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PREDICTORS OF ADHERENCE TO HIGHLY ACTIVE ANTIRETROVIRAL THERAPY (HAART) AMONG HIV PATIENTS ATTENDING SELECTED COMPREHENSIVE CARE CENTRES (CCC) IN KERICHO COUNTY

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Abstract

Purpose: The main objective of the study was to determine Predictors of adherence to Highly Active Antiretroviral Therapy among HIV patients attending selected comprehensive care centres in Kericho County. Specifically, this study sought to determine the socio-demographic and socio-economic factors that affect adherence HAART.

Methodology: A descriptive cross-sectional study was used. It involved 280 HIV patients (≥ 15 years) on HAART in three selected Comprehensive Care Centres in Kericho County. Data was collected from the patients using interviewer administered semi-structured questionnaires while Key informant interviews were held with healthcare providers involved in HIV care at the selected facilities. Viral load was used as a measure of adherence. This was done by retrospective review of the patient files. The three facilities where this study was done were picked using purposive sampling. systematic sampling was then utilized to attain the calculated sample size for each facility. Data was entered into Statistical Package for Social Sciences (SPSS) version 25.0 and analysis was done through descriptive and inferential statistics. Descriptive statistics; frequencies and percentages was used to summarize the data set. Inferential statistics was done using logistic regression analysis (Univariate and multivariate). The p-value was set at 0.05. Summary statistic of independent variables was presented using frequency tables, pie charts and bar graphs.

Findings: 76% of the respondents had optimal adherence while 24% had sub-optimal adherence. More females than males were on treatment. There was an insignificant difference in adherence between males and females. Only age (category 20-24 years) $p=0.023$ and expenditure on food ($p=0.04$) had significant association with adherence to HAART.

Unique contribution to theory, practice and policy: An understanding of these predictors will allow for targeted interventions to increase adherence to HAART and improve the health outcomes of PLHIV. Healthcare providers will be able to develop educational programmes and materials that target HIV patients at risk of sub-optimal adherence.

Keywords: *Highly Active Antiretroviral Therapy, HIV Patients, Care Centres*

1.0 INTRODUCTION

Kenya has the fifth-largest number of people living with HIV (PLHIV) in the world and HIV has continued to be a leading cause of adult morbidity and mortality (NASCO, 2020). Despite this, Kenya is widely regarded as one of sub-Saharan Africa's HIV prevention success stories. There has been a steady decline in the annual new HIV infections from the country's peak of over 200,000 in 1993, 100,000 new infections in 2013, 62,000 in 2016 and 46,000 in 2018 (UNAIDS, 2019). The decline is attributed to the scale up and the success of the Highly Active Antiretroviral Therapy (HAART) programme. HAART has been made available throughout the country in many health facilities ranging from large referral hospitals to small dispensaries.

HAART is undoubtedly the only proven remedy known to enable PLHIV to achieve and maintain utmost viral suppression, reduce the risk of drug resistance development, prevent the transmission of HIV and reduce AIDS-related mortalities. Through HAART, HIV/AIDS has been transformed into a chronic manageable disease for a substantial proportion of PLHIV who have access to treatment. Studies have shown that most people achieve viral suppression within 3-6 months of uninterrupted HAART treatment. For HAART to be effective, maximum level of adherence is required; a near perfect adherence level of 95% is required so as to achieve viral suppression. The success of the HAART programme highly depends on constant high adherence. Scaling up of HAART without addressing adherence inconsistencies further complicates the problem by limiting future treatment options.

With the UNAIDS HIV and AIDS programme setting the 95-95-95 goal to end the epidemic by the year 2030, many countries including Kenya are working towards achieving this goal. This is projected that by the year 2020, 95% of PLHIV will know their status, 95% of the diagnosed individuals will be enrolled to uninterrupted antiretroviral therapy and out of these individuals 95% of them will have undetectable viral load. However, sub-optimal adherence to HAART has been cited as the most probable barrier towards achieving viral suppression.

Adherence to HAART is an important concept in the treatment of HIV. Its significance has been emphasized by its incorporation in the "HIV care continuum" a framework that models the dynamic stages of HIV care. The continuum is made up of five stages; Diagnosis, Linkage to care, Retention in care, Adherence to ART and Viral suppression (Kay et al., 2016). Yang et al., (2018) noted that a reduction in adherence rate to 80% results in an intense drop in the rate of viral suppression and it can drop as low as 20%.

Wakibi (2010) in a study done in Kenya reported that distance to refilling clinics, time taken to refill, level of education and level of income has significant effect on adherence to HAART. Momanyi, (2017) reported that forgetfulness, side effects, Pill burden, depression and stigma are associated with non-adherence while socio-economic and socio-demographic factors does not significantly influence non-adherence.

According to the available literature, no factors have been consistently associated with adherence to HAART. Some factors that were reported to have statistical significance in one study were found to be statistically insignificant in other studies. This necessitates the need for context-specific adherence studies to be undertaken.

1.1 Statement of the Problem

Despite HAART being made freely available in many public health facilities across the globe, adherence to treatment is still a challenge. Adherence to HAART among HIV patients remains a public health concern with sub-optimal adherence resulting in treatment failure being common. It is estimated that around 33% to 38% of PLHIV globally are non-adherent to HAART (Sandeep et al., 2013).

According to Kenya AIDS Indicator Survey (KAIS,2012) an estimated 16.3% of PLHIV between 15–64 years were non-adherent to antiretroviral therapy. The African continent had an average non-adherence rate of 23% with SSA countries, including: 23% in Rwanda, 14% in Ghana and 40% rural Zambia. Kenya is among the four countries with high HIV burden in Africa with an estimated prevalence of 4.9% (NACC, 2018). The HIV epidemic directly or indirectly affects a big percentage of Kenya's population.

HIV patients not adhering to HAART are 3.87 times more likely to die than adherent patients on the same medication (Win et al., 2017). Sub-optimal adherence can lead to decline in Cluster of Differentiation 4 (CD4) cell counts, raising viral loads, development of drug resistance, increased risk of transmission of drug resistant strains, disease progression to AIDS and episodes of opportunistic infections.

Figure 1: showing conceptual framework for the study

Independent variables

Socio-demographic and socio-economic characteristics

- Age
- Gender
- Marital status
- level of Education
- level of income
- Type of Occupation
- Nature of work schedule
- Daily expenditure on food
- Type of residence
- Fare to-and-from the CCC



Dependent variables

-Optimal adherence to HAART
-Sub-optimal adherence to HAART

Modified from Joubert & Ehrlich (2007)

3.0 METHODOLOGY

3.1 Study design

A descriptive cross-sectional study was used. It involved 280 HIV patients (≥ 15 years) on HAART in three selected Comprehensive Care Centres in Kericho County. Data was collected from the patients using interviewer administered semi-structured questionnaires while Key

informant interviews were held with healthcare providers involved in HIV care at the selected facilities. Data was collected for a period of two months, July and August 2018.

Viral load was used as a measure of adherence. This was done by retrospective review of the patient file. Individuals with viral load rebound (>50 HIV-1 RNA copies/ml) from the previous viral load measure were considered to have sub-optimal adherence while those with <50 HIV-1 RNA copies/ml from the previous viral load measure were considered to have optimal adherence.

3.2 Population, Sample size and sampling method

The target population for this study were HIV patients (>15 years) on HAART attending Kericho Referral Hospital, Londiani Sub-County Hospital and Litein mission Hospital comprehensive care centres. The three CCCs were selected purposively. This was done basing on their geographical location within Kericho county.

The required sample size was determined using Fisher's method (Fisher *et al*, 1991) with a 95% confidence interval and a 5% sampling error.

$$n = \frac{z_{\alpha}^2 p(1-p)}{d^2}$$

n=sample size

Z= statistic for a level of confidence at 95% which gives a value of 1.96

P= 24% which is the proportion of HIV patients on HAART not reaching optimal Levels of adherence (Amberbir, 2008)

D= precision with 95% confidence interval which gives a margin of error of ± 0.05

Therefore, the minimum sample size was,

$$n = \frac{1.96^2 \cdot 0.24(1-0.24)}{0.05^2} = 280$$

The number of respondents picked from each facility were determined according to probability proportionate to size as shown in the table below.

Table 1: showing the sample size for each CCC

Comprehensive Care Centre	Total population of patients on HAART(≥ 15 years)	Proportionate number in sample size
Kericho Referral Hospital	5000	$5000/6800 \cdot 280 = 206$
Londiani Sub-County hospital	700	$700/6800 \cdot 280 = 29$
Litein mission hospital	1100	$1100/6800 \cdot 280 = 45$
Total	6800	280

The above table shows the CCCs where the study was conducted, the number of patient on treatment (≥ 15 years) and the sample size from each facility. The figures used were facility estimates as at May 2018.

Systematic sampling was used to attain the sample size of 280. The data collected was coded and entered into Statistical Package for Social Sciences (SPSS) version 25 for analysis.

3.3 Data analysis and presentation

Data was analyzed through descriptive and inferential statistics. Descriptive statistics such as mean, frequencies, and percentages was used to summarize the data set. Logistic regression analysis was used to determine the association between adherence to HAART and various independent variables. First, Univariate logistic regression analysis was done to explore the various variables that affect adherence to HAART. *P*-value was set at 0.05 significance level and any variable whose *p*-value was less than 0.05 were deemed statistically significant. Variables that were deemed to be significant at 0.05 level of significance were transferred to the multivariate analysis to control possible confounders. Differences between the parameters of estimate were deemed to be statistically significant at $P < 0.05$. Summary statistic of independent variables was presented using frequency tables, pie charts, percentages and graphs.

4.0 RESULTS

A total of 280 patients on HAART were interviewed in the three selected comprehensive care centres. However, results from only 261(94%) patients were used during the final analysis. This is because 19 patients' files did not have results for the previous two consecutive viral load results. Since adherence was assessed using viral load results and data on viral loads was extracted retrospectively from patients' files. 19 patients did not have complete data on previous viral loads hence were excluded in the final analysis. This led to the drop in sample size from the previous calculated of 280 to 261. The response rate was 100%, 280 respondents participated fully in the interview. Majority of the respondents, 75.86% were from Kericho, 14.18% were from Litein and 9.96% from Londiani. There were more females (62.45%) than males (37.45%) and majority (49.43%) of the respondents were married. The majority of the respondents; had attained secondary education (41.76%), lived with their family (81.23%), lived in residential places (56.7%), casual labourers (37.93%), earned between Ksh. 5,000-10,000 a month (26.54%).

Table 2: Distribution of respondents according various socio-economic and socio-demographic characteristics and also adherence

Variable	Frequency	Percent (%)	Optimal adherence N(%)	Sub-optimal adherence N(%)
CCC				
Kericho Referral Hospital	198	75.86	148(74.75)	50(25.25)
Litein Mission Hospital	37	14.18	29(78.40)	8(21.60)
Londiani Sub-County Hospital	26	9.96	21(80.77)	5(19.23)
Gender				
Female	166	62.45	111(66.89)	55(33.13)
Male	95	37.55	65(68.42)	30(31.58)
Age				
15-19	15	5.75	13(86.67)	2(13.33)
20-24	25	9.58	12(48.00)	13(52.00)
25-29	35	13.41	28(80.00)	7(20.00)
30-34	42	16.09	30(71.43)	12(28.57)
35-39	37	14.18	25(67.57)	12(32.43)

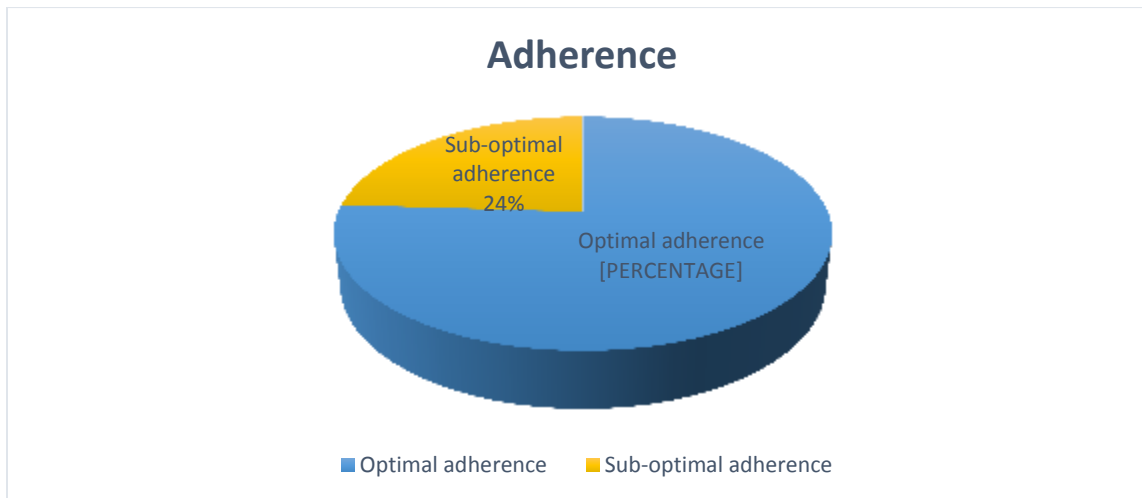
40-44	37	14.18	28(75.68)	9(24.32)
45-49	31	11.88	19(61.29)	12(38.71)
50+	39	14.94	21(53.85)	18(46.15)
Marital status				
Married	129	49.43	87(67.44)	42(32.56)
Widow	31	11.88	22(70.97)	9(29.03)
Widower	3	1.15	1(33.33)	2(66.67)
Single	66	25.29	45(68.18)	21(31.82)
Divorced	3	1.15	3(100)	0(0.00)
Separated	29	11.11	18(62.07)	11(37.93)
Level of Education				
No Formal Education	13	4.98	8(61.54)	5(38.46)
Primary Education	94	36.02	58(61.70)	36(38.30)
Secondary Education	109	41.76	79(72.48)	30(27.52)
Tertiary Education	45	17.24	31(68.89)	14(31.11)
Whom do you Live with?				
Alone	41	15.70	30(73.17)	11(26.83)
Family	212	81.23	140(66.04)	72(33.96)
Friends	8	3.07	6(75.00)	2(25.00)
Type of residence				
Rental	113	43.3	82(46.59)	31(36.47)
Residential	148	56.7	94(53.41)	54(63.53)
Type of occupation				
Teacher	12	4.60	8(66.67)	4(33.33)
Nurse	3	1.15	3(100.0)	0(0.00)
Self employed	105	40.23	62(59.00)	43(41.00)
Mechanic	4	1.53	4(100.00)	0(0.00)
Driver	8	3.07	6(75.00)	2(25.00)
Banker	4	1.53	4(100.00)	0(0.00)
Casual Labourer	99	37.93	64(84.65)	25(33.35)
Unemployed	26	10.00	14(55.00)	12(45.00)
Type of work schedule				
Full time	25	10.55	18(72.00)	7(28.00)
Over time	33	13.92	27(81.82)	6(18.18)
Part time	80	33.76	50(62.50)	30(37.50)
Split shift	3	1.27	1(33.33)	2(66.67)
Rotating shift	1	0.42	1(100.00)	0(0.00)
Casual	95	40.08	63(66.32)	32(33.68)
Level of Income				
< Kshs. 1000	37	14.18	24(65.79)	13(34.21)
Kshs. 1000-5000	68	26.05	44(64.71)	24(35.29)
Kshs. 5001-10000	69	26.44	46(66.67)	23(33.33)
Kshs. 10001-15000	64	24.52	46(70.83)	18(29.17)
Kshs. 15001-25000	13	4.98	10(76.92)	3(23.08)
Kshs. 20001-50000	8	3.07	6(75.00)	2(25.00)
> Kshs. 50000	2	0.77	2(100.00)	0(0.00)
Fare to-and-from the CCC(Ksh.)				
0-50	71	27.20	53(75.61)	18(24.39)
51 <100	28	10.71	21(73.91)	7(23.09)
101 < 200	84	32.18	57(67.86)	27(32.14)
201 <400	58	22.22	43(74.14)	15(25.86)

>401	20	7.66	17(84.00)	3(26.00)
Average daily expenditure on food(Ksh.)				
0-200	220	89.07	147(66.82)	73(33.18)
200-400	25	10.12	18(72.00)	7(28.00)
400-800	2	0.81	2(100.00)	0(0.00)

4.1 Adherence levels among the respondents

From figure below, Majority of the respondents, 198 (76%) had optimal adherence while 63 (24%) had sub-optimal adherence.

Figure 2: showing the adherence status among the respondents



As indicated in the table below, 42.91%(112) of the respondents indicated that there were other issues that made it difficult for them to take their HIV medication as prescribed.

Table 3: showing other issues that made it difficult for the respondents to take their HIV medication as prescribed.

Reason	N	%
Lack of food	23	20.50
Forgetfulness	25	22.30
Denial of one's HIV status	14	12.50
Tight work schedule	8	7.10
HAART side effects	33	29.50
Pill burden	9	8.10
Total	112	100%

Upon analysis at the Univariate level, Age ($p=0.032$), type of residence ($p=0.042$), expenditure on food ($p=0.031$) and fare spent to clinic($p=0.035$) had significant association with adherence to HAART as shown in the table below.

Table 4: Showing univariate association between socio-demographic and socio-economic characteristics and adherence to HAART

Adherence	Odds Ratio	Std. Err.	Z	P>z	[95% Conf.	Interval]
Gender	0.994	0.271	-0.020	0.982	0.582	1.696
Age	0.9085698	0.058	-1.510	0.032	0.802	1.029
Marital Status	0.982	0.073	-0.25	0.804	0.849	1.135
Level of Education	1.227	0.203	1.240	0.216	0.888	1.696
Level of Income	1.123	0.113	1.150	0.248	0.922	1.369
Type of occupation	1.013	0.050	0.260	0.794	0.919	1.116
Expenditure on food	1.600	0.563	1.34	0.031	0.803	3.189
Type of residence	0.658	0.179	-1.540	0.042	0.387	1.120
Whom do live with	1.161	0.247	0.71	0.079	0.766	1.764
Type of work schedule	0.516	0.269	-1.270	0.063	0.186	1.434
Fare spent to clinic	0.825	0.084	-1.900	0.035	0.677	1.006

However, after adjusting for confounders at the multivariate level ($P=0.05$), only **Age** (20-24 years) ($p=0.023$) and **expenditure on food** ($p=0.040$) had significant association with adherence to HAART (Table B).

Table 5: Showing multivariate association between socio-demographic and socio-economic characteristics and adherence to HAART

Adherence	Odds Ratio	Std. Err.	Z	P>z	[95% Conf.	Interval]
Age	1.141	0.121	-2.27	0.023	0.260	0.764
Gender	1.391	0.502	0.92	0.379	0.686	2.83
Marital Status	1.862	0.970	1.19	0.233	0.671	1.168
Level of Education	0.624	0.317	-0.93	0.354	0.231	1.69
Level of Income	0.732	0.489	-0.47	0.640	0.198	2.708
Type of occupation	0.901	0.820	-0.11	0.908	0.151	5.365
Expenditure on food	2.542	1.202	1.97	0.040	1.001	6.423
Type of residence	0.832	0.578	0.260	0.719	0.213	3.250
Whom do you live	0.834	0.519	-0.29	0.770	0.246	0.282
Type of work schedule	0.657	0.579	-0.480	0.634	0.117	3.700
Fare spent to clinic	1.104	0.402	0.270	0.517	0.941	2.252

Among all the socio-economic and socio-demographic variables analyzed in this study, age and expenditure on food had significant influence on adherence. This means that respondents who were aged between 20-24 years were 1.1 times more likely to have sub-optimal adherence compared to other age groups while respondents who had no money to buy food (no food) were 2.5 times more likely to have sub-optimal adherence as compared to those respondents who had money to buy food.

4.2 Themes from Key Informant interviews (KII).

From July to August 2018, I conducted 16 key informant interviews with the healthcare workers involved in HIV care and treatment; Nurses, clinical officers, nutritionists, pharmacists and counsellors. The number of interviews done was determined using the saturation principle; 3 KII's in Londiani Sub-County Hospital, 5 KII's in Litein mission Hospital and 8 KII's in Kericho County Referral Hospital.

According to the healthcare providers, the following factors have significant effect on adherence to HAART;

Age-Age was mentioned repeatedly. A clinical officer from Kericho County noted "Adherence to HAART tends to increase with the patient's age, adolescents and young adults aged 30 years and below mostly struggle with adherence. From the age of 30 years and above, patients seem to understand the importance of adherence hence tend to strictly follow the medication schedule". In Litein Hospital, a counsellors noted "Older patients, above 35 years rarely give us adherence problems. However, from between 18-28 years, only a few patients manage to maintain good adherence. Most of these patients suffer from psychosocial problems ranging from denial of their HIV positive status, hopelessness, guilt about the disease and even some have reported having had suicidal thoughts".

Lack of fare to clinic- A clinical officer in charge of adherence monitoring at Kericho Referral Hospital noted "Fare to clinic has been reported by some of our patients as the reason why sometimes they don't turn up for refill. Some patients have reported having trekked for many kilometres to the clinic. We however always try to identify needy patients who for some reason cannot afford fare to clinic. we enroll them to a group "needy" and offer them financial support to enable them meet cost of fare and basic needs."

Lack of food-A nurse at the Londiani sub-county Hospital noted "some of my patients have reported not taking their medication when they have nothing to eat. They reported of side effects being worse when the drugs are taken on an empty stomach. Loss of energy, stomach pains, headaches and dizziness have been reported being common when HAART are taken on an empty stomach".

Privacy and confidentiality of one's HIV status-A clinical officer at Kericho Referral Hospital reported "when a new healthcare professional is brought into the facility, it takes us a lot of time to get used to them and eventually open up on issues affecting us". He further noted that "Some of my patients have reported to have been forced to go back without refilling because they spotted someone at the hospital who knew them and they did not want to be seen going to the clinic"

5.0 DISCUSSION, CONCLUSION AND RECOMMENDATION

Discussion

This study determined the predictors of adherence to HAART among HIV positive patients attending selected comprehensive care centres in Kericho County, Kenya. Concurring with other studies, this study determined that age has a great influence on adherence. Patients in young adulthood (20-24 years) are 1.1 times more likely to have sub-optimal adherence as compared to patients in later adulthood. This is attributed to the fear being discriminated once their HIV

positive status is known by others and also the hopelessness that results from finding out their status. Such patients also reported missed clinic appointments hence eventually ran short of their medications.

The findings in this study concur with findings from another study done by wakibi (2010) in Nairobi, which reported that respondents in younger age were more than one and half times more likely not to adhere to therapy than the older adults. These findings are also consistent with the study by Fonsah et al.,(2017) who noted that there is increased risk of non-adherence to HAART among younger patients as compared to older ones. In their study, they found that patients less than 40 years were significantly less likely to be adherent as compared to those above 40 years. Sabina et al., (2006) further noted that older age is associated with higher adherence levels while younger age is a risk factor for non-adherence. MacCarthy et al.,(2018) reported that barriers to ART present additional complications to adolescents and young adults. They postulated that; poverty limited adolescents ability to buy food, school limited their privacy further disrupting ART adherence, lack of family support due to constant change in guardianship and the high pill burden is a frustration to the youth with most resorting to drug-holidays.

This study further revealed expenditure on food is also another predictor of adherence to HAART. Daily/monthly expenditure on food is an indicator of individuals' economic access to sufficient food to meet their dietary needs. The individual economic access further determines the food security status of an individual. Patients who had no money to buy food were 2.5 times more likely not to take their medication as compared to those who had money to buy food. Those had no food and opted to swallow their medication on an empty stomach reported that side effects were worse. some of the reported side effects included; stomach pains, rapid heartbeat, shivering and sweating. Such patients further reported that whenever they had no money to buy food, they didn't take their medication due to the fear of adverse effects.

These findings are in agreement with a study by Mavhandu-Mudzusi & Fikadu (2020) who reported that food insecure individuals are 2.7times more likely to have sub-optimal adherence as compared to food secure individuals. Similar findings were also reported by Berhe et al.(2013) who noted that individuals who are unable to get enough and quality food are 2.1 times more likely to have sub-optimal adherence. Weiser et al., (2010) reported that food insecurity undermines ARVs through five mechanisms; 1) ARVs often increased appetite, and food scarcities exacerbated the resulting hunger; 2) Side effects of ARVs being much worse in the absence of food; 3) Participants were counseled on the importance of taking ARVs with a balanced diet and reported that some people did not start ARVs because they could not afford the accompanying food; 4) Competing demands between the cost of obtaining food and the cost of medical treatment and transportation for monthly clinic visits led people either to default from treatment, or to give up food and wages to get medications; and 5) Long days of farming in the fields or doing other work to earn money for food sometimes caused people to skip or forget to take their doses.

Conclusion

Majority of the respondents (76%) were adherent to HAART. This study identified age as one of the independent predictors of adherence; young age (20-24 years) was found to be a risk factor for sub-optimal adherence while increasing age (≥ 30 years) was found to promote optimal adherence. Expenditure on food was found to be predictors of adherence to HAART; having

money to meet the competing demands which includes daily food was found to promote optimal adherence while the lack of money to meet the same needs was found to be a risk factor for sub-optimal adherence.

Recomndations

Follow-up adherence monitoring should be routinely done for patients in the age category 20-24 so as to identify the challenges/ barriers to optimal adherence in this category. There should also be improvement in the mechanisms for identifying very needy cases amongst the patients so as to reduce the cases of missed clinic appointments due to lack of fare and missed doses due to lack of food.

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