Antiretroviral Therapy Adherence and its Determinants among Adolescents in Kajiado County, Kenya

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Abstract

➢ *Introduction*

Anti-Retroviral Therapy (ART) use has increased globally. It is estimated that 15 million (41%) People Living with Human Immunodeficiency Virus (PLHIV) are receiving ART, out of which 823,000 are children. Adherence to ART influences viral load reduction, improved immunity and treatment success. Studies show an almost complete adherence is needed to sufficiently suppress viral replication. However, several factors, including poverty, substance abuse, stigma and lack of disclosure hinder success of adherence. While HIV prevalence has continued to decrease worldwide, it remains a major cause of morbidity and mortality among adolescents. Poor ART adherence increases the risk of viral drug-resistance, reduces future therapeutic options and increases the risk of transmission. Adherence has been studied extensively with adult patients, but adolescent adherence has been largely neglected in the literature.

➢ *Objective*

The aim of this study was to estimate prevalence of ART adherence and to identify characteristics of adolescents and their guardians that influence ART adherence.

➢ *Methods*

A cross sectional, facility-based study was carried out in four select facilities in Kajiado County. Quantitative and qualitative data was collected among 167 HIV positive adolescents and their guardians using interviewer questionnaires and an interviewer guide in two Focused Group Discussions.

Data was managed using SPSS (version 22). Proportions and frequencies were calculated for categorical data and means and medians for continuous variables. Bivariate correlation analysis was conducted to determine strength and direction of associations between independent factors and adherence to ART. The t-test was used to conduct this evaluation at 5% level of significance. A linear regression model was fitted to control for confounders and adjust for association between factors and adherence to ART. Ethical clearance was sought and obtained from Moi Institutional Research and Ethics Committee (IREC).

➢ *Results*

A total of 167 adolescents aged 10-19 were interviewed among whom 49%(82) were males and 51%(95) females. Estimated level of adherence was 92.8% (95% CI: 87.8% - 95.8%). The most common reason for missing a dose was forgetting, fear of stigma and lack of food. Occupation, side effects, lack of food, having friends, confidentiality, trust and quality of care rating, swallowing drugs at the right time and keeping clinic appointments were significantly associated with adherence to ART (P<0.05) at the bivariate level. Adherence to ART was linearly modeled by two factors, "Experiencing side effects" and "Having friends who knew the adolescent's status and cared for them", $F_{4, 157} = 22.302$, p<0.05.

➢ *Conclusions*

This study found a prevalence rate slightly lower than the optimum and higher than most studies. Medication related factors were the most significant predictors of adherence.

➢ *Recommendations*

Adopt mechanisms to remind adolescents to take ART, improved regimen with reduced side effects, psychosocial support and stigma reduction strategies.

Keywords:- Human Immunodeficiency Virus, Anti -Retroviral Therapy, Adolescent, Viral, Suppression, ART Adherence, Kajiado, Kenya.

I. INTRODUCTION

Human Immunodeficiency Virus [HIV] persists as a key public health issue. Globally, there are 36.9 million people living with HIV out of which 2.6 million are children; Seventy percent(70%) of these live in sub-Saharan Africa [1]. It is estimated that 41% of People Living with HIV [PLHIV] are receiving Anti-Retroviral Therapy [ART] translating to 15M people out of which 823,000 are children ["Global HIV and AIDS statistics | AVERT," 2015].

Over 3 million children under 15 years of age were living with HIV in sub-Saharan Africa in 2010, representing more than 90% of all children with HIV in the world. Eastern and Southern Africa bear a larger burden with 2.2 million children with HIV, relative to the 990,000 in West and Central Africa. [2]

In Kenya, there are an estimated 1.6 million People Living with HIV [PLHIV] out which 191,840 are children aged 0-14 years[3]. Seventy-eight percent of adults who need Anti-Retroviral Therapy [ART] are accessing them compared to 42% of children[3]. This shows that ART access is still below the recommended 90% and is worse off in children than adults. This coupled with less than optimal adherence means the battle against HIV/AIDS is far from over as witnessed by survey done by the National AIDS Control Council[4] which found out that one in six adults and adolescents reported missing an ARV dose at least once within the 30 days preceding the survey

Adherence to ART influences viral load reduction, improved immunity and success of treatment among PLHIV evidenced by a longer productive life. [5]. Studies have also continued to show an almost 100% adherence is needed to sufficiently suppress viral replication[6].

Adherence has been studied extensively with adult patients. However, issues in youth adherence and possible reasons for their poor adherence have been largely neglected in the literature. [7].

Several factors hinder adherence success including chronic poverty, limited resources, substance abuse stigma and lack of disclosure[5]. Other factors cited include patients' age, regimen complexity, drug side-effects, advanced HIV disease and patients' mental health [6]

Advancement in HIV treatment and care has resulted to children born with HIV living longer [2]. This means that they need a life time supply of ARV. Adherence to these medications is key as there are limited treatment options. Adherence in adolescents is therefore critical for their survival as they will need the medication all their life. According to UNAIDS, AIDS is the leading cause of death among adolescents in Africa[8]. There is therefore a need to address issues around ART adherence to improve survival and development of the adolescents.

Adolescence is the age between 10-19 yrs. [9]. It is the age of transition from childhood to adulthood and is marked with physical and emotional changes. The age is also marked with sexual experimentation and is characterized by high-risk sexual behavior[10]. Adolescents are mostly school going age with several in boarding schools. This coupled with lack of disclosure and fear of stigma makes them less likely to adhere to ART [5]

Adolescents have been described as the 'fulcrum' and the 'centre of the epidemic', with 42% of new HIV infections occurring in this age group [10]. This means the possibility of an AIDS free generation depends highly on how we respond to the needs of adolescents. Human Immunodeficiency Virus is ranked among top causes of morbidity and Mortality in Kajiado County. [12]. According to Kenya HIV prevention

roadmap, Kajiado County is ranked in the medium incidence cluster with HIV prevalence of 4.4%.[13]. Kajiado is ranked 23rd in terms of HIV burden and contributes 1.6% to the national incidence rate. There are an estimated 20,100 adults and 2956 children living with HIV in Kajiado County. [3]

Kajiado County is near Nairobi County, which has a HIV prevalence of 6.8% [ranked 8th nationally] and falls in the high incidence counties. This has a spill-over effects on Kajiado County because Kajiado offers access to affordable housing [13]. Kajiado County HIV/AIDS strategic plan also prioritizes defaulter tracing as a key activity.

Poor ART adherence increases the risk of viral drug-resistance.[6]. This decreases the treatment efficacy leading to disease progression whereby the HIV infection can develop to full brown AIDS. It also reduces future therapeutic options. In Kenya, there are three treatment options with the third line being very expensive and requiring approval by National Technical Working Group for one to be enrolled. A young person defaulting on first line and being switched to a second line at an early age will adversely affect his/her life. Poor adherence also increases the risk of transmission due to unsuppressed viral Replication [6].

II. MATERIALS AND METHODS

➤ *Study Site*
The study was conducted in Kajiado County, Kenya. According to Kajiado Health Strategic Plan,[13] the county has one County referral hospital, 3 sub-county hospitals, 15 Health centers and 66 Dispensaries giving a total of 85 Government owned health facilities. Over 60% of the population lives more than 5km from the nearest health facility [14].

The study was conducted in four health facilities within Kajiado North namely Ngong Sub-County hospital, Ongata Rongai Health Centre, Beacon of Hope clinic and Dreams Centre.

➤ *Study Design*
A descriptive cross-sectional design was employed in this facility based study. Both qualitative and quantitative data were collected using questionnaires.

Qualitative data was collected using Focus Group Discussions [FGD]. Two types of FGD were held, one with adolescents to understand their issues and another with their caregivers to understand their perspectives. Only adolescents who have been disclosed to were involved in the FGD. The quantitative data was collected using interviewer administered questionnaires involving 167 adolescence respondents aged 10-19 years accompanied by their parents/guardians and having been on ARV regiments for at least 90 days prior to study. Adolescents either with severe disability, very seek or

unable to communicate effectively were excluded from the study.

➢ *Sample Size Determination*

The sample size was determined using the Cochrane, 1977 formula.

$n_0 = (Z^2 pq)/d^2$

Where   p= 86%, prevalence of adherence to ARV [15]

Z=1.96 z-score corresponding to 95% CI

d=Amount of error tolerable on p

N= 2989, Target population

Applying a finite population correction factor of 0.942, the sample size is, $n = N/(N+n-1) = 174$

➢ *Sampling Techniques and Procedures*

Kajiado County was stratified into five sub-counties. Kajiado South sub-county was randomly selected patients attending the four health facilities in this region formed the study population. A list of all adolescents on care were generated from the electronic medical records [EMR] system or manually where EMR was not available or updated. The number of enrolled participants from each of the facilities was proportionately assigned according to facility size and Simple Random Sampling strategy was used to recruit study participants. On each interview day, ascent was sought from the pre-selected participants as they come on their respective scheduled visit dates

➢ *Data Collection Tools*

Quantitative data was collected using the Case Adherence Index questionnaire for assessing adherence. Interview schedule for adolescents was also developed to collect data on demographics and other determinants. Review of client medical records was also done at health facilities. Qualitative data was collected using FGD Guide for caregivers/guardians and FGD Guide for adolescents

➢ *Data Analysis*

SPSS version 22 software was used for data entry, cleaning and coding. Bivariate relationships were evaluated using a t-test, significance being considered at 5%. For each of the significant factors a simple linear regression model was developed to identify presence of confounders. Factors that were associated with adherence at bivariate level were used to construct a multivariate linear regression model. Adjusted R2 was used to evaluate the fitness of the model. Confidence intervals were used to evaluate the significance of regression coefficients. The magnitude of significant Regression coefficients was used to interpret the contribution of significant factors in explaining their contribution on understanding adherence to ARTs.

➢ *Ethical Approvals and Considerations*

Protocol approval was sought and obtained from Moi University Institutional Ethical Review Committee [IREC]. Permission was also sought and obtained from the Kajiado County Health Management team and from Beacon of Hope Clinic Management being a private health facility:-

- *Informed consent/assent*:- The study involved minors and therefore guardians/caregivers were requested to give written assent prior to the study. The purpose of the study was explained fully to the participants. Caregivers participating in the FGD also gave written consent.
- *Confidentiality*:- Unique identifiers were used instead to ensure confidentiality of participants in this study.
- *Laws on research*:- The Kenyan laws and Moi University regulations pertaining research were fully observed during the entire period of the study.

III. RESULTS

➢ *Sociodemographic Characteristics of Respondents*

The respondents consisted an almost 50% for both sexes. Early adolescents (10-14) were slightly more than half (56%). The mean age of the respondents was 14.23±2.576 years. On the level of education, 65% were in primary school while 28% were in secondary school. Summary of other demographics indicate that 92% were students, 95% of the respondents were single and 96% were Christians.

There was an almost 50% spread for both urban and rural residents. On provision of care, 71% of the adolescents lived with at least one biological parent, 19% live with other relatives. The remaining 10% were cared for by siblings or other community structures such as pastors and community health workers.

➢ *Prevalence of Adherence to ART*

The study found a crude prevalence rate of 92.8% [95% CI 87.8% - 95.8%] based on the CASE adherence tool. Results from this study show younger adolescents were more likely to be adherent with a prevalence of adherence among early adolescents, 10-14 years, of 94.6% compared to late adolescents whose rate was 91.7%. However along gender, this study reveals showed no difference between prevalence among males and females both reporting a prevalence rate of 95%.

➢ *Association between Adherence and Client Factors*

An assessment of the client factors showed Occupation as the only statistically significant factor at 5% with students being more likely to be adherent than non-students. All other factors including religion, residence, age, gender, education level, viral load and duration on ART were not significant at 5%.

From the focus group discussion, the adolescent had a clear understanding of ART and importance of adherence. The adolescents explained that 'ART are drugs taken to reduce number of virus in the body'. They help reduce multiplication of the virus and that they help boost immunity. The group explained that if you don't take ART medication, 'The virus

will multiply', 'You can get sick' and 'you can develop resistance'.

From the FGD, the group mentioned stress as a key factor that makes them not to take drugs. They explained that they feel sad sometimes because they have the virus and can't really understand they have it. They ask themselves "why me? Why did God choose me to have this virus"? One female, 13yrs said that "I feel tired of taking ARVs all the time. I wish a day would come when I will no longer need to take the ARVs"

The adolescents explained that addressing the stress factor will help them adhere better to ART. They mentioned that if they play games like football or engage in other hobbies, it will help them forget about their status and enjoy their life.

➢ *Association between Adherence and Medication Related Factors*

An assessment of medication related factors showed four factors to be significantly related with adherence at 5% level. Swallowing drugs at the right time promoted adherence. Adolescents who reported continuing with medication despite experiencing side effects were 7.8 more likely to be adherent than those who discontinued. Having food to take with medication was also significant for adherence as well as keeping client appointments for drug refill.

➢ *Reason for Missed Dose*

The most common reason for missed dose was forgetting at 50%, fear of stigma at 17% and lack of food at 8%.
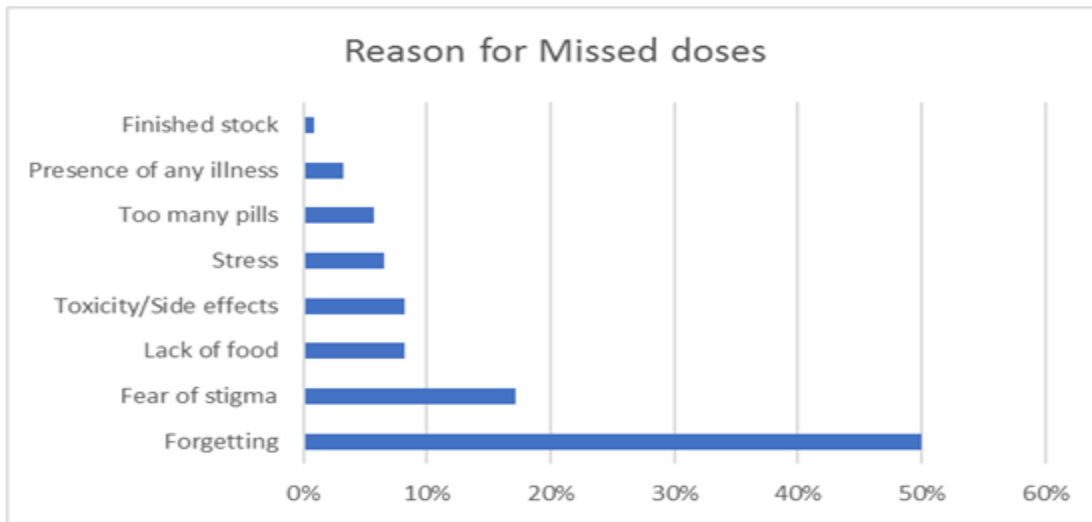

Fig 1:- Reason for Missed Doses

➢ *Side Effects Experienced*

The most common side effect experienced because of taking ARVs was nausea at 31% followed by itching 17% and rashes 13%.
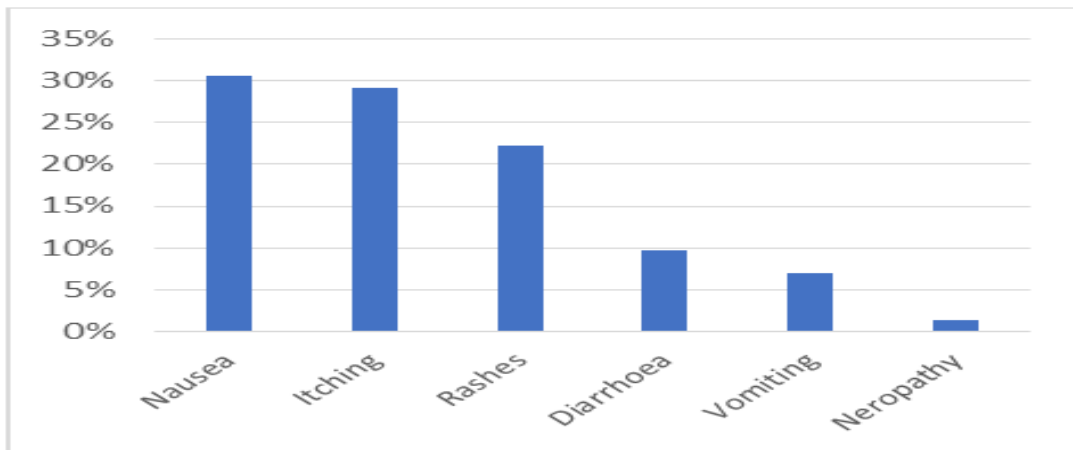

Fig 2:- Side Effects Experienced

> *Association between Adherence and Social Environmental Factors*

"Having a friend who knew status of the adolescent and cared for them" was the only factor found to be statistically significantly associated with adherence to ARTs (p<0.05). Other factors such as participation in support group, privacy and housing arrangement were not significant at 5%.

From the FGDs, disclosure was discussed at two levels, the caregiver disclosing the HIV+ status to the adolescent and the adolescent disclosing his/her status to friends and teachers or other adults. The adolescents reported that it was not important for them to disclose their status to other people. The adolescent felt that their HIV positive status should be kept within the family.

On the issue of informing adolescents on their positive status, there was no consensus on whether it is better to disclose or not. One group agreed that disclosure is important because it is important for society to know the adolescent status. The adolescent should also know their status to avoid infecting other people. It is important for adolescent to know so that they can know how to protect themselves from re-infection.

One group said it is not important for society to know their status citing reasons below;

From the focus group discussion, several issues were raised; the fear of stigma was a key contributor to negative effects of disclosure whereby the adolescents become rebellious and discontinue ART after disclosure. They suggested that adolescent HIV status should only be between close family members.

For younger children, they felt that disclosure should not be done since they may not understand fully and this will increase the chances of negative behavior post disclosure.

The group also suggested that the best person to disclose to the adolescent should be the Doctor because he/she is knowledgeable on HIV and gives guidance and counseling. Others felt it should be done by the Doctor in the presence of the parents/guardian, reason being the parent knows how the adolescent got the virus and they spend most of the time with the parents.

The group also felt that the public should be educated on the plight of the HIV positive and how HIV negative people can support those living with the virus. This will help address the issue of stigma and living with HIV will not seem like such a big deal, they felt that "HIV should be treated like any other illness".

> *Healthcare Delivery System Factors*

An assessment of the healthcare delivery factors, the study found a number of factors to be significantly associated with adherence to ARTS (p<0.05) including "Rating of information given by healthcare workers, confidentiality, trusting healthcare workers and rating of the quality of care provided". Cost of services, location of clinic and length of time clients had to wait during clinic visits were not significant.

From the FGD, One male adolescent explained that "I have a watch to remind them take drugs. I also put a reminder on my mom phone when I am on holiday"

Another recommended having a treatment supporter e.g. parents who will remind them to take drugs at the right time will help in their adherence. They also felt that adolescent should be educated on importance of adherence

Marking appointment dates on calendar was also mentioned as a method of increasing adherence so as not to miss clinic appointments.

> *Predictors of Adherence Multivariate Analysis*

Model	β	Std. Error	Sig.	95.0% Confidence Interval for β	
(Constant)	12.706	0.594	0.0000	11.532	13.88
Swallow right time	1.366	0.543	0.0130	0.294	2.438
Side Effects	-1.524	0.513	0.0030	-2.536	-0.511
Friends Know stats and care	-1.47	0.328	0.0000	-2.117	-0.823
Confidentiality is maintained	1.406	0.51	0.0070	0.398	2.414

Table 1

A multiple regression was run to predict adherence from all the significant factors at bivariate level. In the final model, only two factors contributed significantly to the model, experiencing side effects and having friends who knew the adolescent status and cared for them F $(4,157)$ $=22.302$ $p<0.05$. The other two factors did not add significantly to the model i.e. swallowing drugs at the right time and confidentiality at health facility.

IV. DISCUSSION

This study found a prevalence rate of adherence to be 92.8% [95% CI 87.8% - 95.8%]. This is comparable to a similar study done in Uganda involving 30 Health facilities that documented an adherence rate of 90.4% among adolescents[16]. A study in Nigeria by Lawan et al documented a prevalence rate of 90.5%. [17]

Reda and Biadgilign also found that antiretroviral therapy adherence in sub-saharan Africa are comparable or higher than developed world, contrary to common believe.[18]

This prevalence is also comparable to the KAIS 2012 [7] study which found a prevalence of 91% among general population. It is higher than 86% documented by Marima, 2011 in a similar study among adolescents in Kisumu[15]. A similar Nairobi based study by Wakabi S, found a lower prevalence of 82. Several studies in Africa and other developing countries document adherence levels less than 75% [19–21]

This improved adherence level can be attributed to the significant gains made in the care and treatment for adolescent. It can also be attributed to a change in strategy to the new directive of test and treat approach. The new directive by World Health Organization on 90:90:90 also means that clinicians are putting in more time and effort on retention in care and not just focusing on new enrollments. However, this is still lower than the optimum level of nearly 100% and at least 95% for viral suppression to occur [19–21]

On assessing the client factors, occupation was found to be significant. Other client factors such as age, gender, education level, religion, residence viral load and duration on ART were not significant at 5%. Being a student was promotive for adherence. This could be because the students are likely to be of a younger age and have caregiver influence. They are more likely to engage in games and other sporting activities that result in decreased stress. This aspect came out strongly during the FGD.

Adolescent's residence did not affect adherence contrary to a study finding in Uganda by Inzaule Nabukeera-Barungi et al.[16,24] found that attending a rural health facility decreased adherence. This could be because the urban residents were more likely to be literate and use technology e.g. alarms and calendars to remind them to take their medication. Rural

residents were also more likely to seek treatment at a facility further away from home due to fear of stigma; that someone may recognize them at the local clinic. Rural health facilities are also likely to have personnel issues since most health practitioners prefer urban setup.

The finding that age or gender does not affect adherence agree with other studies who found no association between adherence and age or gender and other epidemiological factors [25-26]. However, it differs from two studies who found a direct relationship between age and adherence [27-28]. This study found an inverse relationship between age and adherence. According to (Kgatlwane, 2010), who carried out a similar study in Botswana, decrease in age led to an increase in adherence. [29]. This could be due to caregiver influence on younger adolescents which may decrease in late adolescence. These studies, therefore, do not provide conclusive evidence on direction in which age affects adherence.

This study did not find an association between adherence and gender. This is similar to findings by (Kgatlwane, 2010) in a similar study in Botswana. Other studies found that being female decreased the adherence levels documented [29]

Swallowing drugs at the right time and keeping clinic appointments were found to promote adherence. This ensured an adolescent keen on taking their medications did not run out of medication.

The most common reason for missed dose was forgetting at 50%, fear of stigma at 17% and lack of food at 8%. This is similar to findings by several studies who found forgetfulness and fear of stigma to be the most common reason for adolescent missing their ART doses [27, 30-31]

This study found out that "Experiencing side effects" affected adherence negatively. The most common side effect experienced because of taking ARVs was nausea at 31% followed by itching 17% and rashes 13%. This finding is similar to that documented by Nabukeera-Barungi et al. in demonstrating that adverse side effects significantly affected level of adherence among adolescents.[16]

Having a friend who knew their status and cared for the adolescents was significant for adherence. A similar study done in Nigeria found that stigma and discrimination decreased adherence [17]. The same study found that avoidance by friends, feeling anxious and depressed led to a decrease in adherence. The fact that stressed adolescent spend most of their time feeling sorry for themselves and others with constant thought of death since HIV has no known cure could lead to their missing ART doses.

Another study done in southern Ghana also agreed with this finding documenting stigma and discrimination as key factors affecting adherence [32]. The fear of stigma from friends and neighbors affected their ability to take ARVs. The

fear that a peer may get to know their HIV status and share with other people affected their ability to adhere to ARVs. This could be the same reason that the adolescents, during FGDs, felt that their status should be kept a secret between family members. They will therefore miss ARV doses if they suspect someone may find out their status.

Other social environmental factors were not significant including housing conditions, participation in support groups, privacy in school settings and disclosure. The finding on lack of privacy in boarding school agrees with findings from Uganda who found that stigma in boarding schools led to a reduction in adherence [18,24] The findings also agree with several other studies that found no relationship between adherence and disclosure [33]. several studies have also indicated that disclosure is beneficial for adherence [34-39]. On assessing healthcare delivery factors, significant factors were rating of information given by healthcare workers, confidentiality, trusting healthcare workers and rating of the quality of care provided This is in tandem with several studies that found that support from healthcare workers increased adherence to ARVs [16,27]. The finding also agrees with Ankomah et al., who found a direct relationship between drug stock out and adherence. [32]

Location of clinic and length of time clients had to wait during clinic visits were not significant factors. This agrees with findings by (Kgatlwane, 2010) who found no association between distance travelled to the clinic and adherence. The findings differ with Ankomah et al., {2016) who found that long distance to treatment center, financial costs and delay at the clinic were significantly associated with adherence.

V. CONCLUSIONS

- This study found a prevalence rate for adherence that is slightly lower than the optimum and higher than most studies.
- Medication related factors were the most significant predictors of adherence at bivariate level.
- On multiple regression, two factors contributed significantly to adherence; experiencing side effects and having friends who knew the adolescent status and cared for them.
- The most common reason for missing a dose was forgetting, fear of stigma and lack of food to take with ART medication.

RECOMMENDATIONS

The value of ARVs in improving the quality of life for ALHIV cannot be underrated. Since ARVs are offered free in the Government facilities, there is need to support adolescents to overcome barriers associated with ART uptake. The researcher proposes the following recommendations to curb

non-adherence and reduce the risk of treatment failure and improve quality of life;

- Adopt strategies to remind adolescent to take drugs and keep clinic appointments.
- Improved ARV regimen with reduced side effects since side effects was key contributor to non-adherence.
- Psychosocial support for adolescents to address stress which was mentioned as key factor affecting ART adherence.
- Stigma reduction strategies in schools to help adolescents in boarding schools take their ARVs without worrying their peers will discover their HIV positive Sero-status.
- Policy review on HIV care services to ensure all ALHIV have access to nutritious food to take with their medication. This is especially important for adolescents living with poor or inadequate caregivers.

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