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### Factors associated with Adherence to Antiretroviral Treatment among Adolescents Attending Kalisizo Hospital, Kyotera District

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#### ABSTRACT

This study aimed to assess the factors associated with adherence to antiretroviral treatment among adolescents attending Kalisizo Hospital, Kyotera District. This was based on study specific objectives that included; assessing the individual, drug related and health care related factors associated with adherence to antiretroviral treatment among adolescents attending Kalisizo Hospital Kyotera District. The study used a descriptive cross-sectional design where a sample of 355 respondents who were adolescents between 10 and 25 on antiretroviral treatment was used. Stratified and simple random sampling techniques were used to select the respondents and data was collected using self-administered questionnaires and analyzed using SPSS. The level of adherence to antiretroviral treatment was low at 33%. This was far lower than the national target of 90%. This was attributed to individual, drug and healthcare factors. Individual factors were; gender (P=0.001), age P=0.021), marital status (P=0.039). The level of adherence to antiretroviral treatment was low. This was attributed to missing of taking of drugs due stigma, drug stock outs, failure to get routine education about ART, distance to health facility, inadequacy of information given and long waiting time.

Keywords: HIV, adherence to antiretroviral treatment, adolescents

#### INTRODUCTION

Adolescence typically describes the years between 13 and 19, which is the transitional stage from childhood to adulthood. However, the physical and psychological changes that occur in adolescence can start earlier during the preteen or tween years (ages 9 through 12) [1]. On the other hand, World Health Organization defines adolescence as the age between 10 and 24 years [2]. In this study adolescent was considered to be between 10 and 2 years of age. Treatment adherence is one of the strongest predictors of virological failure, development of drug resistance, disease progression and death [3]. Poor adherence to combination antiretroviral therapy (CART) is common in both developing and developed nations. It was found in around 20% of HIV-infected patients in Africa and in around 14% in the United States of America [4]. By year-end 2014, approximately 37 million people were living with the human immune-deficiency virus (HIV) globally, with nearly all from low- and middle-income countries. Of those, an estimated 15 million HIV-infected persons were receiving antiretroviral drug (ARV) therapy (ART), a doubling of numbers on ART from 2010 [5]. The use of ART has significantly reduced morbidity and mortality over time in persons living with HIV. Globally in 2014, 1.2 million persons died from AIDS-related causes, representing a 42% reduction since the peak in AIDS deaths in 2004 [5]. Adolescents and young people represent a growing share of people living with HIV worldwide. In 2016 alone, 610,000 young people between the ages of 15 to 24 were newly infected with HIV, of whom 260,000 were adolescents between the ages of

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15 and 19 [1]. Estimates of ART adherence among adolescents living with HIV (ALHIV) in Low and Middle-Income Countries (LMIC) vary substantially [6-12]. Adherence rates ranged from 16% to 99% among adolescents globally [13]. Meta-analysis findings among adolescents and young adults (12-24 years) in 53 countries since 2014 found adherence based on either self-report or viral load measures at 84% in both Africa and Asia [14]. Into the third decade of the HIV/AIDS epidemic, there are 34 million people living with HIV in the world [15-18], of whom five million are aged between 15 and 24 years [19]. Adolescence is a period of mental, physical and emotional maturation wherein commonly individuals undergo behavioural experimentation, identity formation, risk taking and face difficult choices on romantic relationships, sexual behaviour and alcohol and recreational drug use [1]. There has been one previous review of ART adherence among HIV-infected youth, which showed adherence rates ranging from 28.3 to 69.8% in the USA [1]. A multicenter prospective cohort study in 17European countries with 1323 adult patients showed 80% of its population achieving virological suppression (95% CI, 78–82) [20].

UNAIDS estimates that 2.0 million adolescents aged 10-19 were living with HIV in 2014 [21], among which 9,600 were in Thailand. Despite increasing access to ART, several studies in Thailand and worldwide have found decreased adherence and rebound in mortality in adolescents receiving ART as compared to adults and young children [22]. Virologic data show that rates of viral suppression (less than 400 copies/ml) range from 27% to 89% in Africa, from 52% to 87% in Asia and from 37.5% to 49% in Central and South America [23]. The vast majority of people living with HIV are in low- and middle-income countries [24-28]. Sub-Saharan Africa is the most affected region, with an estimated 25.6 million people living with HIV in 2015. About 66% of new HIV infections in 2015 occurred in sub-Saharan Africa [29]. Data indicate that only 15% of adolescent girls and 10% of adolescent boys aged 15-19 in sub-Saharan Africa – the region most affected by HIV - have been tested for HIV in the past 12 months and received the result of the last test  $\lceil 1 \rceil$ . The burden of the epidemic lies largely in sub-Saharan Africa, where the prevalence is estimated to be 2.2% among young women (15-25 years) and 1.1% among young men compared to global estimates of 0.4% and 0.3%, respectively [30]. In a study from Zimbabwe, 39% of adolescents reported suboptimal adherence, but significantly fewer reported suboptimal adherence if guardians were present in the room [31]. About 127,000 adolescents aged 10 to 19 are living with HIV in Uganda [32]. Both good adherence and retention in care are a prerequisite to successful management of adolescents living with HIV (ALHIV). Poor adherence is associated with poor treatment outcome [1]. In the case of ART, optimal adherence is taking 95 % and above of prescribed medication [33].

#### METHODOLOGY

#### Study design

A descriptive cross-sectional study research design was used to carry out this study [34].

Study setting

The study was carried out in HIV clinic of Kaliisizo Hospital in Rakai District.

#### Study population

The study population was categorized into target and access population of HIV/AIDS positive adolescents attending the HIV clinic of Kalisizo Hospital. This group was chosen because there was high death among HIV/AIDS positive adolescents more than other age groups due to poor adherence to antiretroviral treatment yet the reasons were not clearly known to the caretakers and healthcare providers to address the problem. Target population consisted of all HIV/AIDS positive adolescents attending the HIV clinic of Kalisizo Hospital. The hospital has a total of 650 registered HIV positive adolescent 10-24 years. The access population was adolescents who attended Kaliisizo Hospital at the time of study.

#### Eligibility criteria

#### Inclusion criteria

The study population included all adolescents between 10 and 25 years on antiretroviral treatment who attended Kaliisizo Hospital. These were adolescent who had been on ART treatment for six months and consented to take part in the study.

#### **Exclusion criteria**

All HIV/AIDS positive adolescents who attended Kaliisizo Hospital, Kyotera District not on antiretroviral treatment or who had been on antiretroviral treatment for less than six months, or deaf or dumb, mentally ill or the very ill were excluded from the study.

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#### Sample size determination

A sample size of adolescents on antiretroviral treatment was determined using the Kish and Leslie sample size formula given below, [35].

$$n = \frac{Z^2 PQ}{D^2}$$

Where:

n = The minimum sample size

z = z-value is the desired confidence level at 95% which equated at 1.96

P = Is the estimated proportions of HIV/AIDS positive adolescents who adhere to ARVs/ART.

Approximately 70% of adolescents were non-retained in care at Katooke Health Center, Mid-Western Uganda. Consequently, a quality improvement (QI) project was started to increase retention from 29.3% in May 2016 to 90% in May 2017 [36].

q = Is given by 1-P.

e = Margin of error at 5% (0.05)

$$n = Z^{2} P(1-P)$$

$$D^{2}$$

$$n = 1.96 \times 1.96 \times 0.30 \times 0.7$$

$$0.05 \times 0.05$$

$$n = 3.8416 \times 0.21$$

$$0.0025$$

$$n = 0.806736$$

$$0.0025$$

#### n= 323 Respondents

To account for the expected errors that were met during the data collection process a 10% increment was considered and added to the calculated sample size

$$n = \frac{110 \times 323}{100} = 355$$

Therefore, a sample size of 355 respondents was used in this study

#### **Sampling Technique**

The study used both probability and non-probability sampling methods to select the respondents. Stratified and simple random sampling techniques were the probability and purposive sampling was the non- probability. Kaliisizo Hospital, Kyotera District was chosen by convenience because; it was more accessible to the researcher than other wards in Kaliisizo Hospital, Kyotera District since it was the researcher's place of work and residence.

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#### Data collection methods and tools

In this study; quantitative data was collected using researcher-administered questionnaires. An interview guide containing both close ended (structured) and open ended (semi-structured) questions on individual, drug related and health care factors associated with adherence to ARVs/ART among adolescents were used. This was done to create a rapport between the researcher and the respondents and to follow up all important issue the respondents had.

#### Plan for data presentation and analysis

Data was cleaned, coded and entered then right away entered into the computer using the Statistical Package for Social Scientists (SPSS). Descriptive statistics and analysis were carried out and were presented in tables and graphs which had percentages and frequencies. These were relied upon to quantitatively describe the variables univariately. Bivariate analysis was attained through cross tabulation where chi-square tests and correlations were done to establish the P-values upon which levels of significance were determined. The levels of significance were attained by finding the relationship between each independent variable and the dependent variable. After the results were compiled into a report in form of quotes and narratives to supplement the quantitative data.

#### **Ethical consideration**

On completion of the research proposal, it was approved by the supervisor who recommended the researcher to be issued with an introductory letter by the school of Allied Health Sciences. This was addressed and presented to Kalisizo Hospital where the research study was carried out. The letter was handed to the Medical Superintendent of the hospital and after reading it, endorsed it and another accompaniment letter was written by her and forwarded it to the HIV/AIDS clinic to allow the researcher collect data. On accepting the researcher to carry out the study from the hospital, she educated the study population about the purpose of the study and its contents. Patients who consented or whose parents/caretakers consented to the study were enrolled into the study as respondents. Before the commencement of the study, respondents signed a written informed consent form as described in Appendix I below then they were subjected to research questions as illustrated in Appendix II. For all collected data, confidentiality was maintained by not revealing the participants" identities. Data was safely stored in a safety box under lock and key only accessible to the study investigators.

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RESULTS			
Table 1: Frequency distribution of the res	pondents by	y Individual f	factors

Variable	Category	Frequency	Percentage
Gender	Males	150	42
	Females	205	58
Age	Less than 15 years	61	17
	16-18 years	95	27
	19-22 years	117	33
	23-25 years	82	23
Marital status	Singles	139	39
	Married	167	47
	Separated	39	11
	Widows/widower	10	03
Education	No formal education	30	08
	Primary	106	30
	Secondary	132	37
	Tertiary	87	25
Occupation	Housewives	73	20
	Self-employed/Business	50	14
	Unemployed	130	37
	Students	83	23
	Casual labourers	19	05
Place of residence	Urban	158	44
	Rural	197	56
Family size	Less than 3 people	95	27
	4–5 people	136	38
	6-8 people	71	20
	More than 9 people	53	15
Financial status	Earn less than $2,000/=$ a day	184	52
	Btn 2,000/= to 5000 a week	100	28
	Btn 5,001/= to 150,000 a months	71	20
Religion	Catholics	133	37
	Protestants	121	34
	Seventh day Adventists	70	20
	Moslems	05	01
	Born Again Christians	08	02
	Orthodox Christians	18	05

Source: Primary data

Out of 355 respondents who participated in the study, majority 205 (58%) were females, 117(33%) were aged between 19 and 22 years, 167 (47%) were singles, 132 (37%) had secondary education, 130 (37%) were unemployed, 197 (56%) were from rural areas, 136 (38%) were from families with 4-6 people, 184 (52%) earned less than 2000/= a day and 133 (37%) were Catholics.

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#### Figure 2: Level of adherence to ARV treatment among adolescents attending Kaliisizo Hospital

#### Source: Primary data

The level of adherence to ART among adolescents was 33%.

#### Table 2: Adherence to ARV treatment among adolescents attending Kaliisizo Hospital, Kyotera District

Variable	Category	Frequency	Percentage
Time when respondents knew were	Early childhood	39	11
HIV positive	The time when they visited the health	263	74
	Rumours from relatives and neighbours	53	15
Started taking ARVs the moment	Yes	327	92
they knew were HIV positive	No	28	08
Ever missed taking ARV drugs in	Yes	237	67
any day	No	118	33
Frequency of missing taking ARV	Once	107	45
	Twice	85	36
	Thrice	28	12
	Four times and more	17	07
In last three months, missed	Yes	171	72
taking	No	66	28
Number of doses missed	One	94	55
	Two	55	32
	Three	14	08
	More than four doses	09	05

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Out of the 355 of the respondents that participated in the study, majority 263 (74%) knew their HIV status the first time they visited the health facility for testing and counseling, 327 (92%) started taking ARVs the moment they knew were HIV positive, 237 (67%) had ever missed taking ARV drugs in any day since they were initiated on ART where majority 107 (45%) missed once. In the last three months 171 (72%) had missed taking ARV drugs in any day where 94 (55%) missed one dose mainly because they felt stigma (86; 50%).

Variable	Category	Ad	Adherence		Adherence y <sup>2</sup>		P-values	
		Adhered	Never adhered	~				
Gender	Females	75(63.6%)	124(52.3%)	4.04	0.044			
	Males	43 (6.4%)	113 (47.7%)					
Age	Less than 15 years	14 (11.9%)	85 (35.9%)	33.83	0.001			
0	16-18 years	28 (23.7%)	69 (29.1%)					
	19-22 years	40 (33.9%)	36 (15.2%)					
	23-25 years	36 (30.5%)	47 (19.8%)					
Marital status	Singles	34(28.8%)	133 (56.1%)	8.10	0.004			
	Married	73 (61.9%)	51 (21.5%)					
	Separated	8 (6.8%)	28 (11.8%)					
	Widows/widower	3 (2.5%)	25 (10.5%)					
Education	No formal education	13 (11.0%)	30 (12.7%)	10.56	0.014			
	Primary	24 (20.3%)	82 (34.6%)					
	Secondary	51 (43.2%)	68 (28.7%)	-				
	Tertiary	30 (25.4%)	57 (24.1%)	-				
Occupation	Civil servant	11 (9.3%)	4 (1.7%)	27.13	0.001			
- 1	unemployed	27 (22.9%)	82 (34.6%)					
	students	51 (43.2%)	79 (33.3%)					
	self employed	14 (11.9%)	58 (24.5%)	-				
	Self-employed/Business	15(12.7%)	14 (5.9%)					
Place of	Urban	84 (71.2%)	74 (31.2%)	50.94	0.001			
Residence	Rural	34 (28.8%)	163 (68.8%)	00101	01001			
Family size	Less than 3 people	44 (37.3%)	51 (21.5%)	11.02	0.012			
	4-5 people	40 (33.9%)	96 (40.5%)		01012			
	6-8 people	17 (14.4%)	54 (22.8%)	-				
	More than 9 people	17 (14.4%)	36 (15.2%)	-				
Financial status	Farn less than $2000/=a$	11 (11.170)	00 (10.270)	3 6 3	0 169			
i marciai status	day	67 (56.8%)	117 (49.4%)	0.00	0.105			
	Btn 2,000/= to 5000 a week	34 (28.8%	66 (27.8%)					
	Btn 5,001/= to 150,000 a months	17 (14.4%)	54 (22.8%)					
Religion	Catholics	52 (44.1%)	81 (34.2%)	12.68	0.027			
	Protestants	34(28.8%)	87(36.7%)					
	Seventh day Adventists	17 (14.4%)	53 (22.4%)					

 Table 3: Bivariate analysis of the individual factors associated with adherence to antiretroviral treatment among adolescents attending Kaliisizo Hospital, Kyotera District

Most of the social demographic factors were significantly associated with adherence to ARV treatment among adolescents attending Kaliisizo Hospital, Kyotera District. These were; gender ( $\chi^2$  = 4.04

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P=0.044), age ( $\chi^2$  = 33.83 P=0.001), marital status ( $\chi^2$  = 8.10 P=0.001), Education ( $\chi^2$  = 10.56 P=0.014), occupation ( $\chi^2$  = 27.13 P=0.001), place of residence ( $\chi^2$  = 50.94 P=0.001), family size ( $\chi^2$  11.02, P=0.012) and religion ( $\chi^2$  = 12.68, P=0.027). However financial status was not significantly associated with adherence to antiretroviral treatment (P>0.005).

Table 4:	Individual factors associated with adherence to ARV treatment	among	adolescents attending Kaliisizo
Hospital,	Kyotera District		

Variable	Category	Ac	lherence	v <sup>2</sup>	P-values
		Adhered	Never adhered	^	
Persons	Relatives	13 (11.0%)	30 (12.7%)	8.16	0.043
respondents stayed with	Brother/sister	24(20.3%)	71 (30.0%)	_	
	Both biological parents	51 (43.2%)	68 (28.7%)	_	
	One biological parent	30 (25.4%)	68 (28.7%)	_	
Were given	Yes	86 (72.9%)	87 (36.7%)	18.58	0.001
adequate support to access ART	No	32 (27.1%)	150 (63.3%)		
Cultural values	Yes	39 (33.1%)	113 (47.7%)	6.89	0.009
treatment	No	79 (66.9%)	124 (52.3%)		
Took illicit drugs	Yes	14 (11.9%)	62 (26.2%)	9.57	0.002
	No	104 (88.1%)	175 (73.8%)	_	
Believed that	Yes	104 (88.1%)	154 (65.0%)	21.27	0.001
taking ARV treatment everyday makes health better	No	14 (11.9%)	83 (35.0%)		
Carried beliefs that	Yes	17 (14.4%)	99 (41.8%)	26.82	0.130
their health can be better on other treatment other than ARVs	No	101 (85.6%)	138 (58.2%)		

Source: Primary data

Individual factors were significantly associated with adherence to ARV treatment among adolescents attending Kaliisizo Hospital, Kyotera District. These included; relationship were persons respondents stayed with ( $\chi^2 = 8.16$ , P=0.043), were given adequate support to access ART ( $\chi^2 = 18.58$ , P=0.001), cultural values acknowledge ARV treatment ( $\chi^2 = 6.89$ , P=0.009), took illicit drugs ( $\chi^2 = 9.57$ , P=0.002), and believed that taking ARV treatment everyday makes health better ( $\chi^2 = 21.27$ , P=0.001).

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Variable	Category	Adherence		Adherence v <sup>2</sup>		$\mathbf{v}^2$	2 P-values
		Adhered	Never adhered	7 ^			
Had all the drugs	Yes	105 (89.0%)	161 (67.9%)	18.58	0.001		
they were supposed to	No						
lake		13 (11.0%)	76 (32.1%)				
Number of pills	One	68(57.6%)	79(33.3%)	3.92	0.141		
	Two	50 (42.4%)	158 (66.7%)				
Frequency of taking	Once	42 (35.6%)	111 (46.8%)	4.06	0.044		
ARV pills in a day	Twice	76 (64.4%)	126 (53.2%)	-			
Faced challenges	Yes	45 (38.1%)	121 (51.1%)	5.28	0.022		
when taking these drugs	No			-			
		73 (61.9%)	116 (48.9%)				
Challenges	Pill burden (Irritations, taking every day)	27 (61.4%)	60 (50.0%)	19.16	0.001		
	Stigma	16 (36.4%)	46 (38.3%)	-			
	Forgetting	1 (2.3%)	14 (11.7%)	_			
Easy access to	Yes	69 (58.5%)	111 (46.8%)	4.27	0.039		
drugs	No	49 (41.5%)	126 (53.2%)	1			

Table 5: Drug related factors associated with adherence to ARV treatment among adolescents attending Kaliisizo Hospital, Kyotera District

#### Source: Primary data

Most of the drug related factors were significantly associated with adherence to ARV treatment among adolescents attending Kaliisizo Hospital, Kyotera District. These included; having all the drugs they were supposed to take ( $\chi^2$  = 18.58, P=0.001), challenges faced with the drugs ( $\chi^2$  = 19.16, P=0.001), Frequency of taking ARV pills in a day ( $\chi^2$  = 4.06, P=0.044), challenges faced when taking ARVs ( $\chi^2$  = 5.28, P=0.022) and accessibility to ARV drugs ( $\chi^2$  = 4.27, P=0.039). However, the number of pills taken a day was not significantly associated with adherence to antiretroviral treatment (P>0.005).

#### DISCUSSION

Given the fact that majority of the respondents knew their HIV status the time they first visited the health facility for testing and counseling, this could have attributed to poor adherence because it was quite hard to instill a behavior of taking drugs daily into adolescent who felt stigma. Despite the fact that nine out of ten respondents started taking their ART treatment the moment they knew were HIV positive, adherence was hampered by missing of the drug doses. Similar results were reported in a study carried out in Kenya in Kangundo District by [20]. showed that 33.7% of the respondents had optimal adherence to the clinicians" appointment while 33 (33.7%) missed at least one scheduled appointment in the six months before the study. It was further noted that 66.7% and 33.3% of the respondents had missed their clinicians" appointment by more than three days once and twice respectively in the six months before the survey. These similarities could have resulted from both studies being carried out in rural areas among adolescents who could have lacked adequate information about ART treatment to reduce stigma among them. Results showed that almost seven out of ten respondents had ever missed drugs, where majority had ever missed once. Also, seven out of ten respondents had missed drugs in the last months before the study. The major reasons given were stigma and drug stock outs and forgetfulness. These findings were in relation to a study carried out in Kenya where adolescents who missed doses of ARV drugs was mainly due to forgetfulness as it accounted for 70.2% of the respondents [37]. Despite these findings being similar in the present study stigma was the major cause of non-adherence. The medical implication is that, younger adolescents probably below 18 years of age should take their ART treatment under the supervision and guidance of the caretaker to ensure adherence. This is done because younger adolescents can easily be misled not to take the pills or lack resources to collect the drugs themselves and may lack the knowledge about ART due to low exposure. In the present study though younger adolescents were supervised it was not enough since most of the people they stayed with didn't give them adequate support such as food and finance to cater for transport to ART clinics. This could have resulted from the low incomes given that the study was carried out in a rural area where most of families have low incomes. Frequency of taking ARV pills in a day was associated with adherence to antiretroviral treatment where majority of the respondents took the drugs twice a day where one pill was taken in the morning and the other in the evening before sleep ( $\chi_2$  = 4.06, P=0.044). Respondents who took drugs once were more likely to adhere to antiretroviral treatment as compared to those that took twice. This was because taking drugs once saved the respondents of the probability of forgetting taking the drugs and could also travel to distant areas unlike those who could travel with the drugs yet they had to take them twice. Similar results were reported in a study carried among urban and rural adolescent in Uganda [38]. Accessibility to ARV drugs also influenced adherence to antiretroviral treatment ( $\chi 2 = 4.27$ , P=0.039). Respondents who had easy access to drugs were more likely to adhere to antiretroviral treatment as compared to those who never accessed drugs. Respondents who poor access missed doses thus poor adherence. Similar results were reported in a study carried out in Ethiopia where limited availability and accessibility to antiretroviral medications and health care facilities for diagnosis was responsible for poor adherence to ART treatment [39-44].

#### CONCLUSION

In a study that was carried out about the factors associated with adherence to antiretroviral treatment among adolescents attending Kaliisizo Hospital, Kyotera district, it was found out that, the level of adherence to antiretroviral treatment was low at 33%. This was far lower than the national target of 90%. This was attributed to individual, drug and healthcare factors. Drug related factors that were significantly associated with adherence to ARV treatment among adolescents attending Kaliisizo Hospital, Kyotera District included; having all the drugs they were supposed to take, challenges faced with the drugs, Frequency of taking ARV pills in a day, challenges faced when taking ARVs and accessibility to ARV drugs.

#### REFERENCES

- 1. UNICEF, (2017) Monitoring the Situation of Children and Women, UNICEF HIV/AIDS Data, WHO. UNICEF, (2017) Opportunity in crisis. New York: UNICEF.
- 2. World Health Organization (WHO) (2017). World Health Statistics 2017: Monitoring Health for the SDGs, Sustainable Development Goals. WHO, Geneva.
- Ochieng, W., Kitawi, R.C., Nzomo, T.J., Mwatelah, R.S., Kimulwo, M.J., Ochieng, D.J., et al. (2015) Implementation and Operational Research: Correlates of Adherence and Treatment Failure among Kenyan Patients on Long-term Highly Active Antiretroviral Therapy. J Acquir Immune Defic Syndr; 69(2):e49-56.
- Safren, S.A., Mayer, K.H., Ou, S.S., McCauley, M., Grinsztejn, B., Hosseinipour, M.C., et al. (2015) Adherence to Early Antiretroviral Therapy: Results From HPTN 052, a Phase III, Multinational Randomized Trial of ART to Prevent HIV-1 Sexual Transmission in Serodiscordant Couples. J Acquir Immune Defic Syndr; 69(2):234-40.
- UNAIDS. (2013). Global Report: UNAIDS report on the global AIDS epidemic 2013. New York: UNAIDS, 2015. [Cited 2014 Oct 30]. Available from: http://www.unaids.org/sites/default/files/en/media/unaids/contentassets/ documents/epidemiology/2013/gr2013/ UNAIDS\_Global\_Report\_2013\_en.pdf

#### Open Access

- Vincent, C. C., Obeagu, E. I., Agu, I. S., Ukeagu, N. C. and Onyekachi-Chigbu, A. C (2021). Adherence to Antiretroviral Therapy among HIV/AIDS in Federal Medical Centre, Owerri. Journal of Pharmaceutical Research International. 14;33(57A):360-8.
- Offie, D. C., Obeagu, E. I., Akueshi, C., Njab, J. E., Ekanem, E. E., Dike, P. N. and Oguh, D. N. (2021). Facilitators and barriers to retention in HIV care among HIV infected MSM attending Community Health Center Yaba, Lagos Nigeria. Journal of Pharmaceutical Research International. 33(52B):10-9.
- Igwe. M. C., Obeagu, E. I. and Ogbuabor, A. O. (2022). Analysis Of The Factors And Predictors Of Adherence To Healthcare Of People Living With Hiv/Aids In Tertiary Health Institutions In Enugu State. Madonna University journal of Medicine and Health Sciences ISSN: 2814-3035. 2022 Sep 29;2(3):42-57.
- 9. Obeagu, E.I and Obeagu, G. U. (2022). An update on survival of people living with HIV in Nigeria. J Pub Health Nutri. 5 (6):129.
- Omo-Emmanuel, U. K., Ochei, K. C., Osuala, E. O., Obeagu, E. I. and Onwuasoanya, U. F.(2017). Impact of prevention of mother to child transmission (PMTCT) of HIV on positivity rate in Kafanchan, Nigeria. Int. J. Curr. Res. Med. Sci. 3(2):28-34.
- Igwe, C. M., Obeagu, I. E. and Ogbuabor, O. A. (2022). Clinical characteristics of people living with HIV/AIDS on ART in 2014 at tertiary health institutions in Enugu, Nigeria. J Pub Health Nutri.5 (6).;130.
- Igwe, M. C., Obeagu, E. I., Ogbuabor, A. O., Eze, G. C., Ikpenwa, J. N. and Eze-Steven, P. E.(2022). Socio-Demographic Variables of People Living with HIV/AIDS Initiated on ART in 2014 at Tertiary Health Institution in Enugu State. Asian Journal of Research in Infectious Diseases. 2022 Aug 1;10(4):1-7.
- Hudelson, C. and Cluver, L. (2015) Factors associated with adherence to antiretroviral therapy among adolescents living with HIV/AIDS in low-and middle-income countries: a systematic review. AIDS care; 27(7):805-16.
- Ridgeway, K., Dulli, L.S., Murray, K.R., Silverstein, H., Dal Santo, L., Olsen, P., Darrow de Mora, D. and McCarraher, D.R. (2018) Interventions to improve antiretroviral therapy adherence among adolescents in low- and middle-income countries: A systematic review of the literature, PLoS One. ; 13(1): e0189770.
- 15. Obeagu, E. I., Amekpor, F., Scott, G. Y. (2023). An update of human immunodeficiency virus infection: Bleeding disorders. J Pub Health Nutri. 2023; 6 (1). 2023;139.
- Obeagu, E. I., Ogbonna, U. S., Nwachukwu, A. C., Ochiabuto, O., Enweani, I. B, Ezeoru, V. C. (2021). Prevalence of Malaria with Anaemia and HIV status in women of reproductive age in Onitsha, Nigeria. Journal of Pharmaceutical Research International. 33(4):10-9.
- Odo, M., Ochei, K. C., Obeagu, E. I., Barinaadaa, A., Eteng, E. U., Ikpeme, M., Bassey, J. O. and Paul, A. O (2020). Cascade variabilities in TB case finding among people living with HIV and the use of IPT: assessment in three levels of care in cross River State, Nigeria. J Pharm Res Int. 32:9-18.
- Obeagu, E. I. (2023). A Review of Challenges and Coping Strategies Faced by HIV/AIDS Discordant Couples. Madonna University journal of Medicine and Health Sciences ISSN: 2814-3035. 3(1):7-12.
- UNICEF (2011). UNICEF Annual Report 2011 EN 060112. http://www.unicef.org/nutrition/files/UNICEF\_Annual\_Report\_2011\_EN\_060112.pdf
- Kim, S.H., Gerver, S.M., Fidler, S. Ward, H. (2016) Adherence to antiretroviral therapy in adolescents living with HIV: systematic review and meta-analysis, AIDS: Epidemiology and Social, 28 (13) 1945-1956.
- (UNAIDS) (2014). The Gap Report. http://files.unaids.org/en/media/unaids/contentassets/documents/unaidspublication/2014/UNAIDS\_ Gap\_report\_en.pdf
- 22. Lowenthal, E. D., Bakeera-Kitaka, S., Marukutira, T., Chapman, J., Goldrath, K. and Ferrand, R. A. (2014). Perinatally acquired HIV infection in adolescents from sub-Saharan Africa: a review of emerging challenges. The Lancet. Infectious diseases, 14(7), 627-639. https://doi.org/10.1016/S1473-3099(13)70363-3
- 23. Ferrand, R. A., Briggs, D., Ferguson, J., Penazzato, M., Armstrong, A., MacPherson, P., Ross, D. A; Kranzer,, K. (2016) Viral suppression in adolescents on antiretroviral treatment: review of the literature and critical appraisal of methodological challenges, Tropical Medicine & International Health.
- Obeagu, E. I., Scott, G. Y., Amekpor, F., Ofodile, A. C., Edoho, S. H. and Ahamefula, C. (2022). Prevention Of New Cases Of Human Immunodeficiency Virus: Pragmatic Approaches Of Saving Life In Developing Countries. Madonna University Journal of Medicine and Health Sciences ISSN: 2814-3035. 2(3):128-34.
- Odo, M., Ochei, K. C., Obeagu, E. I., Barinaadaa, A., Eteng, U. E., Ikpeme, M., Bassey, J. O. and Paul, A. O (2020). TB Infection Control in TB/HIV Settings in Cross River State, Nigeria: Policy Vs Practice. Journal of Pharmaceutical Research International. 32(22):101-9.
- 26. Ifeanyi, O. E. and Obeagu, G. U. (2015). The values of prothrombin time among HIV positive patients in FMC owerri. International Journal of Current Microbiology and Applied Sciences. 4(4):911-6.

#### Open Access

- 27. Ifeanyi, O. E., Obeagu, G. U., Ijeoma, F. O. and Chioma, U. I. (2015). The values of activated partial thromboplastin time (APTT) among HIV positive patients in FMC Owerri. Int J Curr Res Aca Rev. 3:139-44.
- Chinedu K, Takim AE, Obeagu EI, Chinazor UD, Eloghosa O, Ojong OE, Odunze U. HIV and TB coinfection among patients who used Directly Observed Treatment Short-course centres in Yenagoa, Nigeria. IOSR J Pharm Biol Sci. 2017;12(4):70-5.
- 29. National Academies of Sciences, Engineering, and Medicine; Health and Medicine Division; Board on Global Health; Committee on the Evaluation of Strengthening Human Resources for Health Capacity in the Republic of Rwanda Under the President's Emergency Plan for AIDS Relief (PEPFAR). (2020). Evaluation of PEPFAR's Contribution (2012-2017) to Rwanda's Human Resources for Health Program. National Academies Press (US).
- 30. UNICEF (United Nations Children's Fund) (2016) Defining Quality in Education. Working Paper Series, United Nations Children's Fund (UNICEF), New York.S
- 31. Gross, R., Bandason, T., Langhaug, L., Mujuru, H., Lowenthal, E. and Ferrand, R. (2015) Factors associated with self-reported adherence among adolescents on antiretroviral therapy in Zimbabwe. AIDS Care, 27:322–326.
- 32. UNAIDS (2015). Global Report UNAIDS report on the global AIDS epidemic 2013. 2013 Retrieved January 20, 2015, from http://UNAIDS.org.
- 33. Gokarn, A., Narkhede, M.G., Pardeshi, G.S. and Doibale, M.K. (2012). Adherence to antiretroviral therapy, J Assoc Physicians India; 60: 16-20.
- 34. Ugwu, C. N. and Eze, V. H. U. (2023). Qualitative Research. IDOSR of Computer and Applied Science, 8(1), 20-35.
- 35. Kish, Leslie (1965): Survey Sampling. New York: John Wiley and Sons, Inc. p. 78-94
- 36. Izudi, J., Mugenyi, J., Mugabekazi, M., Muwanika, B., Tumukunde, V.S., Katawera, A. and Kekitiinwa, A. (2018) Retention of HIV-Positive Adolescents in Care: A Quality Improvement Intervention in Mid-Western Uganda, BioMed Research International, 2018, 1524016, 8 pgs
- 37. Kimanthi, J.M. (2016) Adherence To Antiretroviral Therapy Among HIV Infected Adolescents At Kangundo District Hospital dissertation submitted in partial fulfillment of the requirements of the university of Nairobi for award of the Degree of Master of Medicine in Paediatrics and Child Health, University of Nairobi
- Musiime, V., Kayiwa, J., Kiconco, M., Tamale, W., Alima, H., Mugerwa, H. and Kizito, H. (2012). Response to anti- retroviral therapy of HIV type 1-infected children in urban and rural settings of Uganda, AIDS Research and Human Retroviruses, 28, 1647–1657.
- Nachega, J.B. Mills, E.J. and Schechter, M. (2010) "Antiretroviral therapy adherence and retention in care in middle-income and low-income countries: current status of knowledge and research priorities," Current Opinion in HIV and AIDS, 5(1) 70–77.
- 40. Biadgilign, S., Reda, A.A., Deribew, A. et al., (2011) "Knowledge and attitudes of caregivers of HIVinfected children toward antiretroviral treatment in Ethiopia," Patient Education and Counseling, 85(2); e89–e94.
- 41. Aldress Njagi, Ayoo Andrew, Patricia LM Wagana, Benard Moronge Mabeya, Conrad Ondieki Miruka (2019). Adverse drug reactions among AIDS patients receiving antiretroviral treatment at Kampala International University Teaching Hospital, Uganda. International Journal of Academic Research and Development, Volume 4, Issue 1, Pages 40-45.
- 42. Mfinanga, S., Chanda, D., Lesikari, S., Guinness, L., Bottomley, C., Simms, V., ... & Jaffar, S. (2015). Cryptococcal meningitis screening and community-based early adherence support reduces all-cause mortality among HIV-infected people initiating antiretroviral therapy with advanced disease: a randomised-controlled trial in Tanzania and Zambia. 17 th January 2015.
- 43. Buyu, D. W., Miruka, C. O., Maniga, J. N., & Onchweri, A. N. (2016). Factors Affecting Adherence to Anti-Retroviral Therapy at Kampala International University Teaching Hospital, Bushenyi District, Uganda. American Journal of Medical Sciences, 4(1), 17-22.
- 44. Nwovu, A. I., Ifeanyi, O. E., Uzoma, O. G., & Nwebonyi, N. S. (2018). Occurance of Some Blood Borne Viral Infection and Adherence to Universal Precautions among Laboratory Staff in Federal Teaching Hospital Abakaliki Ebonyi State. Arch Blood Transfus Disord, 1(2).

Patrick Jacob Lule (2023). Factors associated with Adherence to Antiretroviral Treatment among Adolescents Attending Kalisizo Hospital, Kyotera District. EURASIAN EXPERIMENT JOURNAL OF SCIENTIFIC AND APPLIED RESEARCH 4(1):77-88