiretroviral therapy
ARV	Anti-retro viral
CD4	Cluster differentiation
CTC	Care and treatment center
FDC	Fixed dose combination
HIV	Human immune deficiency virus
HTC	HIV testing and counseling
HVL	HIV Viral Load
MOHCDGEC	Ministry of Health Community Development Gender Elderly and Children
PLHIV	People living with HIV
R/CHMT	Regional/District Health Management Team
SCT	Social Cognitive Theory
WHO	World health organization

## **CHAPTER ONE**

### **INTRODUCTION**

#### **1.1 Chapter Overview**

The introduction as the first part of this study; it explained the background of HIV infection and ART adherence among the adolescents and adults living with HIV/AIDS. The chapter also explains the advantage of good ART adherence and their contribution toward good outcome of ART medication; It also build the foundation research need of why adolescents is the important group to study as they face unique challenges leading to poor/ sub optimal ART adherence. This study was done to understand the factors associated with ART adherence among adolescents living with HIV (ALHIV). This part of the background have cover the following topics; background to the research problem, statement of the research problem, general objective of study, specific objective of the study, research questions, significant of the study, organization of the report and limitation and delimitation of the study.

#### **1.2 Background to the Research Problem**

Sub-Sahara Africa is highly infected region with HIV in the world; it carries 70% of people living with HIV in the world and 80% (1.4 million) of world's HIV infected adolescent (WHO 2016, UNICEF 2016). It has been reported that 75% ALHIV in the world come from only 12 countries of which Tanzania ranks number three with total of 81000 ALHIV (UNAID 2016). In recent years there is an increase of number of newly diagnosed adolescent infected with HIV in Sub-Saharan countries due to aggressive scaling up of HIV testing and counseling services (UNAID 2014 and

UNICEF 2016).

Adolescent are at risk of HIV infection due to early sexual debut, early pregnancies, child marriage, transgender sex, gender based violence, drug use and HIV acquisition from their mothers (UNICEF 2011; WHO 2007). In Tanzania ART services and coverage has been scaling up to PLHIV where by between 2010 to 2015 there is increase of more than 25% ART services coverage (UNAID 2016). The use of ARV drugs has reduces HIV/AIDS-related morbidity, mortality, and improving the quality of life of PLHIV however the effectiveness of ART treatment depends on optimal and sustainable adherence to the prescribed ART regime (WHO 2003; Chesney MA (2006); Tanzania guideline for management of HIV and AIDS 2017). ART adherence rates as high as 95% has outcome benefit of suppressing of viral replication, decrease in viral load, increases in CD4 cell count, and improvement of the quality of life (Parienti et al., (2010), Adejumo et al., (2015). Poor ART adherence leads to disease progression and ART drug resistant (Tanzania guideline for management of HIV and AIDS 2017)

ART adherence rates among adolescents living with HIV (ALHIV) has shown to vary across different region in the world; In North America it has been found that 53% of ALHIV have optimal ART adherence, in Europe; 62% of ALHIV have optimal ART adherence, in America; 63% of ALHIV have optimal ART adherence and in Africa; 83% of ALHIV have optimal ART adherence (Kim SH et al, 2014). Poor adherence to ART medications results to progression of HIV infection to AIDS which also is associated with emerging of opportunistic infection and even death. Death among ALHIV has been increasing comparing to other age groups (WHO



2013&2014) whereby between 2005 and 2012 AIDS related deaths among ALHIV increased by 50% and are associated with poor ART adherence, emotional and behavioral factors (Idele et al., 2014; Mellins et al., 2013). Many studies in Tanzania have focused to study ART adherence among the adults and few studies covered the children plus adolescents.

According to different studies done in Tanzania have shown different levels of ART adherence; Nyonge et al, (2015) found 84% of children and teenagers 2-19 years and the mean age was 9.8years had optimal ART adherence of  $\times$  95%, Nshea et al., (2013) found that 24.6% of pediatric had good adherence and Watt et al 2010 reported that 84% of adults had excellent ART adherence of 95% and above. As most of the studies have not studies ART adherence among the adolescents of specific age group 10 to 19 years of age; this study will determine the level of adherence among adolescent aged 10-19 years as the proper definition of adolescent and factors associated with their optimal or sub optimal adherence (WHO).

Different factors have shown to affect adherence to ART medication among ALHIV; Adolescent self commitment, availability of emotion and practical life support, client ability to fit the medication into their daily routine, uninterrupted availability of ARVs, accessibility to CTC services and good tolerability to ARVs which have the positive influence ALHIV to learn good ART adherence behavior and continuing to adhere on ARV medications (Tanzania guideline for management of HIV and AIDS 2017). Adolescent being most vulnerable phase of maturity, it's also characterized by many changes biological, psychological and social. It is a transitional phase of

growth and development took place between childhood and adulthood. Adolescents may have concerns about confidentiality, which may impact willingness to discuss personal issues with the caregiver or healthcare.

### **1.3 Statement of the Research Problem**

Despite Tanzania scaling up ART service across the country, adherence to ART medication remained a challenge for better outcome of viral suppression and raise of immunity against HIV viruses (Tanzania guideline for management of HIV and AIDS 2017). Most of the studies done in Tanzania on ART adherence have focused on children under 15 years of age and adults aged 15 years and above which have showed variation of ART adherence rates; the study done by Nyonge et al., (2015) among children and teenagers aged 2 to 19 years found 84% of the participants had optimal ART adherence level of  $\times 95\%$ .

The study done by Nshea et al., (2013) found that only 24.6% of pediatric found to have good adherence. It was reported that there have been increase of AIDS related death among ALHIV in contrast to other age group in recent years, the death increase is are associated with poor ART adherence among adolescents as the face the unique challenge related to their biological, psychological and social factors (WHO 2013&2014, Idele et al., 2014). This study will determine the level of ART adherence among adolescents aged 10-19 years and the factors associated with poor or optimal ART adherence at Maweni Regional Hospital Kigoma. This study has chosen the adolescent age of 10 to 19 years. The world Health Organization (WHO) defines Adolescent as any person between ages 10 and 19 years. Adolescent is rapid phase of maturity where by biological maturity precedes psychosocial maturity.

## **1.4 General Objective**

The general objective of this study is to determine the level of adherence and the factors associated with adherence to antiretroviral therapy among adolescents living with HIV (ALHIV) who have been on ART for at least 6 months at the Maweni Region hospital

### **1.4.1 Specific Research Objectives**

- i. To determine the percentage of ALHIV on ART for at least 6 months at Maweni Regional Hospital with optimal ART adherence of  $\geq 95\%$  and percentage of sub optimal ART adherence of  $< 95\%$ . (level of ART adherence)
- ii. To identify factors influencing ART adherence among ALHIV on ART for at least 6 months at Maweni Regional Hospital
- iii. To propose appropriate strategies for improving adherence among adult ALHIV on ART based on the study findings and the evidence-based literature review.

## **1.5 Research Questions**

- i. What is the percentage of ALHIV on ART for at least 6 months at Maweni Regional Hospital with optimal of  $\geq 95\%$  and poor adherence of  $< 95\%$ ?
- ii. What are the factors influencing ART adherence among ALHIV on ART for at least 6 months at Maweni Regional Hospital
- iii. What are the appropriate strategies for improving adherence among adult ALHIV on ART based on the study findings and the evidence-based literature review?

### **1.6. Significance of the Study**

This study expect to provide the findings on the level of ART adherence among the adolescents living with HIV in Maweni referral hospital and also will allow to understand which factors and how they are associated with poor or optimal ART adherence among adolescents living with HIV. These findings will significantly help Maweni referral hospital, district health management team, regional health management team, ministry of health community development gender elderly and children and the policies maker in addressing the ART adherence issues among PLHIV and ALHIV.

The findings will allow Maweni regional referral hospital to incorporate the factors associating with poor ART adherence in their quality improvement plans to improving ART adherence among ALHIV. These results will help district health management team and regional health management team to strategies the interventions to address the factors associated with ART adherence and including them in their planning and budgets, the results will also help them to understand the challenges areas for their routine supportive supervision of district and region health facilities. In addition the finding will help the MOHCDGEC and policy makers to formulate different strategies in improving the friendly HIV serves delivery to adolescents that can improve their adherence to ART. Finding of this study will also open the room for another study targeting adolescents living with HIV.

### **1.7 Organization of the Report**

The report has been written with five chapters; Chapter one is the introductory part of the study which also consists of statement of the research question, study

objectives and explains the significance of the study and limitation and delimitation of the study. Chapter two covers the literature review which consists of the conceptual definitions, theory explanation, empirical studies review, conceptual framework and explanatory of different factors associated with ART adherence. Chapter three covers the research methodology which consists of the research philosophy, research design, research area, research population, sampling procedures, measurement of the dependent and independent variables, data analysis and ethical considerations. Chapter four covers the study results which consists with reliability test, logistic regression assumption testing, descriptive analysis, binary logistic regression and factors associated with ART adherence. The final chapter is chapter five which cover the discussion of findings and results, proposed strategies for improving ART adherence, theoretical implication and recommendations.

### **1.8 Limitations and Delimitations of the Study**

During the carry one of this study, the number of limitation were expected and also observed which might posed a challenge on conducting a research at its best. One of the limitations was the confidentiality of information which was a concern for some of the respondents especially caregivers, some of the care givers show uncooperativeness to participate or to allow their children (ALHIV) to participate in this study. Another limitation was the was limited time to access the adolescents living with AHIV as Maweni regional referral hospital has only two adolescent care and treatment clinic in every month, this cause the data collection to take longer time and was difficult to collect data from many ALHIV and their caregiver as the HIV clinic was ongoing. Another limitation was due to that all the ALHIV aged 10 to 17

years were included in this study after getting the consent from the caretakers, some of the adolescent at this age who attended the CTC without their care takers were not included in the study during data collection.

To overcome this, a researcher asked for the average number of ALHIV attending at CTC per clinic day which was 30. Researcher used three months for data collection by interviewing the average of 15 ALHIV per clinic day. The researched also explained to the care taker and ALHIV the purpose of the study and that it is only for academic purposes and the confidentiality will be maximum maintained whereby no name of any identification information (like place of living) will be recorded during entire study process. Also the researcher explained to every correspondent their right to participate or not participate in the study.

## CHAPTER TWO

### LITERATURE REVIEW

#### 2.1 Chapter Overview

This chapter covers the conceptual definitions of ART and adolescents, it also covers the theoretical review supporting this study, literature reviews on similar studies conducted by other researchers focused on the factors influencing ART adherence among ALHIV; ART adherence measures, level of ART adherence, factors associating with ART adherence, research gap, theoretical gap, summary of empirical literature reviewed by a researcher with significant to this study and conceptual framework that draw the relationship between factors studied and ART adherence, the study theory and different citation used in construction of conceptual framework.

#### 2.2 Conceptual Definitions

ART Adherence:

*ART*: stands for antiretroviral therapy, is the use of HIV medication to treat HIV infection. People with HIV infection should use ART, which helps them to have longer and healthier life (Aids info Jan 2018). *Adherence*: The World Health Organization (WHO) defined adherence as "the extent to which individuals' behavior in terms of taking medications, following a diet, lifestyle change following agreed recommendations from a health provider. Poor or sub optimal ART adherence is when "a patient forgets to take medication, taking the incorrect dose, poor observation of treatment intervals/frequency or neglecting other agreed recommendations. In Tanzania, adherence level  $\times$  95% needed to maximize the

benefit of ART, adherence level less than 95% considered sub optimal (Tanzania guideline for management of HIV and AIDS 2017).

### **Adolescent:**

The world Health Organization (WHO) defines Adolescent as any person between ages 10 and 19 years. Adolescent is rapid phase of maturity where by biological maturity precedes psychosocial maturity. At this phase, there is development of individual and environmental characteristics which influence the changes taking place during adolescent affecting biological, social, physical and mental developments. Transitional phase of growth and development took place between childhood and adulthood through dramatic biological and emotional changes. Seeking health care might be challenging to some of the adolescents which might be caused by feel fearful, embarrassed, or uncomfortable when expressing health challenge especially concerning to HIV and reproductive health. They may be reluctant to disclose personal information for fear of being scolded or mocked, especially if a caregiver is present. May have concerns about confidentiality, which may impact willingness to discuss personal issues with the caregiver or healthcare

## **2.3 Theoretical Literature Review**

### **2.3.1 Social Cognitive Theory**

The conceptual roots for social cognitive theory come from Edwin B. Holt and Harold Chapman Brown's 1931 book theorizing that all animal action is based on fulfilling the psychological needs of "feeling, emotion, and desire". The most notable component of this theory is that it predicted a person cannot learn to imitate until they are imitated (Holt, E.B. & H.C. Brown (1931). In 1941, Neal E. Miller and John



Dollard revised Holt's social learning and imitation theory and argued four factors contribute to learning: drives, cues, responses, and rewards (Miller, N.E.; J. Dollard & R. Yale University (1941). In 1961 and 1963 Canadian psychologist Albert Bandura explained Social learning finding out why and when children display aggressive behavior.

In 1977 Bandura expanded on the idea of how behavior is acquired by combining some ideas from Miller and Dollard's research Evans, (Bandura A (1989), whereby Bandura claimed that Social Learning Theory shows a direct correlation between a person's perceived self-efficacy and behavioral change. Self-efficacy comes from four sources: "performance accomplishments, vicarious experience, verbal persuasion, and physiological states" (Bandura, A (1977). In 1986; Albert Bandura expanded and renamed his original theory and called it the new theory "social cognitive theory" (SCT) by Albert Bandura and in 1986. SCT states that learning of the behavior occurs in a social context with a dynamic and reciprocal interaction of the person, environment, and behavior.

Regarding to this study, ART adherence among the adolescents depends on interaction of the individual/ personal factors, social factor, environmental factors and behavioral factors. The basic assumptions of social cognitive theory are learning a behavior by observing others cognitive processes through living, symbolic or provide verbal instructions. Learning is an internal process which may or may not be accompanied by a change in current or future behavior. A young child requires constant guidance in order to achieve goals. As an individual matures, he or she will

take more ownership of goals and becomes more aware of the need to monitor and control their behavior in order to achieve his/her goals. People and their environment continually influence each other self regulation which increases with maturity.

The strength of social cognitive theory is that it takes into account the human behavior, cognition and environment and it addresses how reinforcement and punishment as well as self-efficacy effect motivation and how an individual will work to attain goals and the importance of self regulation in learning (Ormrod, 2014). The weakness of the SCT is that it does not address full complexities of human differences beyond acknowledging that they exist, like personality traits, biological differences, mood, etc., when explaining behaviors and their associated cognitive processes (Ormrod, 2014) which can have the contribution on process of learning behavior.

## **2.4 Empirical Review**

### **2.4.1 Studies Review**

Different studies have assessed the factors associated with ART adherence. This study has reviewed the following literatures; Bermudeza et al., (2006) in Uganda who did 5 years longitudinal control trial examining the effects of family-base asset intervention on ART adherence for adolescent aged 10-16 years. Ndiaye et al., (2013) in Gaborone, Botswana did a cross-sectional quantitative study to 82 ALHIV aged 13 to 18 years old. Nsheha et al., (2013) conducted a cross-sectional hospital based analytical study to 183 HIV-infected children aged 2 to 17 years who were on ART for 6 months with the same cohort in Kilimanjaro, Tanzania.

Carly Hudelson and Lucie Cluver (2014) did systematic review study determining factors associated with adherence to antiretroviral therapy among adolescents aged 10 -19 years living in low- and middle- income countries. Nyongea et al., (2015) did a mixed qualitative and quantitative cross-sectional study at Ifakara hospital; assessing ART adherence to children aged 2-19 years. Letta et al., (2015) did mixed cross-sectional study determining factor associated with ART adherence among adult PLHIV in Eastern Ethiopia. Cluver et al., (2016) did a cross-sectional in depth qualitative study titled achieving equity in HIV treatment outcome; can social protection improve adolescent ART adherence in South Africa. Xu et al., (2017) did a mixed qualitative and quantitative cross-sectional study assessed factors influencing antiretroviral treatment suboptimal adherence among perinatal HIV-infected adolescents aged 12 to 19 years in Thailand.

#### **2.4.2 ART Adherence Measurement**

Different studies have used different measurement of ART adherence level. Tanzania guideline of HIV/AIDS management measures the ART adherence in percentage where by ART adherence level of <95% is considered as poor/suboptimal ART adherence while the ART adherence  $\geq 95\%$  is considered optimal/good ART adherence. The following studies shows different methods used to measure the level of ART adherence; Burmudeza et al., (2006) used 30 days self-reporting of pills consumed and missed where by optimal adherence is when 95% of pills reported consumed.

Ndiaye et al., (2013) measure the outcome by excellent pill count and viral suppression, optimal ART adherence is when 95percentage of pills consumed and

HIV viral load 400copies/mL. Letta et al., (2015) ART adherence measured as taking all ART treatment in correct prescribed doses at right time (no dose missed or delayed  $\times 90$  minute) in week prior to study. Nyongea et al., (2015) pill count used as adherence measurement and optimal adherence defined as 80percentage of pills consumed.

### **2.4.3 Mode of Data Collection and Analysis**

Structural questionnaires used in collecting quantitative data and in depth interview technique used (Bermudeza et al., (2006), Ndiaye et al., (2013), Nsheha et al., (2013), Nyongea et al., (2015), Letta et al., (2015), Cluvar et al., (2016), Xu et al., (2017). Multivariate logistic regression analysis was used for data analysis where reliability was tested before carrying on the analysis, also the logistic regression assumptions were tested before carrying on the analysis. The logistic regression model formulated and used to determine the association of predictors and the outcome where by analysis was considered significant at  $p .05$  (Bermudeza et al., (2006), Ndiaye et al., (2013), Nsheha et al., (2013), Nyongea et al., (2015), Letta et al., (2015), Cluvar et al., (2016), Xu et al., (2017)

### **2.4.4 ART Adherence Level**

ART adherence level is the percentages of the adolescent with good (ART adherence  $\times 95\%$ ) or poor ART adherence level ( $<95\%$ ). The level of ART adherence defers with different studies; Cluvar et al., (2014) showed 36% of ALHIV in South Africa had poor ART adherence of less than 95%. Xu et al., (2017) found 51.60% of ALHIV had good ART adherence. Bermudeza et al., (2006) found 70.6%, (n= 494) of respondents reported had optimal adherence to ART, in the last 30 days. Letta et

al., (2015) found 85% ALHIV with optimal ART adherence Ndiaye et al., (2013) found that 99% of adolescent had good ART adherence. Carly Hudelson and Lucie Cluver (2014) found that ART adherence level ranging from 16% among a Zimbabwean population measured by self-report to 99% among Thai adolescents.

#### **2.4.5 Factors Associated with ART Adherence**

ART adherence has been found to be associated with different factors. According to the different literature review these factors which associated with ART adherence among the adolescents living with AHI have been grouped into four groups named; individual related factors, social and community related factors, medical related factors and structural related factors. These factors are explained below with the regard of different literature review cited.

##### **Individual related Factors**

Individual factors are the factors which they are directly concern with adolescents living with HIV (ALHIV), personal factors includes either their age, sex, ART knowledge, knowledge on outcome expectation of ART medication and others. Different literature showed different results concerning individual factors; Xu et al., 2(014) found that younger age, having a boy/girlfriend and extra cubiculum activities were significantly associated with suboptimal adherence.

The systemic literature review of 15 studies by Carly Hudelson and Lucie Cluver 2014 found that male gender was significant associated with good adherence in Uganda ( $p=0.005$  this results are the same as the study done in Tanzania by Nsheha et al 2013. Ndiaye et al., (2013) in Botswana. Carly Hudelson and Lucie Cluver

(2014) found that different studies showed that younger age of adolescence was significant associated with good adherence. Ndiaye et al., 2013 found that no association between knowledge of expected outcome of ART and adherence to ART. Nyongea et al., (2015) found that knowledge of HIV treatment being the lifelong is as not associated with good ART adherence on ART.

### **Socio and Community related Factors**

Social and community related factors are the factors that they surround the ALHIV at the community and social relation with other people in the community and their care takers. Different literature showed different results social and community related factors; The study by Nyongea *et al.*, (2014) showed ALHIV living with non-parental caretaker predicted poor adherence on ART, ALHIV with poor relationship with their caregiver and fear to disclose HIV status were significant associated with ART adherence (Xu et al., (2017) while high parental and caregiver supervision to ALHIV showed to associate with reduced non-adherence (Cluver et al., (2016).

The systematic review by Carly Hudelson and Lucie Cluver 2014 found that ALHIV living with single, or widow caregiver, low caregiver involvement and education, and caregiver being the only one knowing child's serostatus correlated with poor ART adherence. Adolescents attending to HIV support groups and daily provision of at least two meals to adolescent showed association with good ART adherence Cluver et al., (2016). Bermudeza et al., 2006 found that greater odds of adherence were also associated with greater frequency of meals (OR1.49, 95% CI: 0.9262.40)16). Nyongea et al., (2015) found that unfavorable school environment were associated with poor ART adherence among ALHIV

### **Medication related Factors**

Medical related factors are the factors that relate to ARV medications from type of ARV medication, frequency of taking, side effect, care given by health care workers and health facility. Different literature showed different results related to medical factors. Xu et al., (2017) found that ALHIV with difficulty in asking doctor questions were significantly associated with sub optimal ART adherence. Nsheha et al., (2013) found that poor ART adherence associated with children who developed ART side effects, could not attend clinic on regular basis and missed drug doses. Carly Hudelson and Lucie Cluver (2014) found that pill burden and route of ART administration are associated with ART adherence.

Nyogea et al., (2015) did not find association between pill burden and ART adherence but timing of morning ART dose was associated with poor ART adherence. The systematic review of studies by Carly Hudelson and Lucie Cluver 2014 found that administration of medication by adolescents was associated with suboptimal adherence, while caregiver administration of drug was correlated with good adherence and adolescents who taught how to take ART by a healthcare worker were more likely to have good adherence (Filho et al., 2008).

### **Structural related Factors**

Structural related factors are the factors concerning with infrastructures of health facility and outside health facility. These factors range from distance to health facility, availability of transport, health facility settings, availability of ART supplies and others. Different literature showed different results related to medical factors. Bermudeza et al., (2006) found adolescents living with HIV who live near to a

health clinic had greater odds associated with optimal ART adherence comparing to those living far away (OR 1.49, 95% CI: 1.02-2.18). Nsheha et al., 2013 found that children who were not attending to care and treatment clinic on regular bases which means they were missing their ART medication were associated with poor ART adherence. Carly Hunderson and Lucie Cluver (2014) found that in comparison of health facilities located in rural area versus urban, the health facility in urban areas were associated with optimal ART adherence.

## **2.5 Research Gap**

Different studies that have been done in Tanzania assessing the level and factors associated with ART adherence were focused on different ages comparing to this study; some of the studies have focused on children under 15 years of age and adults showing variation of ART adherence rates; the study done by Nyong'e et al, 2015 showed the adherence level of 84% among children and teenagers 2-19 years and the mean age was 9.8 years. Nshea et al, 2013 showed that only 24.6% of pediatric had good adherence and Watt et al 2010 reported that 84% of adults had optimal adherence.

There have been an increase of AIDS related death among ALHIV in contrast to other age group in recent years which is associated with poor ART adherence (WHO 2013&2014, Idele et al., 2014) which can be related with worsening of HIV infection to AIDS and this is due to increase in viral load and decrease in internal immunity and emerging of different opportunistic infections. This study will study factor affecting the ART adherence among ALHIV aged 10 to 19 years old as true definition of adolescent (WHO 2013&2014).



## **2.6 Theoretical Gap**

As the social cognitive theory explains that the learning behavior is influenced by the external and personal factors but also it failed to explain and address full complexities of human differences beyond acknowledging that they exist, like personality traits, biological differences, mood, etc., when explaining behaviors and their associated cognitive learning processes. This study to assess the factors associated with ART adherence among ALHIV have only includes the personal factors, social factors, medical factors and the structural factors and has not take into the account the gaps found in the theory (like personality traits, biological differences, mood, etc.), all the variables studied have been explained by the theory.

## **2.7 A Summary of Empirical Literature Review**

The below table summarized the literature review from different studies. The summary contains the title of the study, researcher name, year of the study, country which the study took place, methodological approach used and the summary of the researches findings. The total of eight studies has done in Tanzania, other parts of Africa and Asia has been summarized.

**Table 2.1: Summary of Empirical Literature Review**

<b>Author</b>	<b>Title (Country)</b>	<b>Methodology</b>	<b>Findings</b>
Bermudeza <i>et al.</i> , (2006)	Equity in adherence to antiretroviral therapy among economically vulnerable adolescents living with HIV in Uganda	Longitudinal randomized control trial examining the effect of a family-based financial asset intervention on ARV adherence for adolescents aged 10-16 years. 30 days self-reporting used to measure ART adherence. Optimal adherence considered $\geq 95\%$ . Multivariate logistic regression analysis used	Greater asset ownership, nearest distance to health clinic were significantly associated with ART adherence. Moreover, applying the composite equity scores, we found that adolescents with greater economic advantage in ownership of household assets, financial savings, and caregiver employment had higher odds of adherence by a factor of 1.70 (95% CI: 1.07-2.70). Optimal ART adherence was 70.6%
Ndiaye <i>et al.</i> , (2013)	Risk factors for suboptimal antiretroviral therapy adherence in HIV-infected adolescents in Gaborone, Botswana: a pilot cross-sectional study	Cross-sectional quantitative study among 82 ALHIV and their caregivers. Outcome measures included excellent pill count ART adherence ( $>95\%$ ) and virologic suppression (HIV viral load $<400$ copies/mL). Multivariate logistic regression analysis used	Overall ART adherence was 99%. 66% of ALHIV had excellent pill count ART adherence levels and 94% achieved virologic suppression. Male gender associated with sub optimal ART adherence
Nsheha <i>et al.</i> , 2013	Adherence to antiretroviral therapy among HIV-infected children receiving care at Kilimanjaro Christian Medical Centre (KCMC), Northern Tanzania:	Cross-sectional hospital based analytical study, from October among HIV-infected children aged 2 to 17 years Two-day self-report, one-month self-recall report, and pill count used to assess adherence. Adherence was considered good adherence if $\geq 95\%$	45 (24.6%) of participants found to have had good ART adherence when subjected to all three methods of assessment. Males were more adherent to ART than females. Poor ART adherence associated with children who developed ART side effects, could not attend clinic on regular basis and missed drug doses.
Carly Hunderson and Lucie Cluver (2014)	Factors associated with adherence to antiretroviral therapy among adolescents living with HIV/AIDS in low- and middle-income countries: a systematic review	Systematic review summarizes the literature on quantitative observational studies among ALHIV aged 10-19 years. Adherence measured by any means (e.g. pill count, self-report etc.)	Relevant studies showed the factor like gender, knowledge of serostatus, family structure, pill burden, route of ART administration, and attitudes about medication, health care rural versus urban location and missed clinic appointments were associated with ART adherence

Author	Title (Country)	Methodology	Findings
Nyongea <i>et al.</i> , (2015)	Determinants of antiretroviral adherence among HIV positive children and teenagers in rural Tanzania: a mixed methods study	Cross-sectional quantitative and qualitative (FGD and IDIs) study targeting children and teenagers aged 2-19 years residing in Ifakara. Pill count used as adherence measure. Optimal adherence defined as $\geq 80\%$ of pills being taken. Logistic regression and thematic content analysis used	70% out of 116 participants had optimal adherence levels. Living with a non-parent caretaker predicted poor adherence status. From the qualitative component, unfavorable school environment, timing of the morning ART dose, treatment longevity, being unaware of HIV status, non-parental (biological) care, preference for traditional medicine (herbs) and forgetfulness were associated with sub optimal ART adherence.
Letta <i>et al.</i> , (2015)	Factors associated with adherence to Antiretroviral Therapy (ART) among adult people living with HIV and attending their clinical care, Eastern Ethiopia.	Cross-sectional qualitative and quantitative study among 626 adult living with HIV. ART adherence defined as taking all antiretroviral treatment in correctly prescribed doses at a right time (no dose missed or delayed $\times 90$ min) in the week prior to the study. Multivariable logistic analysis used.	The study revealed that 85% had good ART adherence. Good adherence was associated with if patients aged 35-44 years, had good monthly income, no history of opportunistic infection and good family support. Patients who did not disclose their sero-status and experience depression were associated with poor adherence to ART.
Cluver <i>et al.</i> , (2016)	Achieving equity in HIV treatment outcome; can social protection improve adolescent ART adherence in South Africa	Cross-sectional in-depth qualitative study. The study examines associations of 10 social protection provisions with adherence among ALHIV aged 10 -19 years of age in 53 in 53 government healthcare facilities. Good adherence defined as one week self-reporting of adherence $\times 95\%$ . Multivariate logistic regression analysis model used.	36% of ALHI reported poor ART adherence independently, provision social protection (food, attendance to HIV support groups and high parental/caregiver supervision) were associated with reduced non-adherence. Combination social protection showed additive benefits where by with no social protection non-adherence was 54%, with any one protection 39-41%, with any two social protections, 27-28% and with all three social protections, 18%

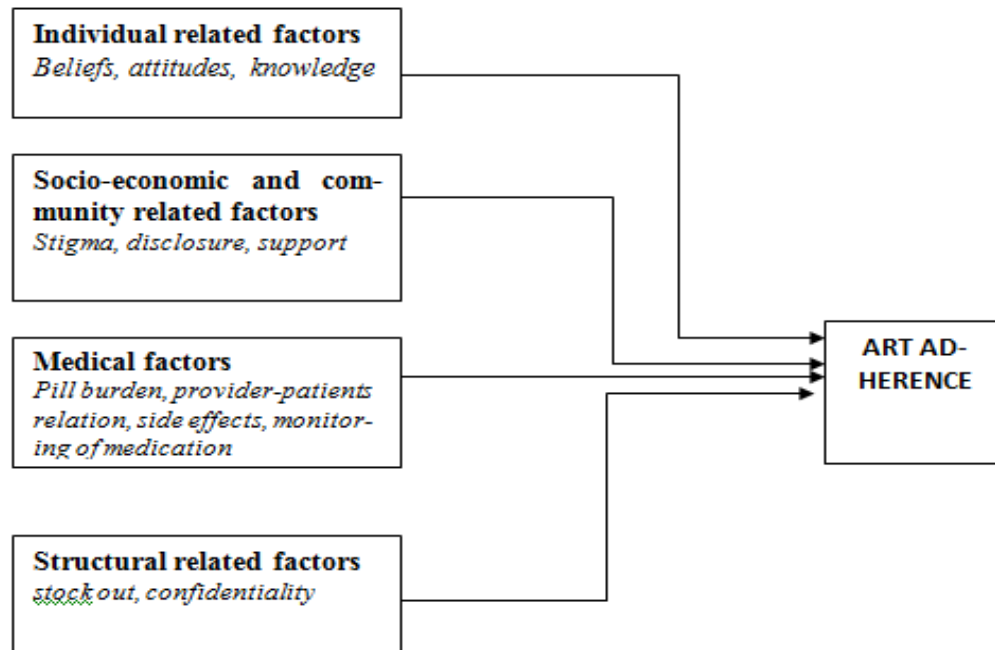
Author	Title (Country)	Methodology	Findings
Xu <i>et al.</i> , (2017)	Factors influencing antiretroviral treatment suboptimal adherence among perinatally HIV-infected adolescents in Thailand	Cross-sectional quantitative and qualitative study to ALHIV aged 12-19 years and their primary caregivers. Survey conducted in 201062012 and 12 in-depth interviews conducted in 2014. Multivariate logistic regression analysis used.	275 (48.4%) of ALHIV report sub optimal adherence (one week self-report). Younger age, non-parent primary caregiver, caregiver-assessed poor intellectual ability, having a boy/girlfriend, frequent online chatting, self-reported unhappiness and difficult in asking doctors questions were significantly associated with suboptimal adherence. From the in-depth interviews, poor relationship with caregiver, fear to disclosure HIV status and having boy/girl friend were important contributors to suboptimal adherence. Attending to HIV support group was a strong adherence promotion factor.

**Source:** Researcher, 2018

## 2.8 Conceptual Framework

The framework was adapted from Wekesa (2007) approach, which used to studying antiretroviral therapy in resource - poor settings in Sub - Saharan Africa. Different studies used this framework studying different factors that influence adherence to ART among PLHIV on ART, such as socioeconomic, community, medical, structural and individual factors. The model has also been used to study factors affecting ART adherence in Botswana, Tanzania and Uganda (Hardon et al. 2006). this conceptual framework has been formulated from the social cognitive theory, research designs and literature review. As SCT stated; learning of the behavior (ART

adherence) occurs in a social context with a dynamic and reciprocal interaction of the person, environment, and behavior.



**Figure 2.1: Conceptual Framework**

**Source:** (Adapted from Wekesa, 2007)

Regarding to this study, ART adherence among the adolescents depends on interaction of the individual/ personal factors, social factor, environmental factors and behavioral factor hence the presence of positive influencing factor they positively influence the good ART learning behavior to adolescents living but the presence of the negative influencing factor will result to adolescents living with HIV not to lean good ART adherence practice and develop suboptimal/bad ART adherence.

The variables within these factors has been grouped as follows; Socio and community-level factors: Including the cost of treatment (transport & missing work),

stigma, social support networks, disclosure patterns, food and hunger. Medication or treatment related factors: Including pill burden, regimen complexity, imagined side effects and a lack of/insufficient medical monitoring and support. Structural factors: Health system factors, drug supplies (stock out), accessibility to health facility, confidentiality of health facility settings and attitude of health care providers and long waiting times. Individual factors: These include attitudes and beliefs about the effectiveness of treatment, difficulties to understand prescribed instructions or inability to read instructions (education/literacy level), personal lifestyle/behaviours (alcohol/substance use). Others are forgetfulness, psychological factors

## **CHAPTER THREE**

### **RESEARCH METHODOLOGY**

#### **3.1 Chapter Overview**

Research methodology is a science of studying how research is done scientifically (Kothari, 2004). It also explains how and where the actual research took place and the approaches used at field work. This chapter is consisting of research philosophy, research design and strategy, rationale of study design, study limitations, research area, survey population, inclusion and exclusion criteria of study population, sampling design and procedure, rationale of using sampling technique, reliability and validity of the research instrument, methods of data collection, data processing and analysis, ethical issues and expectations of the study designs.

#### **3.2 Research Philosophy**

A research philosophy explains the way data are collected, analyzed and used (Guba 1990,). There are three types of research philosophies; positivism, interpretive and critical (Mackenzie & Knipe, 2006). Positivism and interpretive are the commonest used study philosophies. Positivist studies generally attempt to test theory (Myers, 1997) and are most commonly aligned with quantitative methods of data collection and analysis (Mackenzie & Knipe 2006). Interpretive study philosophy; rather than starting with a theory (as in postpositivism), inquirers generate or inductively develop a theory or pattern of meaning.

In social research the interpretivist approach is much more of qualitative study design. This study will use positivism research strategy as this study will adopt Social Cognitive Theory and found the proof of theoretical implication, the study

will also use documentation and questionnaires and quantitative data analysis to assess the factors influencing ART adherence among ALHIV.

### **3.3 Research Design**

The Research design focuses on the research question, say the purposes of the study, what information most appropriately will answer specific research questions, and which strategies are most effective for obtaining it (LeCompte & Preissle with Tesch, 1993). Study design also places the researcher in the observed world and links him or her to specific sites, persons, groups, institutions, and bodies of relevant interpretive material, including documents and archives (Denzin & Lincoln, 2011).

This study used cross-sectional descriptive quantitative approach; this design is useful especially in offering in depth explanation as to how the independent variables (personal factors, social economic factors, medical factors and structural factors) influence the dependent variable (ART adherence). According to Vanderstoep and Johnston (2009) the factors/variables are best explored via descriptive quantitative study as it can describe the relationship between independent and dependent variable.

### **3.4 The Rationale for Cross-Sectional Descriptive Quantitative Study**

The descriptive study try to answer the research questions are of a how and what type (Beri 2013). With the descriptive case study in Maweni hospital in Kigoma region will allow the researcher to find what factors, how and why they are influencing ART adherence among ALHIV.



### 3.5 Limitations of Cross-Sectional Descriptive Quantitative Study

Limitations are the possible weaknesses or problems which the researcher identified while undertaking the study (Creswell, 2012). These limitations are often related to deficient measures of variables, absence of participants, tiny sample sizes, errors in measurement, and other factors typically linked to data collection and analysis. These limitations are useful to other potential researchers who may choose to conduct a similar or replication study (Creswell, 2012).

### 3.6 Research Area



Kigoma Region resides in the northwestern corner of Tanzania. The region is bordered to the north by Burundi and the Kagera Region, to the east by the Shinyanga and Tabora regions, to the south by the Rukwa Region, and to the west by Lake Tanganyika. According to the 2012 national census Kigoma has a population of 2,127,930 people.

**Figure 3.1 Kigoma Region Map**

Study area is Kigoma region at Maweni regional referral hospital in Kigoma/Ujiji municipal council. Kigoma is among the regions with low HIV prevalence of 3.4% (2011-12 Tanzania HIV/AIDS and Malaria indicator survey) but also low number of individuals diagnosed to have HIV infection due to low testing rate in the region have

(2011-12 Tanzania HIV/AIDS and Malaria indicator survey and Global AIDS Response Country Progress Report -Tanzania March 2014) . By the year 2014 the total of 1114 children and 11866 adult were diagnosed HIV positive and enrolled in care among these; 60% of children and 55% of adult initiated on ART but only 42% of children and 62% of adult retained on ART (Global AIDS Response Country Progress Report -Tanzania March 2014).

Kigoma region through its Regional Referral hospital ó Maweni its important strategic place to study the level of ART adherence and find the factors associated, and address them properly. Its expected many HIV positive individual will be identified as current country direction s to ensure 90% of people initiated on ART should be retained to ART and have desirable viral suppression (UNAID 2015).

### **3.7 Survey Population**

A research population is usually a large pool of individuals or objects that is the key focus of a scientific investigation. Normally the researcher cannot test every individual in the population as it is too expensive and time-consuming; they rather count on sampling techniques (Saunders et al., 2009). Maweni regional hospital has about 300 ALHIV registered at Maweni CTC. Among 300 ALHIV the target population comprised of all ALHIV aged 10 to 19 years of age who are on ART treatment for more than 6 months and they are not lost to follow up at the time of the study were selected. Total of 64 ALHIV participated in the study. Random sampling was done to find and select the appropriate participants while considering their willingness to participate in the study. All selected participants were separately interviewed together with their caregivers

### **3.7.1 Inclusion Criteria**

ALHIV aged 10 to 19 years who are on ART at least 6months and who know their HIV status and attended at Maweni CTC.

### **3.7.2 Exclusion Criteria**

All ALHIV who were on ART for at least 6months were eligible for this study except those who were lost to follow-up and who could not be found/traced back by the institution. Respondents who were not ready to participate and those who did not have their caregiver to during qualitative data collection were excluded.

## **3.8 Sampling Design and Procedures**

According to Kothari (2004) the sample design is a definite plan for obtaining a sample from a given population; the respondents selected should be as representative of the total population as possible in order to give the proper estimation of the given characteristics in given population (Kothari 2004). A sample is the subset of people from the population who will participate in the current study while sampling frame refers to the eligible members of the population (Vanderstoep & Johnston, 2009) Sampling means selecting participants who are best suited for your study, deciding whom to look at or talk with, where, when and why, ( Thomas, 2010; Saunders et al. 2009). This study used simple random sampling technique to obtain study participants.

First the adolescents aged 10 to 19 years of age were identified, then the number were written on pieces of paper according to total number of ALHIV aged 10 to 19 years, the lottery method was used and the odd number were selected (total of 15

ALHIV per day). This is a probability sampling whereby all members in the population have equal chance of being selected to form a sample (Adam and Kamuzora 2008). The technique is good when the population made up of members of similar characteristics, as the size of random sample depends on the homogeneity (Shaughnessy et al. 2000). The use of simple random sampling in this study was because it was easier to apply and require no prior knowledge or true composition of the population.

### **3.9 Sampling Design and Procedures**

According to Creswell (2014), the qualitative research involves a purposeful selection of respondents or sites (or documents or visual material) that will best help the researcher understand the problem and the research question. This does not necessarily suggest random sampling or selection of a large number of participants and sites, as typically found in quantitative research. Most of all, an investigator should avoid biasing his study or any appearance of bias by choosing only those sources that confirm his/her own preconceptions (Yin, 2011). However, the question still exists; how big should my sample be? Obviously it is averred that the larger the sample, the better it represents the population under study (Mills & Gay, 2014; Yount, 2006)

Nyonge et al, 2015 found 84% level of adherence children and teenagers 2-19 years and the mean Watt et al 2010 reported that 84% of adults had excellent ART adherence. The sample size will be derived from the sample size determination formula as follows (Daniel WW, 1999, Naing L *et al.*, 2006)

$$N = \frac{P(100-P)}{e^2}$$

$$N = \frac{84(100-84)}{(5)^2} = 54 \text{ Clients}$$

Where N= Desired sample size

P= Proportion of clients with optimal ART adherence = 84%

e= Margin of error for 95% confidence interval.

Therefore, the required sample size of the respondents was 54. 10 addition samples were added in case of in case of non-respondents, and then the minimum sample size was 64 ALHIV.

### **3.10 The Rationale for Using a Sampling Technique**

The reason for not using the whole population but rather opt to sampling technique is due to the fact that, sampling provides a valid alternative to a census when it would be impracticable for you to survey the entire population, as such, it is cheaper than studying the whole population while maintaining a high degree of validity. It enables us to lower the costs of the research especially when your budget constraints prevent you from surveying the entire population. Sampling method is a quicker way and save time. (Saunders et al., 2009)

### **3.11 Reliability and Validity of the Research Instrument**

#### **Reliability of the Research Instrument**

Reliability is the capability of a research instrument to generate similar results when used repeatedly under similar conditions (Kumar, 2011); it indicates accuracy and

predictability of a research instrument: the higher the reliability, the higher the accuracy. As observe Marczyk, et al. (2005), if the measurement is reliable, then there is less chance that the obtained score is due to random factors and measurement error. With intent of eliminating and so minimizing errors, the possibility of misinterpretations and omissions of data plus other discrepancies able to meddling in sound judgment, raw data collected from the respondents were scrutinized and subjected to Cronbach's Alpha coefficient formula for believability (validity) and trustworthiness (reliability) through sorting, editing and coding.

### **Validity of the Research Instrument**

Validity is the ability of an instrument/questionnaire to measure what it is intended to measure which means uprightness and realness of the research data (Kumar, 2011). This study, adopted constructive validity which is the combination of content validity and criterion-related validity to validate the believability of the instrument/questionnaire (Corbetta 2003). Construct validity focus on identify correct set measures for the concepts being studied where by the researcher put in considered the variables with the conceptual and theoretical relation. (Marczyk, et al. 2005, Yin, 2009).

In construction of validity of an instrument/ questionnaire as with this study, first the variables were outlined in specific concept and then related with the study objectives. Secondly the variable measures were identified which matches with the cited published studies that make the same matches as recommends. Multiple source of data triangulation, collection of information from Tanzania guideline of management of HIV/AIDS was used as recommended by Yin (2009). Triangulation

strategy reduces the risk of chance associations and of systematic biases prevents the use of the only one method which allows the better understanding of the explanatory (measures of variables) that was developed (Yin, 2009).

### **3.12 Variables and Measurement Procedures**

This part explain how the both independent and the dependent variable are measured. Different citation has been referred to determine the measurement level of each variable. Tanzania guideline of management of HIV /Aids was used in finding the ART adherence measurement.

#### **Dependent Variable (ART adherence)**

ART Adherence measurement within Sub Saharan Africa and elsewhere has been categorized into two major group including patient-derived information and independently monitoring drug intake method (Garcia et al. 2003). Questionnaires and interviews are commonly used to assess adherence by patients, whereby medication event monitoring systems (MEMS), pharmacy records and pill counts are used to monitor drug intakes, which predict adherence ( Nsheha et al., 2013, Carly Hunderson and Lucie Cluver 2014). Most studies that have combined these methods to measure ART adherence where by overestimation of results have been revealed from patients self-report (Ndiaye et al., 2013, Nsheha et al., 2013).

#### **ART Adherence Measurement**

According to Tanzania guideline for management of HIV and AIDS, the client is self-reporting the number of pill that did not take for the past one week when he/she attends the care and treatment clinic. Formula for calculating percentage ART

adherence is as follows.

- a. % of pills missed =  $(\text{No. pills remained} \div \text{Total No. pills missed}) \times 100$
- b. % adherence =  $100 - \% \text{ of pills missed}$

### **Independent Variable**

Factors associated with ART adherence are the independent variable. These factors include individual factors, socio economic factors, medical factors and structural factors. . Multiple source of data triangulation used to find the measurement of these variables. Triangulation was done in order to reduce the risk of chance associations and of systematic biases prevents the use of the only one method to find variable measurement.

### **Independent Variable Measurement**

The tables 3.1, 3.2, 3.3 and 3.4 shows the independent variables within specific factors, their measurement levels and the cited literature which was adopted.

**Table 3.1: Individual Factors Variable Measurement**

Variable	Measurement	Study
Age	Years	
Sex	Female, Male	
Adolescent education level	No school, Primary School, Secondary School	
Adolescent employed/Work	Yes, No	
Adolescent having girl/boyfriend	Yes, No	
Adolescent understand ART is lifelong treatment	Yes, No	
Outcome expectancy (ART improves health?)	Yes, Not sure, No	Ndiaye et al., 2013

**Source:** Research Data, 2018



**Table 3.2: Social Factors Variable Measurement**

Variable	Measurement	Study
Type of caregiver	Parents, other family members, grand parents	Xu et al 2014
Have you ever felt discriminated	Yes, Not sure, No	
ART Supervision (Who is administering the ART to adolescent?)	Adolescent, caregiver, Both	
Family support network (do you discuss with caregiver about ART adherence?)	Yes, Not sure, No	Cluver et al., 2016

**Source:** Research Data, 2018

**Table 3.3: Medical Factors Variable Measurement**

Variable	Measurement	Study
Frequency of taking ART medications	Once per day, twice per day	
Number of pills taken at once	One, Two, More than two	Nsheha et al., 2013; Nyongea et al 2015
Side effect documented/ reported by adolescent?	Yes, No	

**Source:** Research Data, 2018

**Table 3.4: Structural Factors Variable Measurement**

Variable	Measurement	Study
Distance from home to health facility	0-3 km, 3-5 km, 5 km	Bermudeza et al., 2006
ARV changed due to stock out.	Yes, No	

**Source:** Research Data, 2018

### 3.13 Methods of Data Collection

A structured questionnaire was used to capture demographic, cultural, historical factors associated with service quality and customer satisfaction.

### 3.14 Data Processing and Analysis

Statistical Package for Social Sciences (SPSS) version 16.0 used during analysis. Regression model and descriptive data analysis of quantitative done where frequencies and percentages have been presented in tables and graphs.

### Binary Logistic Regression Analysis

When dependent variable is categorical we cannot carry out a multiple linear regression as many of the assumptions of this technique will not be met, instead we would carry out a logistic regression analysis. With the perceived behavior problems, we are interested in modeling the variation in the probability or proportion of being perceived to have behavior problems. Logistic regression is a statistical method for analyzing a dataset in which there are one or more independent variables that determine an outcome. The outcome is measured with a dichotomous variable. The goal of logistic regression is to find the best fitting model to describe the relationship between the dichotomous characteristic of interest (dependent variable) and a set of independent/predictor variables. Logistic regression generates the coefficients (and its standard errors and significance levels) of a formula to predict a logit transformation of the probability of presence of the characteristic of interest:

$$\text{logit}(p) = b_0 + b_1X_1 + b_2X_2 + b_3X_3 + \dots + b_kX_k$$

Where  $p$  is the probability of presence of the characteristic of interest and the logit transformation is defined as the logged odds:

$$\text{odds} = \frac{p}{1-p} = \frac{\text{probability of presence of characteristic}}{\text{probability of absence of characteristic}}$$

And

$$\text{logit}(p) = \ln\left(\frac{p}{1-p}\right)$$

The logistic regression coefficients are the coefficients  $b_0, b_1, b_2, \dots, b_k$  of the regression equation and they show the change (increase when  $b_i > 0$ , decrease when  $b_i < 0$ ) in the predicted logged odds of having the characteristic of interest for a one-unit change in the independent variables. Predictor variables are  $X_1, X_2, X_3, \dots, X_k$ .

### **Binary Logistic Regression Assumptions**

- i. The outcome is a binary or dichotomous variable. The outcome variable should have only two outcomes of measurement
- ii. Logistic regression does not require a linear relationship between the dependent and independent variables although there is a linear relationship between the logit of the outcome and each predictor variables. Recall that the logit function is  $\text{logit}(p) = \log(p/(1-p))$ , where  $p$  is the probabilities of the outcome
- iii. No high inter-correlation or multicollinearity among the predictors. Multicollinearity is a state of very high inters association or intercorrelations among predictor variables. Multicollinearity is not required among the predictor variables because they will be measuring the same thing. Multicollinearity can also be detected with the help of tolerance and its reciprocal, called variance inflation factor (VIF). If the value of tolerance is less than 0.2 or 0.1 and, simultaneously, the value of VIF 10 and above, then the multicollinearity is problematic.

### **3.14 Ethical Issues**

The researcher has an obligation to respect the rights, needs, values, and desires of the informant(s) (Creswell, 2014). As such, ethical behavior pervaded each step of the research process in this study data collection, data analysis, reporting, and dissemination of information (Sekaran, 2003) Codes of research ethics all emphasizing the protection of human participants were established to ensure autonomy, beneficence, and justice as it is insisted in Marczyk, et al (2005) The researcher adhered to autonomy, which means that participants had the right to

decide what they wanted to do and to make their own decisions about the kinds of research experiences they wanted to be involved in, if any.

Participants' voluntariness was encouraged where the informed consent was also voluntary and without pressure of any kind as observed Kumar (2011), De Vaus (2001) and Marczyk et al (2005). To maintain the participants' confidence, then, confidentiality, anonymity, privacy and 'harmless exposure' to respondents was addressed by unnecessarily not exposing the respondents' identity or names in all course of filling the questionnaires. Regarding to this study; data collection process and the study tools were handled with strict confidentiality. Ethical clearance for conducting this study obtained from the Open University of Tanzania and then permission was granted by regional medical officer and medical officer in charges to conduct this study in Maweni Regional Hospital. All study participants consented. Adequate information about the study provided, including the benefits and risks for participating in this study. Only those who voluntarily agree to participate in the study were eligible for the study. No incentive was provided to study participants.

### **3.15 Expected Results of the Study**

The study contributes to better understanding of factors affecting the ART adherence among the ALHIV aged 10 to 19 years of age. The understanding of these factors affecting positively or negatively the ART adherence among ALHIV will be of the academic purposed and also will enable the health and education sector to formulate or strengthening the appropriate strategies to tackle the sub optimal ART adherence challenges among the adolescence and also appropriate channeling of the recourses both human and financial to the areas with most challenges.

## **CHAPTER FOUR**

### **PRESENTATION OF FINDINGS/ RESULTS**

#### **4.1 Chapter Overview**

This chapter presents study findings and organized according to the study objectives. Thus, the chapter consists of the following sections: reliability test, testing of the logistic regression model, descriptive analysis of the study population; logistic regression analysis and factors associated with ART adherence among ALHIV.

#### **4.2 Reliability Test**

The raw data collected were subjected to Cronbach's Alpha coefficient formula for reliability. Sorting, editing and coding of the variable done with the intent to obtain the acceptable value of Cronbach's Alpha. By the use of SPSS following the process (analyze, Scale, reliability analysis and checking scale, scale if item deleted and correlation), the totals of 16 variables data were subjected to Cronbach's Alpha and 8 of them were able to have acceptable Cronbach's Alpha value 0.762 as shown in table 4.1 which is acceptable.

Reliability is the capability of a research instrument to generate similar results when used repeatedly under similar conditions (Kumar, 2011); it indicates accuracy and predictability of a research instrument: the higher the reliability, the higher the accuracy. As observe Marczyk, et al. (2005), if the measurement is reliable, then there is less chance that the obtained score is due to random factors and measurement error. With intent of eliminating and so minimizing errors, the possibility of misinterpretations and omissions of data plus other discrepancies able to meddling in sound judgment.

**Table 4.1: Reliability Test (Cronbach's Alpha)**

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
0.762	0.761	8

Source: Research Data, 2018

The Table 4.2 shows the value of Cronbach's Alpha value if either of the variables is deleted. As it can be seen, if any of the variable is deleted the value of the Cronbach's Alpha will not reach or exceed 0.762.

**Table 4.2: Reliability Test**

Variables	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Sex	6.09	4.679	0.252	0.104	0.755
Working	4.72	4.172	0.462	0.445	0.703
Girl/boyfriend	5.62	5.022	0.279	0.296	0.752
ART lifelong	6.35	4.388	0.376	0.534	0.726
Outcome expectancy	6.4	4.65	0.318	0.526	0.74
Discriminated	5.8	4.569	0.363	0.266	0.731
ART supervision	4.95	3.201	0.534	0.373	0.678
ART stockout	5.72	4.453	0.294	0.245	0.747

Source: Research Data, 2018

### 4.3 Testing the Assumption of Multiple Linear Regression Model

#### 4.3.1 Dichotomous Variable

The outcome ART adherence is a binary variable whereby it has only two measurement of Optimal or good ART adherence of  $\geq 95\%$  and suboptimal or poor ART adherence of  $< 95\%$ .

#### 4.3.2 No Linear Relationship between the Dependent and Independent Variables

Logistic regressing have no linear relationship between predictor and outcome variables although there is a linear relationship between the logit of the outcome and

each predictor variables. Recall that the logit function is  $\text{logit}(p) = \log(p/(1-p))$ , where  $p$  is the probabilities of the outcome

**Correlation:** The sample correlation coefficient (Pearson Product Moment correlation coefficient), denoted  $r$ , is the statistical method used to study the strength of the relationship between two variables. A range between -1 and +1 quantifies the direction and strength of linear relationship between two variables, the value greater than 0.7 indicate strong correlation and linearity. The correlation between two variables can be positive where by higher levels of one variable are associated with higher levels of the other or negative where by higher levels of one variable are associated with lower levels of the other. By plotting the graphs there is no linear relationship between dependent and independent variables.

**Table 4.3: Correlation**

	ART adherence	Sex	Working	Girl/boyfriend	ART lifelong	Outcome expectancy	Discriminated	ART supervision	ART stock out
ART adherence	1	-0.02	-0.11	0.09	-0.1	-0.08	-0.34	0.01	0
Sex	0	1	0.15	-0.05	0.14	0.11	0.12	0.23	0.2
Working	-0.1	0.15	1	<b>0.46</b>	0.12	0.11	0.41	<b>0.44</b>	0.12
Girl/boyfriend	0.09	-0.05	0.48	1	0.11	0.09	0.04	0.22	0.17
ART lifelong	-0.1	0.14	0.12	0.11	1	<b>0.71</b>	0.2	0.17	0.12
Outcome expectancy	-0.1	0.11	0.1	0.09	<b>0.71</b>	1	0.17	0.14	-0.03
Discriminated	<b>-0.34</b>	0.12	<b>0.41</b>	0.04	0.2	0.17	1	<b>0.35</b>	0.03
ART supervision	0.01	0.23	<b>0.44</b>	0.21	0.17	0.14	0.35	1	<b>0.41</b>
ART stock out	0	0.2	0.12	0.17	0.12	-0.03	0.02	0.41	1

**Source:** Research Data, 2018

By the use of SPSS following the process ñanalyze, correlate, bivariate and Pearson coefficient was checkedö to determine the correlation between independent and

dependent variables. From the table 4.3 the  $r$  values are less than 0.7 which indicate very weak correlation and lack of linearly relationship between the dependent and independent variables.

#### 4.4.3 Multicollinearity Test on Independent Variables

The primary concern is that as the degree of multicollinearity increases, the regression model estimates of the coefficients become unstable and the standard errors for the coefficients can get wildly inflated. We used the *variance inflation factor (VIF)* and tolerance rate to check for multicollinearity. As a rule of thumb, a variable with Tolerance less than 0.1 and VIF values are greater than 10 may merit further investigation note that VIF is reciprocal of Tolerance. Presence of multicollinearity inflates the variance of the parameter estimates making them individually statistically insignificant even though the overall model may be significant.

In addition multicollinearity causes problems in estimation of the coefficients of independent variables and their interpretation. Tolerance was studied with SPSS by *looking* at linear regression collinearity diagnostic to find the values of Tolerance and VIF. The Table 4.4 shows the Tolerance and VIF of each variable, as the commonly used cut of points of tolerance less than 0.1 or VIF greater than 10 indicates the presence of multicollinearity. From the table below all the Tolerance values are above 0.1 and the VIF of less than 10 which indicate the absence of Multicollinearity.



**Table 4.4: Tolerance Test and VIF**

Variables	Tolerance	VIF
Sex	0.896	1.116
Working	0.555	1.801
Girl/boyfriend	0.704	1.42
Outcome expectancy	0.466	2.147
Know ART lifelong	0.474	2.111
Discriminated	0.734	1.363
ART discussion	0.627	1.595
ART stock out	0.755	1.324

**Source:** Research Data, 2018

#### **4.4 Descriptive Analysis**

With the descriptive analysis it's trying to explain the general summary of the data and the responses from the ALHIV plus their care takers. All the variables were run in SPSS to determine their frequencies and percentage grouped in individual related factors, social community related factors, medical related factors and structural factors. This part contains the f distribution of the independent variables and their percentages. Table 4.5 shows the frequency distribution of the individual variables, social related variables, medical related variables and structural related variables with their percentage as explained below.

**Individual Factors:** Among the ALHIV interviewed 37 (57%) were female and 28 (43%) were male. Only 4 (6%) of ALHIV reported to be working (they are not attending school), 5 (8%) they don't work neither attending school nor 56 (86%) they were students. 59 (91%) of the ALHIV reported to have no either boy or girlfriend and only 6 (9%) reported to have boy or girl friend. 58 (89%) of ALHIV

reported to know that ART is lifelong while 7 (11%) were did not know that ART is lifelong. 60 (92%) of ALHIV understand the outcome expectancy of ART medication while 5 (11%) do not understand outcome expectancy of ART.

**Social and community Factors:** The social factor variables discussed here is discrimination. Among the ALHIV questioned 47 (72%) reported never to experience any kind of discrimination while 18 (28%) reported to experience any sort of discrimination at school, hospital and community level in past six months and from either caregiver, friend, neighborhood etc.

**Medical Factors:** Among the ALHIV interviewed, 46 (71%) reported to take ARV drugs twice per day, 18 (28%) reported to take ARV drugs once per day and 1 ALHIV (2%) reported to take ARV drugs more than twice per day. Regarding the ARV drug supervision; 51 (78%) of ALHIV in collaboration with caretakers supervise their ART medications while 14 (28%) ALHIV reported that they supervise their own ARV medications.

**Structural Factor:** Regarding changing ART medication due to stock out; 18 (28%) responded yes to have been changed ART medication due to stock out, 42 (65%) responded no while 5 (8%) they are not sure if they have been changed ART medications due to stock out. The stock out can be explained by failure of the supply chain system failure from the ordering process, delivery, storage and timely sock taking.

**Table 4.5: Frequency Distribution of Independent Variable**

Factor	Variable	Frequency	%
Sex	Fe	37	57%
	Me	28	43%
Working	Working	4	6%
	Don't work/not student	5	8%
	Student	56	86%
Having boyfriend or girl friend	Yes	6	9%
	No	59	91%
ALHIV know ART treatment is lifelong	Yes	58	89%
	No	3	5%
	Not sure	4	6%
ALHIV know outcome expectancy of ART medication	Yes	60	92%
	No	2	3%
	Not sure	3	5%
ALHIV ever discriminated	Yes	18	28%
	No	47	72%
ART medication supervision	Adolescent	14	22%
	Both	51	78%
Frequency of taking ART medication per day	Once	18	28%
	Twice	46	71%
	More than twice	1	2%
Change of ART medication due to stock out	Yes	18	28%
	No	42	65%
	Not sure	5	8%

Source: Research Data, 2018

#### 4.5 Level of ART Adherence

Level ART adherence is measured in percentage whereby  $\geq 95\%$  is indicating optimal (good) ART adherence and  $<95\%$  indicating sub optimal (poor) ART adherence. 60 ALHIV had optimal ART adherence while 5 had sub optimal ART adherence. Tables 4.6 show us the coding of dependent variable (level of ART adherence) whereby the optimal adherence  $\geq 90\%$  is coded 0 and sub optimal adherence level of  $<95\%$  is coded as 1.

**Table 4.6: Dependent Variable**

Original Value	Internal Value
$\geq 95\%$	0
$<95\%$	1

Source: Research Data, 2018

#### 4.4 Binary Logistic Regression Analysis

After testing the logistic regression assumptions; Logistic regression model was used to analyzing a dataset in which there are one or more independent variables that determine an outcome. The outcome in order to find the relationship between ART adherence (dichotomous variable) and factors associated with ART adherence.

Recall the logistic regression model

$$\text{logit}(p) = b_0 + b_1X_1 + b_2X_2 + b_3X_3 + \dots + b_kX_k$$

**Table 4.7: Variable not in Equation**

Variables	Significance level
Sex(1)	.885
Working	.345
Working(1)	.180
Working(2)	.502
Having boyfriend or girl friend (1)	.458
ALHIV know ART treatment is lifelong	.721
ALHIV know ART treatment is lifelong (1)	.419
ALHIV know ART treatment is lifelong (2)	.609
ALHIV know outcome expectancy of ART medication	.798
ALHIV know outcome expectancy of ART medication (1)	.502
ALHIV know outcome expectancy of ART medication (2)	.678
ALHIV ever discriminated (1)	.007
Frequency of taking ART medication per day	.791
Frequency of taking ART medication per day (1)	.522
Frequency of taking ART medication per day (2)	.582
ART medication supervision (1)	.931
Change of ART medication due to stock out	.694
Change of ART medication due to stock out (1)	.689
Change of ART medication due to stock out (2)	.454

**Source:** Research Data, 2018

As first step before variables were run and included in the model, the individual variable association with ART adherence was computed. Table 4.7 shows the significant level of deferent independent variable before they were included in the model which showed that ALHIV reported to have been discriminated in past six months are associated with poor ART adherence to ART  $p=0.007$ . Other variable were not statistical significant associated with ART adherence.

The second step of the logistic regression analyses is to inter the variables which were statistical into the regression model. Table 4.8 shows the model equation.

Referring to the binary logistic regression model

$$\text{logit}(p) = b_0 + b_1X_1 + b_2X_2 + b_3X_3 + \dots + b_kX_k$$

**Table 4.8: Variable in the Equation**

		B	S.E.	Wald	df	Sig.	Exp(B)	95.0% C.I. for EXP(B)	
								Lower	Upper
Step 2 <sup>a</sup>	ALHIV ever discriminated (1)	2.576	1.159	4.940	1	.026	13.143	1.356	127.406
	Constant	-3.829	1.011	14.347	1	.000	.022		
a. Variable(s) entered on step 1: ALHIV ever discriminated									

**Source:** Research Data, 2018

Variables in the equation are the run by the SPSS software and included in the model to show the relationship between the independent and dependent variables. From the table 4.8 the variable "ALHIV ever discriminated" is the only variable which fit in the model equation.

**Sub optimal ART adherence = -3.829 + 2.576\*ever discriminated (1)**

The equation explains the relationship between the independent variables and the dependent variable, where the dependent variable "ART adherence" is on the logit scale. These estimates tell the amount of increase (or decrease, if the sign of the coefficient is negative). Because these coefficients are in log-odds units, they are often difficult to interpret, so they are often converted into odds ratios by exponentiation the coefficient, or by looking at the right-most column in the Variables in the Equation table labeled "Exp(B)". Also the model explains that there is 3.829 less chance to find ALHIV with sub optimal ART adherence in comparison with optimal ART adherence. Discrimination has high ODD of 13.143 in predicting sub optimal ART adherence.

#### **4.6 Factors Associated with ART Adherence**

The data analysis using binary logistic regression showed that the independent variable "discrimination" which is grouped in social factor showed to be statistically significant associated with sub optimal/ poor ART adherence at 95% confidence interval with p value of 0.026. Other individual factors; sex, if adolescent is working, ALHIV having girl or boyfriend, adolescent understanding if ART is lifelong, and adolescent understand outcome expectation of ART medication. Medical factor (ART supportive supervisors) was not associated with ART adherence. Structural factors (ART stock out) were not associated with ART adherence. Other variables grouped in individuals, social, medical and structural factors were not included in the analysis as they were excluded during reliability test.

## CHAPTER FIVE

### DISCUSSION OF FINDINGS/RESULTS

#### 5.1 Chapter Overview

This chapter presents discussion of the findings and comparison with other studies. The aimed to find the factors associated with ART adherence. This chapter contains the following sections; factors influencing ART adherence among ALHIV, Level of ART Adherence, Proposed Strategies for Improving ART Adherence, Theoretical Implication, conclusion and recommendations.

#### 5.2 Factors influencing ART Adherence among ALHIV

This study has not found any association between and individual factors to be associated with ART adherence where by Xu et al., (2014) found that having a boy/girlfriend and extra cubiculum activities were significantly associated with suboptimal adherence. Carly Hudelson and Lucie Cluver 2014 and Nsheha et al 2013 found that male gender significantly associated with good ART adherence Ndiaye et al., 2013 in Botswana. Ndiaye et al., 2013 found that no association between knowledge of expected outcome of ART and adherence to ART. Nyongea et al., 2015 found that knowledge of HIV treatment being the lifelong is as not associated with good ART adherence on ART.

This study has found presence of discrimination toward ALHIV is significantly associated with poor ART adherence ( $p=0.026$ ) at the 95% confidence, this results are the same as Xu *et al.*, (2017) in Thailand found that fear to disclosure HIV status was important contributors to suboptimal adherence. Letta *et al.*, (2015) in Ethiopia found that patients who did not disclose their sero-status and experience depression

were associated with poor adherence to ART. Nyongea *et al.*, (2015) in Ifakara Tanzania found that unfavorable school environment was associated with poor ART adherence.

This study did not find any relationship between medical related factors (frequency of taking ART medication and who is supervising ALHIV to take his/her ART medication). Carly Hudelson and Lucie Cluver (2014) found that pill burden and route of ART administration are associated with ART adherence. Nyongea *et al.*, (2015) did not find association between pill burden and ART adherence but timing of morning ART dose was associated with poor ART adherence. The systematic review of studies by Carly Hudelson and Lucie Cluver 2014 found that administration of medication by adolescents was associated with suboptimal adherence (Ernesto *et al.*, 2012), while caregiver administration of drug was correlated with good adherence (Cardorelle *et al.*, 2014).

While adolescents who taught how to take ART by a healthcare worker were more likely to have good adherence (Filho *et al.*, 2008). This study did not find any relationship between structural factors (ART stock out) and ART adherence. Nsheha *et al.*, 2013 found that children who could not attend clinic on regular bases and missed drug doses were associated with poor ART adherence. Carly Hudelson and Lucie Cluver (2014) found that health facilities located in rural area versus urban location were associated with ART adherence.

### **5.3 Level of ART Adherence**

This study found that the 92% of adolescents have optimal ART adherence of  $\geq 95\%$



this results are the same as Ndiaye et al., (2013) who found that 99% of adolescent had good ART adherence while Carly Hudelson and Lucie Cluver (2014) found 99% Thai adolescents had optimal ART adherence. But these results are contrary to Cluvar et al., (2014) who found that 36% of ALHIV in South Africa had poor ART adherence of less than 95%. Xu et al., (2017) found 51.60% of ALHIV had good ART adherence. Bermudeza et al., (2006) found 70.6%, (n= 494) of respondents reported had optimal adherence to ART, in the last 30 days. Letta et al., (2015) found 85% ALHIV with optimal ART adherence

#### **5.4 Proposed Strategies for Improving ART Adherence**

From the results found by this study, it is proposed that the Maweni regional hospital and Kigoma Health Management team with collaboration with education sector through local government to strengthening and provide the education concerning discrimination to the community with the use of their own community local leaders, influential people and religious people. The following strategies can be used to address the discrimination challenge which has been devided in two interventions; first intervention is individual level and second is Community intervention. Both explained as follows;

##### **Individual Intervention**

Also HIV-related stigma can addressed in a holistic manner by providing HIV/AIDS-related information, facilitating the acquisition of coping skills, and providing contact with other youth who are living with HIV in order to improve social support throughout the individual and group sessions targeting four aspects of stigma reduction (decreasing negative feelings toward self and others living with

HIV, increasing planned and strategic HIV disclosure to others, building supportive networks to combat fears and feelings of rejection; and building skills to combat HIV-related discrimination and other forms of stigma. Harper *et al.*, (2014) did study intervention in Chicago, New York, and Puerto Rico and made three month follow up and found that there was reduction in stigma in combining males and females in three dimensions (personalized stigma, disclosure concerns, and negative self-image), whereby with gender ugh Gender-specific there was reduced stigma for males across all four dimensions of stigma (personalized stigma, disclosure concerns, negative self-image and concern with public attitudes about people with HIV).

### **Community level intervention**

Build Knowledge about HIV and AIDS and ART medication ; this can be done through creating an different information education communication (IEC)materials focusing on the substantive content of messages pertaining to HIV as well as good and appropriate style and method of delivery. The HIV education materials should contain content of messages pertaining to HIV, providing information not only on how HIV is transmitted, but also how it is not transmitted, ART medications and importance of using RT medications. This training and information education communication (IEC) materials should be delivered to affected community (HIV/AIDS stigma, 2006).

- I. Involve People with HIV and AIDS People with HIV and AIDS must play a central role in stigma reduction. They have the life experience and knowledge needed to design and implement appropriate stigma-reduction

responses. In particular, they can help combat the fear of casual transmission of HIV, the belief that HIV means immediate disability and death, and the feeling that people with HIV are somehow different from everyone else.

- II. Work with Communities. Implementing activities include raising awareness workshops on HIV/AIDS-related stigma for communities, train and sensitizing local community leaders, religious leaders and influential people on HIV/AIDS

### **5.5 Theoretical Implication**

This study show statistical significant between poor ART adherence and discrimination to ALHIV; referring to the SCT which states that learning of the behavior occurs in a social context with a dynamic and reciprocal interaction of the person, environment, and behavior, where by basic assumptions of social cognitive theory are learning a behavior by observing others cognitive processes through living, symbolic or provide verbal instructions. This theory have proven to work as discrimination to ALHIV is the negative social and environmental factor which trigger negative influence to the ALHIV to learn ART adherence behavior.

### **5.6 Conclusion**

This study have shown that social factors have the influence to ART adherence although other factors like individual factors, medical factors, and structural factors have not found to associate with ART adherence. ALHIV faces social context gap **discrimination** which hinders them from learning and adhering to ART medications. HIV-related discrimination refers to negative attitude, abuse or pre

judgments directed at ALHIV. Discrimination makes adolescent vulnerable to HIV as they fear to access HIV services. Discrimination may occur at health care settings and prevent people from accessing health services, or may occur at family, school, neighborhood work place and other places. Some ALHIV are shunned by family, peers and the wider community, while others face poor treatment in educational and work settings, erosion of their rights, and psychological damage. These all limit access to HIV treatment and lead to poor adherence to ART medication.

Discrimination can be rectified by the community sensitization by local leaders. May ALHIV showed to have the knowledge on ART outcome, and HIV in general this can be explained because due to Maweni being the regional referral hospital with many health care workers comparing to other rural health facilities also the Health care workers have the adequate knowledge concerning HIV in general and adequate skills in providing adherence services to ALHIV. Individual factors, medical factors, and structural factors have showed no statistical significant associated with ART adherence, this can be either due to all factor together they contribute to influence ART adherence but when they stand as individual they don't show the association also this can be due to low sample size which fail to draw much conclusion on association with ART adherence.

## **5.7 Recommendation**

This study recommend that more study to be done studying ART adherence among adolescent living with HIV in different setting composing of rural and urban areas with high sample size so that to allow the big understanding of ART adherence among ALHIV aged 10 to 19 years. This study also recommend that the variables

discrimination should be investigated in depth to find the associated with ART adherence especially what type of discrimination, age, gender, place, and other influencing factors among ALHIV.

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## APPENDICES

### APPENDIX 1: QUESTIONNAIRE

Dear Respondent, My name is Gerald Charles, a postgraduate student at **Open University of Tanzania**. In partial fulfillment of the requirements for a degree Masters of Project Management, I am undertaking research on ðFactors associated with ART adherence among adolescents living with HIV a case of Kigoma regional hospital (Maweni). I wish to emphasize that the research is purely academics and all the information given and views expressed shall be treated with confidential. It is hoped that the findings will be useful for both academicians and the public as whole. I would appreciate if you spend some times to answer the questions as required.

**ART Adherence level** \_\_\_\_\_

#### **Demographical and personal information**

1. Age \_\_\_\_\_
2. Sex:
  - a. Male
  - b. Female
3. Level of education:
  - a. No schooling
  - b. Primary education
  - c. Secondary education
4. Employment/Working:
  - a. Working
  - b. Not working

5. Do you have boy/ girlfriend?
  - a. Yes
  - b. No
6. Does adolescent understand ART is lifelong treatment
  - a. Yes
  - b. No
  - c. Not sure
7. Does adolescent understand outcome of ART treatment?
  - a. Yes
  - b. Not sure
  - c. No

**Social economic information**

8. Type of caregiver:
  - a. Biological parents
  - b. Other family members
  - c. Grand parents
9. Have you ever felt discriminated in past six months?
  - a. Yes
  - b. Not sure
  - c. No
10. ART supervision (Who is administering the ART to adolescent?)
  - a. Adolescent him/herself
  - b. Caregiver

- c. Both adolescent and caregiver

11. Family support network (do you discuss with caregiver about the ART adherence?)

- a. Yes
- b. Not sure
- c. No
- a. More than two meals
- a. No

**Medical related information**

12. Frequency of taking ART per day:

- a. Once per day
- b. Twice per day

13. Number of pills taken per once

- a. One
- b. Two
- c. More than two

14. Any side effect documented or reported by adolescent:

- a. Yes
- b. No

**Structural information**

15. Distance from home to health facility:

- a. 0-3 km
- b. 3-5km

c. More than 5km

16. Does ARV changed due to stock out.

a. Yes

b. Not sure

c. No



## APPENDIX 1: CLEARANCE LETTER

**THE OPEN UNIVERSITY OF TANZANIA**  
**DIRECTORATE OF RESEARCH, PUBLICATIONS, AND POSTGRADUATE STUDIES**

P.O. Box 23409 Fax: 255-22-2668759  
Dar es Salaam, Tanzania,  
<http://www.out.ac.tz>



Tel: 255-22-2666752/2668445 ext.2101  
Fax: 255-22-2668759,  
E-mail: [drpc@out.ac.tz](mailto:drpc@out.ac.tz)

31/08/2017

Maweni Regional Hospital,  
KIGOMA.

**RE: RESEARCH CLEARANCE**

The Open University of Tanzania was established by an act of Parliament no. 17 of 1992. The act became operational on the 1<sup>st</sup> March 1993 by public notes No. 55 in the official Gazette. Act number 7 of 1992 has now been replaced by the Open University of Tanzania charter which is in line with the university act of 2005. The charter became operational on 1<sup>st</sup> January 2007. One of the mission objectives of the university is to generate and apply knowledge through research. For this reason staff and students undertake research activities from time to time.

To facilitate the research function, the vice chancellor of the Open University of Tanzania was empowered to issue a research clearance to both staff and students of the university on behalf of the government of Tanzania and the Tanzania Commission of Science and Technology.

The purpose of this letter is to introduce to you Gerald Robi; Reg.No. PG201506486 who is a MPM student at the Open University of Tanzania. By this letter Gerald Robi has been granted clearance to conduct research in the country. The title of his research is "Factors associated with Antiretroviral therapy adherence among adolescents living with HIV."

The period which this permission has been granted is from 1/09/2017 to 2/11/2017.

In case you need any further information, please contact:  
The Deputy Vice Chancellor (Academic);  
The Open University of Tanzania;  
P.O. Box 23409;  
Dar Es Salaam.  
Tel: 022-2-2668820

We thank you in advance for your cooperation and facilitation of this research activity.  
Yours sincerely,

Prof Hossea Rwegoshora  
For: VICE CHANCELLOR  
THE OPEN UNIVERSITY OF TANZANIA