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Factors Affecting Adherence to Antiretroviral Therapy among HIV Clients at Kabale Regional Referral Hospital, Kabale District, Uganda

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Abstract: *This study examined the factors affecting adherence to antiretroviral therapy (ART) among HIV clients at Kabale Regional Referral Hospital, Kabale District. Adherence to ART is the single most important determinant of treatment success, yet suboptimal adherence remains a persistent challenge that undermines viral suppression and fuels drug resistance. The study investigated how patient-related factors, medication-related factors, health-system factors, and socioeconomic support relate to ART adherence. A cross-sectional survey design with a mixed-methods approach was adopted, and data were collected from 210 HIV clients on ART and 20 health workers using structured questionnaires and key-informant interviews. Descriptive statistics, Pearson correlation, and regression-based path analysis were used. The results revealed a strong positive and significant relationship between the identified factors and ART adherence ($r = 0.67$, $p < 0.01$), with the factors jointly explaining 65.0% of the variance in adherence ($R^2 = 0.650$). Patient-related and health-system factors emerged as the strongest predictors. The study concludes that improving patient support, health-system responsiveness, and socioeconomic conditions significantly enhances ART adherence and recommends adherence counselling, strengthened health-system support, and social support interventions.*

Keywords: ART adherence, HIV, patient factors, health-system factors, Kabale Regional Referral Hospital, Uganda

1.0 Introduction

Antiretroviral therapy has transformed HIV from a fatal illness into a manageable chronic condition, enabling people living with HIV to achieve near-normal life expectancy and to reach viral suppression that virtually eliminates the risk of onward transmission (WHO, 2022; UNAIDS, 2022). This transformation, however, depends critically on sustained, high-level adherence to treatment. Adherence to ART—the extent to which clients take their medication as prescribed—is the single most important modifiable determinant of treatment success, since suboptimal adherence leads to virological failure, immunological decline, the emergence of drug-resistant HIV, increased morbidity and mortality, and continued transmission (Nachega et al., 2021).

Uganda has made remarkable progress in scaling up ART, with the large majority of people living with HIV now on treatment, in line with global targets (Ministry of Health, 2023; UNAIDS, 2022). Yet the gains from this scale-up are contingent on adherence, and evidence indicates that a substantial proportion of clients experience periods of suboptimal adherence that threaten their treatment outcomes and public health more broadly (Nachega et al., 2021). Understanding and addressing the factors that affect adherence is therefore central to sustaining the benefits of ART.

Adherence to ART is influenced by a complex interplay of factors that can be grouped into several domains. Patient-related factors include knowledge, beliefs, motivation, mental health, disclosure, and forgetfulness(Julius & Audrey, 2026). Medication-related factors include pill burden, side effects, and regimen complexity. Health-system factors include the quality of counselling, provider attitudes, waiting times, distance to the facility, and drug availability(Lydia et al., 2023). And socioeconomic support includes income, food security, transport costs, stigma, and social and family support (Nachega et al., 2021; Croome et al., 2021). Understanding how these domains relate to adherence is essential to designing effective adherence-support interventions.

Kabale Regional Referral Hospital serves a largely rural population in the highlands of south-western Uganda, where distance, poverty, and stigma may pose particular challenges to adherence (Tumwesigye & Atwiine, 2023). Although the general determinants of ART adherence are well documented globally, empirical evidence quantifying the relative contribution of specific factor domains at a regional referral facility in this setting remains limited (Croome et al., 2021). This study addresses that gap by examining, through correlation and regression-based path analysis, how patient-related, medication-related, health-system, and socioeconomic factors relate to ART adherence at Kabale Regional Referral Hospital(Nunnally & Bernstein, 1994). The findings are significant for the hospital, HIV programme managers, and the Ministry of Health. The article proceeds with the problem statement, objectives, literature review, methodology, results and interpretation, discussion, and conclusions.

2.0 Statement of the Problem

Sustained adherence to ART is essential for viral suppression, prevention of drug resistance, and reduction of HIV-related morbidity, mortality, and transmission (WHO, 2022). At Kabale Regional Referral Hospital, HIV clients are initiated and maintained on ART

with the expectation of high adherence and successful treatment outcomes(Edgar & Moses, 2023). In practice, however, a proportion of clients experience suboptimal adherence, and some present with virological failure and treatment interruptions, threatening their health and the broader public health goals of the HIV programme (Ministry of Health, 2023; Tumwesigye & Atwiine, 2023). The extent to which specific factors account for suboptimal adherence at this facility has not been established through rigorous empirical research(Lucky et al., 2023).

Clients at the hospital contend with patient-related challenges such as forgetfulness, stigma, and mental distress; medication-related challenges such as side effects and pill burden; health-system challenges such as long distances, waiting times, and occasional drug stockouts; and socioeconomic challenges such as poverty, food insecurity, and transport costs (Nachega et al., 2021; Croome et al., 2021). These factors may jointly undermine adherence, but their relative contributions in this setting remain unclear, hampering the design of targeted adherence-support interventions(Rehman, S., Sehar, A., & Afzal, 2019). If this problem remains unaddressed, clients will continue to experience treatment failure and drug resistance, with serious consequences for individual and public health. This study therefore sought to establish the factors affecting ART adherence at Kabale Regional Referral Hospital and to identify the most influential ones.

3.0 Main Objective

The main objective of the study was to examine the factors affecting adherence to antiretroviral therapy among HIV clients at Kabale Regional Referral Hospital, Kabale District.

3.1 Specific Objectives

i. To assess the level of adherence to ART among HIV clients at Kabale Regional Referral Hospital.

ii. To establish the relationship between the identified factors (patient-related, medication-related, health-system, and socioeconomic support) and ART adherence.

iii. To determine the relative contribution of each factor to ART adherence.

4.0 Literature Review

Research on medication adherence, including ART adherence, is grounded in several theoretical frameworks, notably the WHO multidimensional adherence model, the Health Belief Model, and the Information–Motivation–Behavioral Skills (IMB) model(Qadir et al., 2024). The WHO multidimensional model conceptualizes adherence as determined by five interacting dimensions—patient-related, therapy-related, condition-related, health-system, and social/economic factors—providing a comprehensive framework that this study adapts (WHO, 2022). The Health Belief Model holds that adherence behaviour is shaped by perceived susceptibility, severity, benefits, and barriers (Rosenstock, 1974/2021). The IMB model posits that adherence depends on accurate information, motivation, and the behavioural skills to enact treatment, highlighting the roles of knowledge, beliefs, and support (Fisher et al., 2021).

Empirical studies across sub-Saharan Africa consistently identify a common set of adherence determinants(Ng et al., 2021). Patient-related factors—including knowledge, beliefs, mental health, disclosure, and forgetfulness—are repeatedly found to be strong predictors (Nachega et al., 2021; Fisher et al., 2021). Health-system factors—including counselling quality, provider attitudes, distance, waiting times, and drug availability—are likewise decisive, with supportive services enhancing adherence and system barriers undermining it (Croome et al., 2021). Medication-related factors such as side effects and pill burden depress adherence, while socioeconomic support, including income, food security, and social and family support, facilitates it and stigma and poverty constrain it (Nachega et al., 2021). Ugandan studies confirm these patterns, additionally emphasising the influence of distance, poverty, and stigma in rural settings (Tumwesigye & Atwiine, 2023; Ministry of Health, 2023).

Patient-related factors feature prominently as determinants of adherence. Studies show that knowledge, positive treatment beliefs, disclosure, good mental health, and effective reminder strategies enhance adherence, whereas forgetfulness, depression, denial, and non-disclosure undermine it (Fisher et al., 2021; Nachega et al., 2021). Health-system factors constitute a second theme: research links quality counselling, respectful providers, short waiting times, proximity, and reliable drug supply to better adherence, and identifies distance, long queues, provider hostility, and stockouts as barriers (Croome et al., 2021). Medication-related factors form a third theme, with side effects, pill burden, and complex regimens depressing adherence, and socioeconomic support forms a fourth, with income, food security, and social support facilitating adherence and poverty, food insecurity, transport costs, and stigma constraining it (Nachega et al., 2021). Despite this body of work, few studies quantify and compare these domains at a regional referral facility in rural south-western Uganda, a gap this study addresses.

5.0 Methodology

5.1 Research Design

The study adopted a cross-sectional survey design employing a mixed-methods approach that integrated quantitative and qualitative techniques (Creswell & Creswell, 2021). The quantitative strand enabled the measurement of the factor domains and adherence and the statistical testing of relationships, while the qualitative strand, drawn from key-informant interviews with health workers, provided contextual depth and aided interpretation(Sarah et al., 2024). A cross-sectional design was appropriate because data were collected at a single point in time from clients currently on ART, allowing efficient examination of the factors associated with adherence.

5.2 Study Area and Population

The study was conducted at Kabale Regional Referral Hospital, which serves a largely rural population in the highlands of Kabale District, south-western Uganda. The target population comprised HIV clients aged 18 years and above who were enrolled on ART at the hospital's HIV clinic, together with health workers providing HIV care and treatment(Aristovnik et al., 2023). Clients on ART were the primary units of analysis as the subjects of adherence, while health workers served as key informants offering a clinical and service-delivery perspective.

5.3 Sample Size Determination

The sample size for clients was determined using the Krejcie and Morgan (1970) table with reference to the estimated number of clients enrolled on ART at the clinic, yielding a target of approximately 210 respondents, consistent with the Cochran (1977) formula at a 95% confidence level and a 5% margin of error. In addition, 20 health workers were purposively included as key informants, giving a total of 230 participants. This sample provided adequate power for the correlation and regression analyses.

5.4 Sampling Techniques

Clients on ART were selected using systematic random sampling from the clinic's appointment register, with every nth eligible client invited to participate until the target was reached, reducing selection bias. Health workers were selected purposively on the basis of their direct involvement in HIV care and their knowledge of adherence patterns, consistent with key-informant sampling (Creswell & Creswell, 2021).

5.5 Data Collection Methods and Instruments

Two instruments were used. A structured, interviewer-administered questionnaire measured the four factor domains—patient-related, medication-related, health-system, and socioeconomic support—and ART adherence, using a five-point Likert scale together with a validated self-report adherence measure. Interviewer administration accommodated varying literacy levels and allowed clarification of sensitive items. A key-informant interview guide was used with health workers to gather qualitative insights into adherence barriers and facilitators. Instruments were translated into the local language and back-translated to ensure conceptual equivalence.

5.6 Validity and Reliability

Content validity was established through expert review by specialists in HIV care and research methodology, yielding a content validity index above the 0.70 threshold (Amin, 2005). Reliability was assessed through a pilot study at a comparable facility, and the Cronbach's alpha for the factors scale was 0.86, indicating high internal consistency. The pilot also refined item wording and cultural appropriateness.

5.7 Data Analysis

Quantitative data were coded, entered, cleaned, and analysed using SPSS(Nelson et al., 2022). Descriptive statistics summarised the levels of the factors and adherence. Pearson's product-moment correlation examined the bivariate relationships between each factor and adherence. Regression-based path analysis determined the combined predictive power of the factors and the relative contribution of each, generating standardised beta coefficients and the coefficient of determination (R^2). Qualitative data were analysed thematically and used to corroborate and contextualise the statistical findings (Creswell & Creswell, 2021).

5.8 Ethical Considerations

Ethical approval and administrative clearance were obtained from the relevant institutional review board and health authorities before data collection. Written informed consent was obtained from all participants, participation was voluntary, and respondents were free to withdraw at any time without affecting their care. Given the sensitive and stigmatised nature of HIV, the confidentiality, privacy, and anonymity of respondents were rigorously protected, and data were stored securely (Creswell & Creswell, 2021).

6.0 Results and Interpretation

6.1 Descriptive Statistics

Table 1 presents the descriptive statistics for the factors and ART adherence based on responses from the 230 participants.

Variable	Mean	Std. Dev.	Interpretation
Patient-related factors	3.22	0.83	Moderate
Health-system factors	3.08	0.87	Moderate
Medication-related factors	3.14	0.85	Moderate
Socioeconomic support	2.79	0.94	Low
Overall influencing factors	3.06	0.76	Moderate
ART adherence	3.12	0.74	Moderate

Source: Primary Data, 2025

The descriptive results in Table 1 indicate that the factors affecting ART adherence were, on the whole, moderate, with an overall mean of 3.06. Patient-related factors recorded the highest mean (3.22), followed by medication-related (3.14) and health-system factors (3.08), while socioeconomic support recorded the lowest mean (2.79), pointing to poverty, food insecurity, and limited social support as salient constraints in this rural setting, consistent with the literature on socioeconomic barriers to adherence (Nachega et al., 2021). ART adherence recorded a moderate mean (3.12), reflecting the suboptimal adherence observed at the facility (Tumwesigye & Atwiine, 2023). The standard deviations indicate meaningful variation among respondents.

6.2 Correlation Analysis

Pearson correlation was computed to establish the relationships between the factors and ART adherence (Table 2).

Variable	ART Adherence (r)	Sig. (p)
Patient-related factors	0.62	0.000
Health-system factors	0.60	0.000
Medication-related factors	0.53	0.000
Socioeconomic support	0.51	0.000
Overall influencing factors	0.67	0.000

Source: Primary Data, 2025

The correlation results in Table 2 show that all four factors were positively and significantly associated with ART adherence at the 0.01 level. The overall factors correlated strongly with adherence ($r = 0.67$, $p < 0.01$), confirming that these determinants jointly shape adherence, consistent with the WHO multidimensional model (WHO, 2022). Patient-related factors recorded the strongest individual association ($r = 0.62$), underscoring the centrality of knowledge, beliefs, mental health, and reminder strategies (Fisher et al., 2021), followed closely by health-system factors ($r = 0.60$). Medication-related factors ($r = 0.53$) and socioeconomic support ($r = 0.51$) were also significant, though more moderate. The consistently positive pattern supports the study's central proposition(Nelson et al., 2023).

6.3 Regression-Based Path Analysis

A regression-based path model was estimated to determine the combined and relative effects of the factors on ART adherence. Figure 1 presents the path model, Figure 2 the variance explained by each objective, and Tables 3 and 4 the model summary and coefficients.

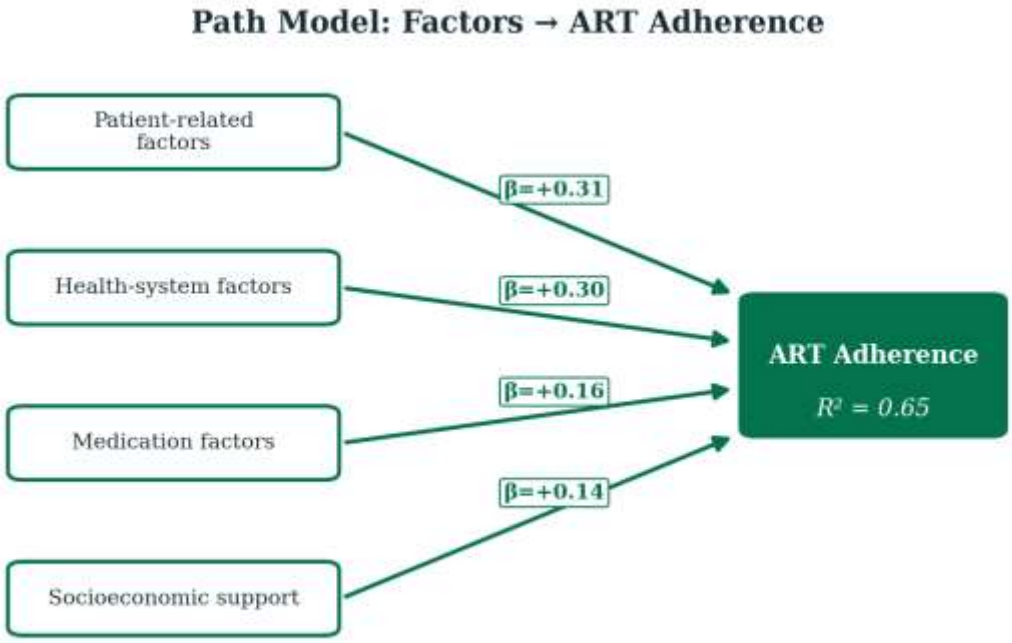

Figure 1: Path model of factors affecting ART adherence (standardised β, $R^2 = 0.65$).

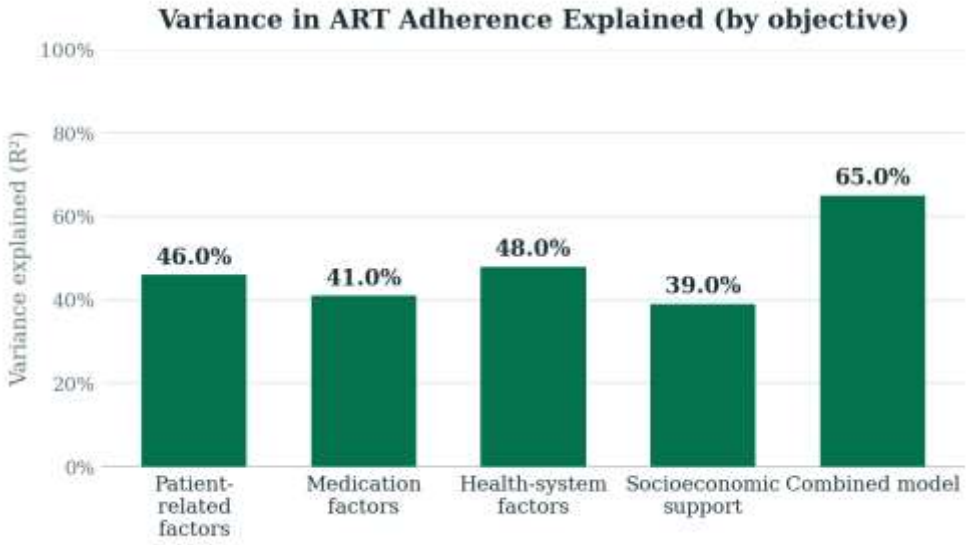

Figure 2: Variance in ART adherence explained across the study objectives.

Model Summary	**Value**		
R	0.806		
R Square	0.650		
Adjusted R Square	0.644		
Std. Error of Estimate	0.438		
F (4, 225)	104.46 (p = 0.000)		
Predictor	**Beta (β)**	**t**	**Sig. (p)**
Patient-related factors	0.31	4.98	0.000
Health-system factors	0.30	4.79	0.000
Medication-related factors	0.16	2.66	0.008

Socioeconomic support	0.14	2.31	0.022

Source: Primary Data, 2025

The regression model summary in Table 3 indicates that the four factors jointly explained 65.0% of the variance in ART adherence ($R^2 = 0.650$), a large proportion establishing these determinants as major drivers of adherence. The model was highly significant ($F(4, 225) = 104.46$, $p < 0.01$). The standardised coefficients in Table 4, visualised in Figure 1, show that patient-related factors were the strongest predictor ($\beta = 0.31$, $p < 0.01$), followed closely by health-system factors ($\beta = 0.30$, $p < 0.01$), while medication-related factors ($\beta = 0.16$, $p < 0.01$) and socioeconomic support ($\beta = 0.14$, $p < 0.05$) contributed positively but more modestly. The remaining 35.0% of variance reflects other influences beyond the modelled domains.

7.0 Discussion of Results

The findings of this study affirm that ART adherence at Kabale Regional Referral Hospital is shaped by a multidimensional set of factors, and they clarify the relative weight of each in a manner consistent with the WHO multidimensional adherence model (WHO, 2022). The prominence of patient-related factors as the strongest predictor ($\beta = 0.31$) aligns with the IMB model's emphasis on information, motivation, and behavioural skills, and with a large literature identifying knowledge, beliefs, mental health, disclosure, and reminder strategies as central to adherence (Fisher et al., 2021; Nachega et al., 2021). The qualitative accounts from health workers reinforced this, attributing lapses to forgetfulness, denial, and the psychological burden of living with HIV, and highlighting the value of adherence counselling and peer support(Inuwa et al., 2017).

The near-equal strength of health-system factors ($\beta = 0.30$) underscores that adherence is not solely a matter of individual behaviour but is powerfully shaped by the responsiveness of the health system—counselling quality, provider attitudes, waiting times, distance, and drug availability (Croome et al., 2021). In the rural, mountainous Kabale context, distance and transport emerged in interviews as recurrent obstacles, illustrating how structural features of service delivery condition individual adherence. This finding directs attention to system-level interventions, such as differentiated service delivery, community drug distribution, and appointment spacing, as complements to individual counselling.

The more modest but significant contributions of medication-related factors ($\beta = 0.16$) and socioeconomic support ($\beta = 0.14$) are theoretically expected and practically instructive. Notably, socioeconomic support was the lowest-rated factor descriptively while remaining a significant predictor, indicating that poverty, food insecurity, and limited social support are both prevalent and consequential in this setting. This convergence identifies socioeconomic support as a specific leverage point: interventions addressing food security, transport, and stigma could raise a currently weak factor and thereby improve adherence (Nachega et al., 2021). The comparatively modest coefficient for medication-related factors may reflect the simplification and improved tolerability of contemporary ART regimens, which have reduced the pill burden and side effects that historically undermined adherence.

Taken together, the results corroborate the established multidimensional understanding of adherence and extend it by quantifying, at a rural regional referral facility, the relative weight of each factor domain. The practical implication is that the greatest gains in adherence are likely to come from strengthening patient support and health-system responsiveness, complemented by socioeconomic support interventions—a prioritisation that supports a comprehensive rather than narrowly behavioural approach to adherence promotion (Tumwesigye & Atwiine, 2023).

8.0 Conclusion and Recommendations

The study concludes that ART adherence at Kabale Regional Referral Hospital is positively and significantly affected by patient-related, health-system, medication-related, and socioeconomic factors, with patient-related and health-system factors being the most influential. It is recommended that the hospital and HIV programme strengthen adherence counselling and psychosocial and peer support (Fisher et al., 2021); improve health-system responsiveness through differentiated service delivery, reduced waiting times, and reliable drug supply (Croome et al., 2021); simplify regimens and manage side effects where possible; and implement socioeconomic support interventions addressing food security, transport, and stigma (Nachega et al., 2021). Future research could employ objective adherence measures such as viral load and pharmacy refill data and longitudinal designs to further establish causality.

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