Research Paper

Evaluating the Influence of Parental HIV Status on Well-being of Children and Adolescents in Lagos State, Nigeria

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ABSTRACT

Background and Purpose: The quality of life (QoL) of children and adolescents living with HIV is a crucial area of public health concern, particularly in regions heavily impacted by HIV. Parental HIV status can significantly influence different dimensions of a child's life, including their emotional, social, and physical health. Nigeria is one of the countries having the highest HIV prevalence rates; understanding how parental HIV status affects children is essential for designing effective intervention and support systems. This study aims to investigate the relationship between parental HIV status and health-related QoL (HRQoL) among children and adolescents. We hope to provide insights that can improve the lives of young individuals in Lagos State, Nigeria. By examining demographic factors and health-related variables, this research seeks to advise targeted strategies to support families affected by HIV.

Materials and Methods: This retrospective study collected data at the Pediatric and Adolescent Clinic, the Clinical Sciences Department of the Nigerian Institute of Medical Research (NIMR), Yaba, Lagos State, Nigeria, between May and July 2019. The Institutional Review Board of NIMR granted ethical approval for the study. The study population consisted of 113 children and young people with HIV. Participants were randomly selected and assessed for eligibility. Then, written informed consent was obtained before enrollment in the main study. Data on sociodemographic characteristics, HIV-related health metrics, and HRQoL were collected using a case record form and a validated questionnaire to assess the pediatric QoL (PedsQL). A total of 108 participants (60 with single parent HIV-positive and 48 with both parents HIV-positive) were included. The data were analyzed using STATA software, version 16, employing the chi-square test and logistic regression to examine the determinants influencing HRQoL. We employed the PedsQL version 4, and the clinician filled out the questionnaire in the Pediatric Clinic.

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Results: Participants' mean ages were 13.6 years (single parent HIV positive) and 14.2 years (both parents HIV positive), with significant associations between age and parental HIV status (P<0.05). Fathers were primary caregivers for 46.7% (single parent HIV positive) and 56.3% (both parents HIV positive) of participants (P<0.05). Parental status (alive or deceased) and education level were significantly associated with parental HIV status, with most participants having secondary education. Most participants identified as Christians (86.7% single parent HIV positive and 87.5% both parents HIV positive). The CD4 cell counts below 500 were more common in participants with both parents HIV positive, though with no significant association (P>0.05). The HRQoL scores were significantly associated with parental HIV status (P<0.05), with better scores in psychosocial and physical domains. Logistic regression showed no significant links between parental HIV status and gender, age group, or primary caregiver's gender. Participants with both HIV-positive parents were less likely to have both parents alive.

Conclusion: Parental HIV status significantly affects demographic factors and HRQoL in children and adolescents. These findings highlight the necessity for specialized interventions and support mechanisms to enhance the QoL for families affected by HIV.

Keywords: Parental HIV status, Child wellbeing, Adolescents, HIV impact, Health-related quality of life (HRQoL)

Introduction

Human immunodeficiency virus (HIV) and acquired immune deficiency syndrome (AIDS) have remained major health challenges globally. As of 2020, approximately 38 million individuals were living with HIV globally, including 1.7 million children under the age of 15. In the same year, it was reported that over 600,000 people worldwide succumbed to HIV/AIDS-related illnesses [1]. Despite the availability of antiretroviral therapy (ART) during pregnancy and breastfeeding, as well as significant advancements in treatment, the disease burden has remained high in sub-Saharan Africa, including Nigeria [2].

Six states in Nigeria (Kaduna, Akwa Ibom, Benue, Lagos, Oyo, and Kano) account for 41% of the country's HIV cases [3]. The highest prevalence of HIV is found in the southern region, known as the South South Zone, with a rate of 5.5%. Conversely, the lowest prevalence, 1.8%, is observed in the southeast or the South East Zone. Additionally, rural areas exhibit higher HIV rates at 4% compared to 3% in urban areas [4]. More than 200,000 HIV cases in Nigeria were among adolescents aged 10-19, of which is 7% of the total HIV population in the country [5]. However, in sub-Saharan Africa, including Nigeria, the number of children with HIV reaching adolescence and adulthood is increasing due to the availability of comprehensive universal care, including ART [6-9]. Several authors have examined the impact of HIV/AIDS on the quality of life (QoL) of adolescents. While some studies report adverse effects of the disease, others have found positive outcomes. The variation in these findings may stem from differences in the availability and accessibility of adolescent-friendly healthcare services, such as HIV/AIDS care and support centers. Other factors include the stage of HIV/AIDS in the adolescents studied, long-term disorders associated with AIDS, and the unique challenges of adolescence, including lifestyle and habits [10-20].

Understanding the specific influence of parental HIV status on the QoL of children and adolescents is crucial for designing effective interventions. Nigeria, with its high HIV burden and diverse sociodemographic landscape, provides a critical context for this study. Previous research has not adequately addressed how parental HIV status, whether one or both parents are HIV positive, affects the HRQoL of their children. This study aims to explore the between parental HIV status and the health-related QoL (HRQoL) among children and adolescents, providing insights that can improve the lives of young individuals in Lagos State, Nigeria. By examining demographic factors and health-related variables, this study seeks to inform targeted strategies to support families affected by HIV.

Materials and Methods

This retrospective cohort study utilized data collected at the Pediatric and Adolescent Clinic, the Clinical Sciences Department at the Nigerian Institute of Medical Research (NIMR) in Yaba, Lagos State, Nigeria, between May and July 2019. The HRQoL of 113 children and adolescents who were living with HIV was considered in the study. The study data were collected over three months. Children and adolescents attending the Pediatric and Adolescent Clinic were randomly selected from the clin-

ic database and assessed for eligibility for the study. The study was explained to eligible participants and their caregivers by the clinician and a designated counselor from the study team. Those who agreed to participate were taken through a detailed informed consent and assent process before enrolling in the study. The case record form was used to collect data on sociodemographic characteristics (age, sex, level of education, and parental HIV status, among others). The clinic database provided information on the study participants' age at diagnosis, current and previous ART, duration of ART, current CD4 count, and viral load.

Pediatrics QoL questionnaire (PedsQL) version 4.0 was used to evaluate HRQoL. This tool and questionnaire instrument were administered by the clinician. The data collected from the PedsQL questionnaire was analyzed using the scoring protocol of PedsQL version 4. The tool was validated by all research team members and confirmed reliable after entering data as a demo using the study tools designed [21]. The QoL assessment was conducted using a pre-tested, interviewer-administered questionnaire and the PedsQL, validated among children from various cultures and countries, including those in Africa, such as Nigeria [22-24]. The information obtained from the PedsQL questionnaire was analyzed according to the scoring protocol of the PedsQL version 4. The Likert scale was scored in reverse and linearly transformed to a 0-100 scale: 0=100, 1=75, 2=50, 3=25, 4=0. Permission to use the questionnaire was obtained from copyright owners [20] before the start of the study.

This study recruited 108 children and adolescents who were living with HIV (60 children with single parents and 48 with both parents HIV-positive status). The estimated formula for calculating a sample size for a cross-sectional study was used to assess the sample size for the main study [25]. Children and adolescents who attended the clinic together with their parents or caregivers were randomly selected from the clinic database (using a table of random numbers generated by the biostatistician), and their eligibility for the study was assessed.

All data obtained were entered and stored in Microsoft Excel, then exported to STATA 16.0, where statistical data analysis was performed. The absolute numbers and percentages were calculated for all the categorical variables (nominal, including binary/dichotomous and ordinal). For all numeric variables, where data were subject to normal distribution, arithmetic Mean±SD were computed. Differences between discrete group variables were carried out using the chi-square test. The logistic regression model was used to explore the influence of some explanatory variables on children's HRQoL. Parent HIV status was the response variable classified into single and both parents' HIV-positive status. In contrast, gender, age, primary caregiver, parent status (both parents alive, single-parent orphan, and both-parent orphan), educational status, and last measured CD4 cell count were used as the explanatory variables. Significant values were considered at P≤0.05.

Results

This section presents the results based on the comparative analyses of critical variables concerning the study participants with HIV-positive single parents and participants when both parents were HIV-positive. The results are presented in Tables 1 and 2.

Sociodemographic and disease-related characteristics

Among the children and adolescents with HIV-positive single parents, 33(55.0%) were males, and 27(45.0%) were females. For participants when both parents were HIV-positive, 24(50.0%) were males and 24(50.0%) were females. Gender was not significantly associated with parent HIV status (P>0.05) [26]. The Mean±SD age for participants with HIV-positive single parents was 13.6±2.8) years, and for those with both parents HIV-positive, it was 14.2±3.0 years. Age was significantly associated with parent HIV status (P<0.05).

For HIV-positive single-parent participants, 28(46.7%) had their father as the primary caregiver, while 27(56.3%) of HIV-positive both parents participants had their father as the primary caregiver. Primary caregiver was significantly associated with parent HIV status (P<0.05). In the single-parent HIV-positive group, 45(75.0%) had both parents alive, compared to 29(60.4%) in the both-parents HIV-positive group. Parent status was significantly associated with parent HIV status (P<0.05).

Most participants had secondary education: 42(70.0%) in the single-parent HIV-positive group and 39(81.3%) in the both-parents HIV-positive group. Educational status was significantly associated with parent HIV status (P<0.05). The majority of participants were Christians, 52(86.7%) in the single parent HIV positive group and 42(87.5%) in the both-parents HIV-positive group. Religion was significantly associated with parent HIV status (P<0.05).

Among the single-parent HIV-positive participants, 48 (80.0%) had a CD4 cell count ≥500/mm^3, compared to 37(77.1%) in the both-parents HIV-positive group. The

CD4 cell count was significantly associated with parent HIV status (P<0.05). Details of this information are provided in Table 1.

HRQoL

The Mean±SD physical HRQoL score for the single-parent HIV-positive group was 84.9±23.4, and for both parents HIV-positive group, it was 85.7±20.1. This difference was statistically significant (P<0.05). The psychosocial function HRQoL score was 79.8±16.4 for the single parent HIV-positive group and 76.9±18.9 for both parents HIV-positive group, which was also significant (P<0.05).

The Mean±SD absolute HRQoL score for the single parent HIV-positive group was 82.4±18.1, and for the both parents HIV-positive group, it was 81.2±18.3. The finding was not statistically significant (P>0.05). The majority of participants in both groups had good HRQoL, 65.0% in the single parent HIV positive group and 68.8% in the both parents HIV positive group. The classification of participants into good, intermediate, and poor HRQoL was significantly associated with parent HIV status (P<0.05). Details of these findings are provided in Table 2.

Logistic regression analysis

Female participants were 1.2 times more likely than male participants to have both parents HIV-positive (Odds ratio [OR]=1.22; 95% CI, 0.57%, 2.62%), although the relationship was not statistically significant (P=0.61). Those aged 12 years or younger were 0.68 times less likely to have both parents HIV-positive compared to those older than 12 years (OR=0.68; 95% CI, 0.31%, 1.52%), with no significant association observed (P=0.35).

Table 1. Sociodemographic and disease-related characteristics of the participants

Characteristic		No. (%)/Mean±SD		P
		Single Parent HIV Positive	Both Parents HIV Positive	
Gender	Female	27(45.0)	24(50.0)	0.51
	Male	33(55.0)	24(50.0)	
Age (y)		13.6±2.8	14.2±3.0	0.03
Primary caregiver	Father	28(46.7)	27(56.3)	0.001
	Mother	23(38.3)	14(29.2)	
	Others	9(15.0)	7(14.6)	
Parent status	Both parents alive	45(75.0)	29(60.4)	0.001
	Single-parent orphan	14(23.3)	6(12.5)	
	Both-parent orphan	1(1.7)	13(27.1)	
Educational status	Primary	16(26.7)	7(14.6)	0.001
	Secondary	42(70.0)	39(81.3)	
	Tertiary	2(3.3)	2(4.2)	
Religion	Christian	52(86.7)	42(87.5)	0.001
	Muslim	8(13.3)	6(12.5)	
Last measured CD4 cell count /mm^3	<500	12(20.0)	11(22.9)	0.001
	≥500	48(80.0)	37(77.1)	

HRQoL: Health-related quality of life.

Table 2. Study participants' QoL scores

HRQoL Score of Participants	Mean±SD/No. (%)		P
	Single Parent HIV-positive	Both Parents HIV-positive	
Absolute HRQoL	82.4±18.1	81.2±18.3	0.62
Physical	84.9±23.4	85.7±20.1	0.001
Psychosocial function	79.8±16.4	76.9±18.9	0.001
Good HRQoL [80%-100%]	39(65.0)	33(68.8)	
Intermediate HRQoL [60%- 80%]	12(20.0)	8(16.7)	0.001
Poor HRQoL [<60%]	9(5.0)	7(14.6)	

When the primary caregiver was the father, the odds of both parents being HIV positive were 1.24 times higher (OR=1.24; 95% CI, 0.40%, 3.80%), and when the primary caregiver was the mother, the odds were 0.78 times lower (OR=0.78; 95% CI, 0.24%, 2.57%). Neither association was statistically significant (P=0.71 for father, P=0.69 for mother). The odds of participants with both parents alive were 0.11 times lower for both parents being HIV positive (OR=0.11; 95% CI, 0.01%, 0.94%; P=0.04), which was statistically significant. For single-parent orphans, the odds were 0.16 times lower (OR=0.16; 95% CI, 0.02%, 1.47%; P=0.10), not statistically significant (Table 3).

Participants with primary education had 0.44 times lower odds of having both parents HIV-positive (OR=0.44; 95% CI, 0.05%, 3.76%, P=0.45). Those with secondary education had 0.93 times lower odds (OR=0.93; 95% CI, 0.13%, 6.92%; P=0.94). Educational status was not significantly associated with parental HIV status. Participants with a last measured CD4 cell count below 500/mm³ were 1.19 times more likely to have both parents HIV-positive compared to those with a CD4 cell count of 500/mm³ or higher (OR=1.19; 95% CI, 0.47%, 3.00%), with no significant association (P=0.71). Participants with good HRQoL were 0.74 times less likely to have both parents HIV-positive (OR=0.74; 95% CI, 0.24%, 2.32%; P=0.60). Those with intermediate HRQoL were 1.11 times more likely (OR=1.11; 95% CI, 0.28%, 4.42%; P=0.88), but this was not statistically significant (Table 3).

Discussion

Sociodemographic and disease-related characteristics

This study found no significant difference in gender distribution among children and adolescents with HIV-positive single parent and those with both HIV-positive parents. This finding suggests that gender does not influence the likelihood of having one or both parents with HIV. Age, however, shows a significant association with parent HIV status [27]. The older age group had a higher mean age in the category where both parents were HIV positive, indicating that older children might be more affected by both parents having HIV, possibly due to the prolonged exposure and increased awareness of their parents' health status.

The primary caregiver's role was also significantly associated with the parent's HIV status. Fathers were more likely to be the primary caregivers in both categories, which could reflect cultural or social norms in the study setting. This finding underscores the importance of targeting primary caregivers, especially fathers, in the support and intervention programs. Parent status (alive or deceased) significantly affects the children's living conditions and quality of life. Children with both parents alive have better support systems, whereas those with both parents deceased (both-parent orphans) face more challenges, highlighting the need for targeted support for orphans.

Educational status shows that most participants have secondary education, and this condition is significantly associated with parent HIV status. This outcome may reflect the general education level of the population

Table 3. Logistic regression analysis of the relationship between parental HIV status, sociodemographic and disease-related characteristics, and participants' QoL scores

Variables		Parent HIV Status		Coefficient	Crude Odds Ratio (95% CI)	Adjusted Odds Ratio (95% CI)	P
		Single Parent Positive	Both Parents HIV Positive				
Gender	Female	27	24	0.2	1.22 (0.57-2.62)	-	0.61
	Male	33	24		1		
Age group (y)	≤12	24	36	-0.38	0.68 (0.31-1.52)	-	0.35
	>12	15	33		1	-	
Primary caregiver	Father	28	27	0.22	1.24 (0.40-3.80)	-	0.71
	Mother	23	14	-0.25	0.78 (0.24-2.57)	-	0.69
	Other	9	7		1	-	
Parent status	Both parents alive	45	29	-2.23	0.11 (0.01-0.94)		0.04
	Single-parent orphan	14	6	-1.87	0.16 (0.02-1.47)		0.10
	Both-parent orphan	1	13	-	1		
Educational status	Primary	16	7	-0.83	0.44 (0.05-3.76)		0.45
	Secondary	42	39	-0.07	0.93 (0.13-6.92)		0.94
	Tertiary	2	2				
Last measured CD4 cell count (mm^3)	<500	12	11	0.17	1.19 (0.47-3.0)		0.71
	≥500	48	37				
	Good HRQoL [80%-100%]	39	33	-0.30	0.74(0.24-2.32)		0.60
	Intermediate HRQoL [60%–80%]	12	8	0.11	1.11(0.28-4.42)		0.88
	Poor HRQoL [<60%]	9	7				

studied and indicates that educational attainment might influence how families cope with HIV. Religion is another significant factor, with most participants being Christians. This factor can influence the support systems available to families, as religious communities often play a crucial role in providing social support. The CD4 cell count, a marker of immune function, is higher in participants with a single parent HIV-positive compared to those with both parents HIV-positive. This finding indicates better health outcomes for children with single-parent HIV positive, possibly due to reduced stress and better care when only one parent is affected.

HRQoL

HRQoL score was high in both groups, with a slight edge for both parents HIV positive group. This finding could suggest that children in both categories receive adequate medical care and support for their physical health. Psychosocial HRQoL scores were lower than physical HRQoL scores, with both parents HIV-positive group having a slightly lower mean score. This finding indicates that the psychosocial impact of having both parents HIV-positive is more profound, necessitating targeted psychological and social support interventions.

The absolute HRQoL scores were similar and not significantly different between the groups, suggesting that overall QoL does not differ drastically between

children with HIV-positive single or both parents. However, the classification into good, intermediate, and poor HRQoL shows significant differences, with a higher percentage of good HRQoL in both groups. This finding suggests that while the overall QoL might appear similar, the nuances in different domains highlight areas needing specific interventions.

Logistic regression analysis

The logistic regression analysis shows that female respondents are more likely to have both parents HIV-positive, though not statistically significant. Age group is also not significantly associated with parent HIV status, suggesting that factors other than age and gender play more crucial roles. The primary caregiver being the father increases the odds of both parents being HIV-positive, while having both parents alive significantly reduces these odds. This finding reinforces the importance of parental status and primary caregiver roles in influencing children's health outcomes. Educational status and CD4 cell count did not show significant associations, indicating that other factors might affect the relationship between educational attainment, immune function, and parent HIV status. Participants with good HRQoL are less likely to have both parents HIV positive, emphasizing the adverse impact of having both parents affected by HIV on children's health quality of life. This outcome highlights the need for comprehensive support programs to improve the HRQoL for children with both parents HIV positive.

Conclusion

The findings revealed that 33 out of 48 children with both parents affected by HIV reported good HRQoL scores, while 39 out of 60 children with a single parent affected by HIV reported good HRQoL scores, particularly in the domains of psychosocial and physical functioning.

This study indicates that sociodemographic variables such as gender and age (when categorized as a binary variable) do not have a significant association with the HRQoL of participants with either one or both parents being HIV-positive. However, a significant association is observed for participants aged between 13 and 18 years.

Educational status and religion have a significant relationship with the participants' HRQoL.

Regression analysis shows that age and gender have significant relationships ($P<0.05$) with HRQoL of participants that have one of their parents HIV positive.

The regression analysis also reveals that a reduction in CD4 count has a negative effect on the HRQoL of the participants for single/both parents having positive HIV HRQoL, and it has a significant relationship ($P<0.05$) with HRQoL.

A large sample size may be required to have an accurate picture of the effects of the aforementioned variables on the health QoL of children and adolescents living with HIV. Other social determinants of health that can impact the HRQoL may also be included in future studies. The findings of this study suggest that interventions targeting these factors should be developed to improve the HRQoL of children affected by HIV.

Study limitations

The study sample size was small, which may limit the generalizability of the findings. This study relied on self-reported data, possibly subject to recall or social desirability bias.

Ethical Considerations

Compliance with ethical guidelines

This study received ethical approval from the Institutional Review Board of the Nigerian Institute of Medical Research (NIMR-IRB), Lagos, Nigeria (Code IRB/20/002).

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Authors contributions

Conceptualization: Abideen Salako and Kazeem Osuolale; Methodology: Kazeem Osuolale, Oluwatosin Odubela and Dolapo Abidemi Shobanke; Investigation: Oluwaseun Otekunrin, Titilola Gbaja-Biamila, and Dayo Lawal; Data collection: Dayo Lawal and Dolapo Abidemi Shobank; Data analysis: Kazeem Osuolale and Adisa Saka; Data interpretation: Oluwaseun Otekunrin, Titilola Gbaja-Biamila, Dayo Lawal, Kazeem Osuolale and Adisa Saka; Writing the original draft: Kazeem Osuolale and Dayo Lawal; Review and editing: Muinah Fowora, Olabisi Davies-Bolorunduro, and Dolapo Abidemi Shobanke; Funding administration: Adesola Musa and Abideen Salako; Supervision: Oluwaseun Otekunrin, Adesola Musa, Titilola Gbaja-Biamila, Abideen Salako and Kazeem Osuolale.

Conflict of interest

The authors declared no conflicts of interest.

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References

[1] No author. The global HIV and AIDS epidemic [internet]. 2021 [Updated 2024 August 12]. Available from: [Link]

[2] Salako A, Agatha D, Babasola O, Kazeem O, Titilola GB, Odubela O, et al. Parental perception of health-related quality of life of children [8-12 Years] Living with HIV. Central European Journal of Paediatrics. 2021; 17(1):8-15. [Link]

[3] National Agency for the Control of AIDS. National Strategic Framework on HIV and AIDs: 2017 - 2021. Abuja: National Agency for the Control of AIDS; 2017. [Link]

[4] National Agency for the Control of AIDS (NACA). GLOBAL aids response country progress report Nigeria GARPR 2015. 2015. ABUJA: National Agency for the Control of AIDS; 2015. [Link]

[5] UNICEF. Statistical tables. New York: UNICEF; 2017. [Link]

[6] National Agency for the Control of AIDS (NACA). National strategic framework on HIV and AIDS: 2017-2021. Abuja: National Agency for the Control of AIDS; 2020. [Link]

[7] Mahy M, Penazzato M, Ciaranello A, Mofenson L, Yianoutsos CT, Davies MA, et al. Improving estimates of children living with HIV from the Spectrum AIDS Impact Model. AIDS. 2017; 31(Suppl 1):S13-22. [DOI:10.1097/QAD.0000000000001306] [PMID] [PMCID]

[8] Davies MA, Gibb D, Turkova A. Survival of HIV-1 vertically infected children. Current Opinion in HIV and AIDS. 2016; 11(5):455-64. [DOI:10.1097/COH.0000000000000303] [PMID] [PMCID]

[9] Shabangu P, Beke A, Manda S, Mthethwa N. Predictors of survival among HIV-positive children on ART in Swaziland. African Journal of AIDS Research: AJAR. 2017; 16(4):335-43. [DOI:10.2989/16085906.2017.1386219] [PMID]

[10] UNICEF. Adolescent health. New York: UNICEF; 2019. [Link]

[11] Oguntibeju OO. Quality of life of people living with HIV and AIDS and antiretroviral therapy. HIV AIDS (Auckl). 2012; 4:117-24. [DOI:10.2147/HIV.S32321] [PMID] [PMCID]

[12] Basavaraj KH, Navya MA, Rashmi R. Quality of life in HIV/AIDS. Indian Journal of Sexually Transmitted Diseases and AIDS. 2010; 31(2):75-80. [DOI:10.4103/0253-7184.74971] [PMID] [PMCID]

[13] Martin F, Russell S, Seeley J. Higher quality of life and lower depression for people on ART in Uganda as compared to a community control group. Plos One. 2014; 9(8):e105154. [DOI:10.1371/journal.pone.0105154] [PMID] [PMCID]

[14] Mutumba M, Bauermeister JA, Musiime V, Byaruhanga J, Francis K, Snow RC, et al. Psychosocial challenges and strategies for coping with HIV among adolescents in Uganda: A qualitative study. AIDS Patient Care and STDs. 2015; 29(2):86-94. [PMID]

[15] Pozniak A. Quality of life in chronic HIV infection. The Lancet. HIV. 2014; 1(1):e6-7. [DOI:10.1016/S2352-3018(14)70003-7] [PMID]

[16] Fielden SJ, Chapman GE, Cadell S. Managing stigma in adolescent HIV: Silence, secrets and sanctioned spaces. Culture, Health & Sexuality. 2011; 13(3):267-81. [DOI:10.1080/13691058.2010.525665] [PMID]

[17] Aurpibul L, Oberdorfer P, Choeyprasert W, Louthrenoo O. Health-related quality of life of perinatally HIV-infected adolescents. Current Pediatric Research. 2016; 20(1&2):231-7. [Link]

[18] Xu T, Wu Z, Rou K, Duan S, Wang H. Quality of life of children living in HIV/AIDS-affected families in rural areas in Yunnan, China. AIDS Care. 2010; 22(3):390-6. [DOI:10.1080/09540120903196883] [PMID] [PMCID]

[19] Collaborative Initiative for Paediatric HIV Education and Research (CIPHER) Global Cohort Collaboration; Slogrove AL, Schomaker M, Davies MA, Williams P, Balkan S, et al. The epidemiology of adolescents living with perinatally acquired HIV: A cross-region global cohort analysis. Plos Medicine. 2018; 15(3):e1002514. [DOI:10.1371/journal.pmed.1002514] [PMID] [PMCID]

[20] Varni JW. Pediatric quality of life inventory™ [internet]. 1998. [Updated August 2024 10]. Available from: [Link]

[21] Buisker TR, Dufour MS, Myers JJ. Recall of nadir CD4 cell count and most recent HIV viral load among HIV-infected, socially marginalized adults. AIDS and Behavior. 2015; 19(11):2108-16. [DOI:10.1007/s10461-015-1018-x] [PMID] [PMCID]

[22] Ingersoll KS, Dillingham RA, Hettema JE, Conaway M, Freeman J, Reynolds G, et al. Pilot RCT of bidirectional text messaging for ART adherence among nonurban substance users with HIV. Health Psychology. 2015; 34S(0):1305-15. [DOI:10.1037/hea0000295] [PMID] [PMCID]

[23] Atilola O, Stevanović D. PedsQLTM 4.0 Generic Core Scales for adolescents in the Yoruba language: translation and general psychometric properties. Clinical Child Psychology and Psychiatry. 2014; 19(2):286-98. [DOI:10.1177/1359104513488375] [PMID]

[24] Ogunyemi AO, Adubiaro FM, Oluwole EO, Somefun EO, Olubodun T. Stigma, discrimination and non-disclosure among young people living with HIV in Lagos, Nigeria. The Pan African Medical Journal. 2022; 41:106. [PMID]

[25] Suresh KS, Shiv KM, Kalpana T, Rakhi G. How to calculate sample size for observational and experimental nursing research studies? National Journal of Physiology, Pharmacy and Pharmacology. 2020; 10 (1):1-8. [DOI:10.5455/njppp.2020.10.0930717102019]

[26] Guta A, Areri HA, Anteab K, Abera L, Umer A. HIV-positive status disclosure and associated factors among children in public health facilities in Dire Dawa, Eastern Ethiopia: A cross-sectional study. Plos One. 2020; 15(10):e0239767. [DOI:10.1371/journal.pone.0239767] [PMID] [PMCID]

[27] Adella GA, Yimer MA, Abebe EC. Human immunodeficiency virus positive status disclosure among children in northwest Ethiopia: A cross-sectional study. African Health Sciences. 2023; 23(1):178-89. [DOI:10.4314/ahs.v23i1.20] [PMID] [PMCID]