

Effect of Individualized Care Coordination on Adherence for Viremic Children Living with HIV in Kiambu County, Kenya

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ABSTRACT

Background: HIV continues to disproportionately affect children and adolescents, with only about 1 million of the 1.7 million infected children aged 0–14 receiving treatment. Without ART, most infants die before age five. Individualized case planning has improved adherence in viremic children, increasing doses taken from 62% to 86% and enhancing viral suppression. Tailored counseling and support have shown higher adherence (89.7% vs 80.6%) and better viral outcomes, emphasizing the need for personalized interventions in resource-limited settings.

Methods: This descriptive cross-sectional study involved 177 caregivers of viremic children and healthcare workers from selected health facilities in Kiambu County. Data were collected using structured self-administered questionnaires and key informant interviews. Quantitative data were analyzed using SPSS version 30.0, with descriptive statistics and regression analyses (Pearson correlation, ordinal and multiple regression) to assess associations between individualized case planning and adherence ($p < 0.05$). Qualitative data were analyzed thematically to complement quantitative findings.

Results: The study involved 177 caregivers of viremic children, with most children aged 10–14 years (36.7%), followed by 5–9 years (32.8%) and under 5 years (30.5%). The majority (37.3%) had been on ART for over six years (mean age 7.49 ± 4.07). Overall adherence was 67.2%. Key informants noted improving adherence but highlighted barriers such as stigma and socio-economic challenges. Individualized case planning significantly increased adherence, with odds ratios ranging from 4.6 to 10.6 for components such as goal setting, resource identification, and scheduled visits/refills ($p < 0.05$). The model explained 68.5% of adherence variation ($R^2 = 0.685$).

Conclusions: The study found that 67.2% of viremic children achieved ART adherence. Individualized case planning significantly improved adherence, with goal setting and scheduled visits/refills showing the strongest effects. The model explained 68.5% of adherence variation, highlighting the importance of tailored, patient-centered case planning for sustaining adherence in this population.

Keywords: Viremic children, Antiretroviral therapy adherence, Individualized case planning, Pediatric HIV care

INTRODUCTION

The global HIV epidemic continues to disproportionately affect children and adolescents, with approximately 1.7 million children aged 0-14 currently living with HIV worldwide (World Health Organization, 2023). Despite the availability of life-saving antiretroviral therapy (ART), fewer than 1 million of these children receive treatment, leaving a critical gap in pediatric HIV care. The consequences of untreated HIV in children are devastating: without intervention, 50% of HIV-positive infants die before their second birthday, and 80% succumb before age five. In response to persistent challenges with treatment adherence, individualized care

coordination has emerged as a promising intervention strategy (Makonokaya et al., 2025). Akpan et al., (2022) demonstrated this approach's effectiveness by implementing personalized case plans for 20 viremic children, incorporating tailored adherence strategies that addressed individual medication regimens, family support structures, and patient-specific barriers to sustained ART compliance.

Over a six-month follow-up period, the study demonstrated a substantial improvement in adherence, with the proportion of prescribed ART doses taken increasing from 62% to 86%, alongside notable reductions in viral load. Improved communication between healthcare providers and families was identified as a key contributing factor, underscoring the role of collaborative, individualized approaches in enhancing adherence outcomes (Amour et al., 2022). Evidence from diverse settings demonstrates the effectiveness of individualized care coordination (ICC) in improving antiretroviral therapy (ART) adherence among children living with HIV. In Kenya, Masaba et al., (2022) reported significantly higher adherence rates in the ICC group (88%) compared to standard care (75%), alongside fewer episodes of viral rebound. Similarly, Ayieko et al., (2023) found improved viral suppression (79% vs. 61%) and reduced treatment failure among children receiving ICC. Enhanced provider–caregiver communication and tailored adherence support, though limited by small sample size. Furthermore, improved adherence and lower treatment failure in the ICC group. Collectively, these studies support ICC as a promising strategy for optimizing pediatric HIV treatment outcomes.

METHODS

Study design

This study employed an analytical cross-sectional design employing both quantitative and qualitative approaches. Quantitative data were collected using self-administered structured questionnaires completed by parents or caregivers of viremic children living with HIV, while qualitative data were obtained through key informant interviews with healthcare workers in HIV care units. The study was conducted over a two-months period in selected public health facilities (Ruiru Sub-county Hospital, Igegania Level 4 Hospital, Githunguri Health Center, Githurai Langata Health Center, Ngenda Health Center, Juja Farm Health Center, and Makongeni Level 4 Hospital) in Kiambu County between October 2025 to November 2025.

Sampling

The study population comprised caregivers of viremic children living with HIV aged 0–14 years and healthcare workers providing HIV care services in selected public health facilities in Kiambu County. Due to ethical and practical challenges in collecting data directly from children, caregivers served as proxy respondents. Healthcare workers were included to provide qualitative insights into individualized case management practices. Seven public health facilities were purposively selected based on the availability of pediatric HIV services and reported cases of viremia. Stratified sampling was applied, with each health facility constituting a stratum to ensure proportional representation. Within each stratum, simple random sampling was used to select caregiver participants. The sample size of 177 caregivers was determined using Yamane's (1967) formula and proportionately allocated across facilities according to monthly viremic caseloads. Healthcare workers were selected purposively based on their involvement in HIV care and case management services.

Research instruments

Data were collected using structured questionnaires and key informant interview guides. The questionnaire, administered to caregivers, comprised six sections covering socio-demographic characteristics, ART adherence, and components of individualized case management, including assessment, case planning, care coordination, and monitoring. Items were measured using a five-point Likert scale to ensure consistency and facilitate quantitative analysis. Qualitative data were collected using an in-depth interview guide administered to healthcare workers to explore contextual and experiential perspectives on adherence support. Instruments were developed in line with study objectives, pretested, and refined following expert review to ensure clarity, validity, and reliability with Cronbach Alpha coefficients was above 0.76

Data analysis

Data collection was conducted using a drop-and-pick approach for questionnaires, allowing respondents sufficient time to complete them. Interviews with healthcare workers were conducted face-to-face in private settings and audio-recorded with consent. Quantitative data were cleaned, coded, and analyzed using SPSS version 30.0. Descriptive statistics summarized respondent characteristics and study variables, while inferential statistics including Pearson’s correlation and regression analyses examined relationships between individualized case management components and ART adherence. Ordinal and multiple regression models were used to assess individual and combined effects of independent variables. Qualitative data were transcribed verbatim and analyzed thematically to complement quantitative findings.

Ethical Considerations

Ethical approval was obtained from Kenya Methodist University’s Science and Ethical Review Committee and authorization granted by NACOSTI. Permission was also sought from relevant health facilities. Written informed consent was obtained from all participants prior to data collection, and participation was voluntary. Confidentiality and anonymity were ensured through the use of coded identifiers and secure data storage. No personal identifiers were included in reports or publications. Given the involvement of children, additional safeguards were applied, including caregiver consent and strict confidentiality. Participants were informed of their right to withdraw from the study at any stage without penalty.

RESULTS

Socio-Demographic Characteristics of study respondents

The study involved 177 respondents, most of children 65 (36.7%) were between 10-14 years with 58 (32.8%) and 54 (30.5%) were between 5-9 years and less than 5 years respectively. Further, 66 (37.3%) had been on ARVs for more than 6 years with 50 (28.2%) and 32 (18.1%) for less than 3 years and between 5-6 years respectively. The mean age was 7.49±4.07 and median was 8.0 (Table 1).

Table 1: Demographic Characteristics of study respondents

Characteristics		Frequency	Percent
Child age	Less than 5 years	54	30.5%
	5-9 years	58	32.8%
	10-14 years	65	36.7%
Duration on Antiretroviral	Less than 3 years	50	28.2%
	3-4 years	29	16.4%
	5-6 years	32	18.1%
	More than 6 years	66	37.3%

Adherence for Viremic Children Living with HIV

Slightly more than two third 119 (67.2%) of children had adherence for viremia (Figure 1).

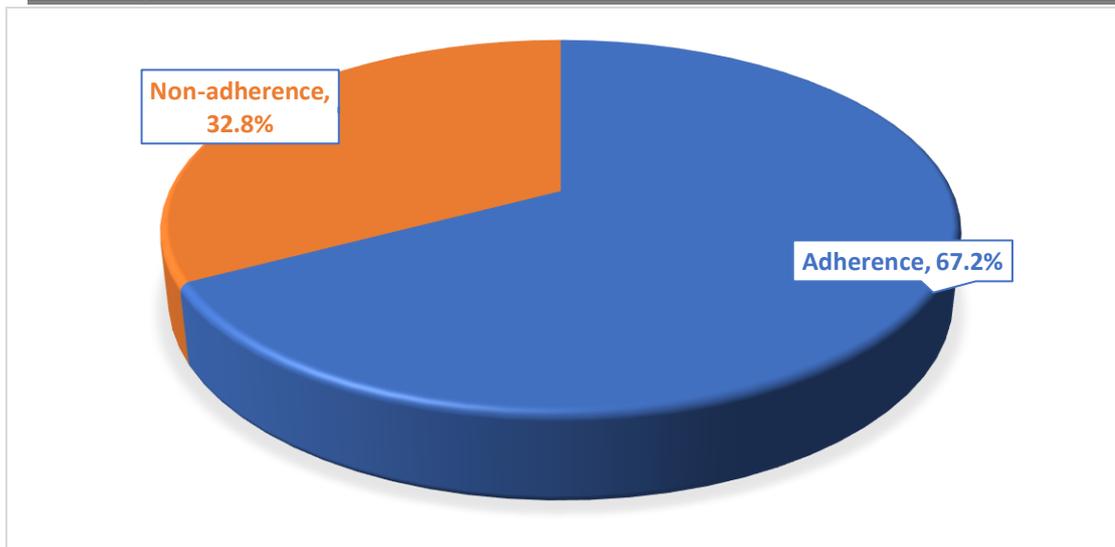


Figure 1: Adherence for Viremic Children Living with HIV

The key informants generally viewed adherence as improving, though challenges remain due to socio-economic barriers, stigma, and lack of awareness, especially among certain demographics like younger populations or those with limited access to healthcare. The informants mentioned

“Adherence among people living with HIV in Kiambu County has generally improved over the years, especially with better access to healthcare services” (KII 2).

“Viremia is a significant issue here; we see a reasonable number of cases, especially among children, because they are more vulnerable to not adhering to treatment regimens” (KII 1).

“Despite improvements, adherence is still a challenge, especially among those who face socio-economic difficulties or stigma” (KII 5).

“There’s a positive trend, but we still see some people struggle with consistency, particularly with younger populations or those who don’t fully understand the importance of treatment adherence” (KII 3).

Effect of Individualized Case Planning on Adherence for Viremic Children

Individualized case planning was significantly associated with improved treatment adherence across all measured domains (Table 2). Caregivers who agreed that individualized case planning supports structured care plan development had more than fourfold higher odds of adherence compared to those who disagreed (OR = 4.576, p = 0.010). Similarly, perceptions that care planning promotes adherence were strongly associated with improved adherence outcomes (OR = 4.608, p < 0.001). Goal-oriented planning demonstrated particularly strong effects. Agreement that goal setting enhances treatment outcomes was associated with over sevenfold increased odds of adherence (OR = 7.476, p < 0.001), while evaluating short- and long-term targets showed comparable impact (OR = 7.109, p = 0.006). Planning elements related to service organization and personalization also showed substantial associations. Scheduling visits and medication refills demonstrated the strongest effect (OR = 10.639, p < 0.001). Additionally, resource identification, age- and gender-tailored interventions, and upholding client dignity were all significantly associated with increased adherence (ORs ranging from 5.022 to 5.524, p < 0.01) (Table 2)

Table 2: Effect of Individualized Case Planning on Adherence for Viremic Children

Variables	Adherence	Non-adherence	OR	95% CI	p-value
Agree	96(85.7%)	16(14.3%)	4.576	1.012-13.282	0.010

Individualized case planning supports care plan development	Disagree	23(35.4%)	42(64.6%)	Ref		
Care plan development promotes adherence	Agree	99(81.8%)	22(18.2%)	4.608	2.011-9.235	0.0001
	Disagree	20(35.7%)	36(64.3%)	Ref		
Goal setting enhances treatment outcomes	Agree	90(85.7%)	15(14.3%)	7.476	3.146-16.580	0.0001
	Disagree	29(40.3%)	43(59.7%)	Ref		
Plan evaluates short and long-term targets	Agree	97(84.3%)	18(15.7%)	7.109	1.985-11.312	0.006
	Disagree	22(35.5%)	40(64.5%)	Ref		
Case planning aids resource identification	Agree	86(78.2%)	24(21.8%)	5.498	2.063-9.606	0.0001
	Disagree	33(49.3%)	34(50.7%)	Ref		
Case plan includes age- and gender-tailored interventions	Agree	85(84.2%)	16(15.8%)	5.022	1.008-11.221	0.008
	Disagree	34(44.7%)	42(55.3%)	Ref		
Planning schedules visits and refills	Agree	95(88.8%)	12(11.2%)	10.639	4.562-16.898	0.0001
	Disagree	24(34.3%)	46(65.7%)	Ref		
Case planning upholds client dignity and preferences	Agree	98(87.5%)	14(12.5%)	5.524	3.188-9.988	0.001
	Disagree	21(32.3%)	44(67.7%)	Ref		

Informants believe that individualized case planning significantly affects adherence for viremic children living with HIV in Kiambu County. By addressing the specific challenges faced by the children and their families, such as financial difficulties, lack of education on HIV, or social stigma, these plans help create more realistic and tailored treatment regimens. However, the success of these plans in improving adherence depends heavily on regular follow-up, family involvement, and the availability of healthcare resources. Providers also noted that without continuous support, case plans may not be as effective in sustaining long-term adherence.

“Individualized case planning does indeed affect adherence for viremic children....mmm...it allows healthcare providers to offer personalized solutions to challenges that impact adherence, such as understanding family-related issues or addressing logistical barriers like transportation. The key is ensuring that these plans are regularly reviewed and updated based on the child’s evolving needs to maintain high levels of adherence over time” (KII 1).

“I believe individualized case planning plays a significant role in improving adherence for viremic children. When healthcare providers create care plans tailored to each child's unique needs, it makes adherence feel more achievable for families. However, consistent follow-up is critical to making this approach work. Without it, even the best-laid plans may not lead to sustained adherence in the long term” (KII 3).

Model Summary of Individualized Case Planning on Adherence for Viremic Children

The model summary is computed to establish the ability of the model to establish the relationship between the individualized case planning in the county have pushed case planning upholds client dignity and preferences, case planning aids resource identification, goal setting enhances treatment outcomes, care plan development promotes adherence, case plan includes age- and gender-tailored interventions, individualized case planning

supports care plan development, planning schedules visits and refills, plan evaluates short and long-term targets and adherence for viremic children coverage. The computed R-squared is 0.685 which indicates that 68.5% of the variation in the realization of adherence for viremic children is occasioned by the individualized case planning. The remaining variation of 31.5% is determined by variables not included in this study

Table 3: Model Summary of Individualized Case Planning

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.837 ^a	0.700	0.685	0.264
a. Predictors: (Constant), Case planning upholds client dignity and preferences, case planning aids resource identification, goal setting enhances treatment outcomes, care plan development promotes adherence, case plan includes age- and gender-tailored interventions, individualized case planning supports care plan development, planning schedules visits and refills, plan evaluates short and long-term targets				

DISCUSSION

The findings from the study on individualized case planning (ICP) for viremic children living with HIV in Kiambu County show a significant impact on adherence to antiretroviral therapy (ART). Respondents overwhelmingly agree that individualized case planning supports care plan development, aids in resource identification, promotes adherence, and includes age- and gender-tailored interventions. Specifically, those who agreed that individualized case planning enhanced care plan development and promoted adherence had higher odds of treatment adherence. This suggests that tailored care plans can address specific barriers to adherence and support the unique needs of children, particularly those facing challenges such as social stigma, logistical barriers, and family dynamics. This finding is consistent with Jaleta et al., (2022) conducted a study on individualized case planning for children with viremia, showing that personalized case plans led to an increase in ART adherence from 62% to 86%, with a corresponding decrease in viral load. Like the study findings, Simoni et al., (2019) study emphasizes the importance of personalized care, highlighting the role of case planning in addressing individual barriers and promoting adherence. Both studies underline the critical role of communication between healthcare providers and families in ensuring the success of these interventions.

Similarly, Cheruiyot et al., (2021) in Kenya found that individualized adherence counseling significantly enhanced ART adherence and viral suppression rates among children and adolescents. Their study aligns with the findings from Kiambu County, as it shows the importance of tailored interventions in improving adherence. Cheruiyot et al., (2021) work also supports the argument that understanding individual and familial challenges is crucial to improving ART outcomes, which is echoed in this study, where key informants noted the value of customizing case plans based on a child's unique circumstances. Additionally, Marseille et al., (2021) in Ethiopia explored how caregivers viewed ICP for their children, emphasizing the importance of addressing adherence barriers such as forgetfulness, side effects, and stigma. This mirrors the findings from this study, where healthcare providers and caregivers expressed the value of tailored care plans in overcoming adherence barriers. The study from Zimbabwe also underscores the need for continuous support and regular follow-up, which is echoed in this study findings where informants highlighted that the success of individualized case planning relies on ongoing support, regular updates, and family involvement.

The study's findings also align with Becker et al., (2020), who reviewed multiple studies on interventions for improving ART adherence. Becker et al., (2020) review found that multi-component interventions, which include personalized counseling and tailored support, are more effective than single-component strategies. This study similarly emphasizes the importance of a comprehensive, personalized approach, particularly in goal setting, resource identification, and scheduling visits, which were all identified as key components in improving adherence rates for viremic children.

However, despite these similarities, some differences in the findings of this study and those in the published literature are evident, particularly regarding resource constraints. Informants in the Kiambu study noted that the success of individualized case planning is often hindered by insufficient resources, such as staffing shortages and lack of medical supplies. This issue of limited resources was not as prominently highlighted in some of the published studies, such as Njoroge, (2022), which focused more on the effectiveness of the intervention itself. The issue of resource limitations in this study underscores a significant challenge in implementing ICPs in resource-limited settings, which was less emphasized in other studies but is crucial for the sustainability of these interventions.

CONCLUSION

This study demonstrates that while adherence among viremic children living with HIV in Kiambu County has generally improved, significant gaps remain. Slightly more than two-thirds (67.2%) of children achieved adherence, indicating meaningful progress but also highlighting a substantial proportion at continued risk of poor virological outcomes. Key informant insights corroborated these findings, noting persistent challenges related to socio-economic constraints, stigma, limited awareness, and the vulnerability of younger children, all of which undermine consistent treatment adherence. Individualized case planning emerged as a strong and statistically significant determinant of adherence. Children whose caregivers reported effective case planning including care plan development, goal setting, evaluation of short- and long-term targets, resource identification, age- and gender-tailored interventions, scheduled visits and refills, and respect for client dignity had markedly higher odds of adherence. The strongest effects were observed in structured planning elements such as visit and refill scheduling and goal-oriented care plans. The regression model further confirmed the robustness of this relationship, with individualized case planning accounting for 68.5% of the variation in adherence outcomes. Qualitative findings reinforced that personalized, patient-centered case planning enables healthcare providers to address contextual barriers faced by families. However, sustained adherence depends on regular follow-up, caregiver involvement, and adequate health system support. Strengthening individualized case planning within pediatric HIV programs is therefore essential to improving and sustaining adherence among viremic children.

Suggestions

The Ministry of Health, in collaboration with county governments and key HIV implementing partners, should strengthen and institutionalize individualized case planning within pediatric HIV care programs. Clear national and county-level guidelines should be developed to standardize individualized case planning components, including structured goal setting, routine evaluation of short- and long-term targets, scheduled clinic visits and medication refills, and age- and gender-responsive interventions. Kiambu County should prioritize adequate funding to support regular follow-up, caregiver counseling, and resource identification for families facing socio-economic barriers that hinder adherence.

Healthcare facilities should be supported to build the capacity of healthcare workers through continuous training on patient-centered case planning, communication skills, and stigma-sensitive care. Facilities should also integrate systematic monitoring and review mechanisms to ensure case plans are regularly updated based on the child's evolving needs. Strengthening caregiver involvement through education and psychosocial support is critical to sustaining adherence outcomes. In addition, community-based support systems, including linkage to social protection services, should be enhanced to address structural barriers such as poverty and transportation challenges. Finally, a robust feedback and reporting mechanism between caregivers, healthcare providers, and county health authorities should be reinforced to identify adherence challenges early and guide timely, evidence-based interventions for viremic children living with HIV.

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Declarations

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Conflict of interest: None declared

Ethical approval: The study was approved by the Kenya Methodist University- Ethical Review Committee and a permission by National Commission for Science, Technology and Innovation, Kenya. Written consent was obtained from the participants.

Author Contribution

Amos Mureithi, Anne Murugi: Conceptualization and design of the study, literature review, data collection and analysis, interpretation of results, and drafting of the manuscript.

Khisa Allan Wanjala, Aswani Clevin Wakhisi: Review of study concept and design, contribution to data interpretation, and revision of the manuscript for intellectual content.

Alice Ngima Wanjohi, Jane Wanjiru Kuria: Support in data collection, verification of data accuracy, contribution to data interpretation, and manuscript review.

Amos Mureithi, Norbert Kaimenyi Mukaria: Critical review of data analysis and interpretation, supervision of methodological processes, and final review of the manuscript.

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