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Abstract

Sustained adherence to antiretroviral therapy is essential for viral suppression, prevention of drug resistance, and improved survival among people living with HIV. Evidence on adherence among culturally distinct urban populations in Kenya remains limited, particularly in Eastleigh, Nairobi, where HIV related stigma, economic insecurity, and health service barriers may interact. This study assessed the prevalence of ART adherence and examined socio demographic, psychosocial, and health systems factors associated with adherence among HIV positive residents of Eastleigh. An analytical cross sectional design was used among adults attending Pumwani Level 4 Hospital, Eastleigh Health Centre, and Biafra/Eastleigh Lions Clinic. A sample of 272 participants was targeted and 263 completed questionnaires were analysed, giving a response rate of 96.7%. Participants were selected through systematic random sampling and data were analysed using descriptive statistics, chi square tests, and binary logistic regression in SPSS Version 26 at a 95% confidence level. Overall adherence was 81.1% and the mean three day dose recall was 8.7 ± 2.3 . Adherence was significantly associated with sex, age, marital status, income, and duration on ART. Depression, HIV related stigma, intimate partner violence, disclosure, and social support were significant psychosocial correlates, while provider communication, waiting time, distance to facility, and medication accessibility were significant health systems correlates. Twelve variables significant at the bivariate level were entered into a binary logistic regression model, which was

statistically significant (omnibus $\chi^2 = 89.64$, $df = 12$, $p < 0.001$), well calibrated (Hosmer and Lemeshow $\chi^2 = 6.27$, $df = 8$, $p = 0.617$), explained 48.2% of the variation in adherence and classified 86.3% of cases correctly. Low perceived stigma (AOR = 5.61, 95% CI 1.92–16.38, $p = 0.002$) and absence of moderate to severe depressive symptoms (AOR = 3.94, 95% CI 1.82–8.52, $p < 0.001$) were the strongest independent predictors, followed by monthly income above KES 10,000 (AOR = 3.62) and satisfaction with provider communication (AOR = 3.18), while distance to the facility did not retain significance after adjustment (AOR = 1.69, $p = 0.115$). The study recommends integrated mental health screening, culturally responsive counselling, reduced refill waiting times, reliable medicine supply, and targeted socioeconomic support for vulnerable ART clients in Eastleigh.

Keywords: *antiretroviral therapy, adherence, psychosocial factors, health systems, HIV, Eastleigh, Nairobi*

1.0 Introduction

Human Immunodeficiency Virus remains a major global public health challenge despite sustained advances in diagnosis, treatment, and viral suppression. Antiretroviral therapy has transformed HIV from a rapidly fatal infection into a manageable chronic condition, but the therapeutic benefit of ART depends on consistent medication taking and continued engagement with care (UNAIDS, 2025; WHO, 2025). In 2024, approximately 40.8 million people were living with HIV globally, while viral suppression among all people living with HIV remained below the UNAIDS 95 95 95 treatment targets (UNAIDS, 2025). These gaps indicate that expanding ART coverage must be accompanied by attention to the individual, social, and health system conditions that determine whether treatment is taken consistently.

Sub Saharan Africa carries a disproportionate share of the global HIV burden and continues to show substantial variation in ART adherence. A systematic review reported adherence estimates ranging from about 43% to 84% across the region, reflecting differences in socioeconomic circumstances, psychosocial conditions, health system performance, and methods used to measure adherence (Almeida et al., 2024). In Eastern and Southern Africa, the proportion of people who achieve viral suppression remains below the third 95 target, with stigma, gender disparities, poverty, and barriers to health care access contributing to treatment interruptions (UNAIDS, 2023; Frontiers in Public Health, 2025). This makes context specific adherence research essential, particularly in urban communities where treatment is geographically available but social and economic barriers remain substantial.

Kenya has made considerable progress in HIV treatment scale up, yet adherence remains an important public health concern. National prevalence among adults aged 15 to 49 was estimated at 4.3% in 2023, with about 1.378 million people living with HIV and extensive ART service availability across the country (NSDCC, 2024). Nairobi County recorded 3,045 new HIV infections in 2023, the highest number among Kenyan counties, while Eastleigh was reported to have an HIV prevalence of about 7%, slightly above the Nairobi County estimate of 6.8% (MOH, 2024; NSDCC, 2024). The coexistence of substantial HIV burden and incomplete adherence within a dense urban environment therefore requires attention beyond simple treatment access.

Eastleigh presents a distinctive social setting because it is a densely populated commercial area with a large Somali population and strong cultural and religious norms. HIV related stigma, fear of disclosure, shame, social isolation, and sensitivity around sexuality may discourage clinic attendance or make medication taking difficult to conceal within households (WHO, 2023; Ali et

al., 2025). Economic pressures may compound these concerns through transport costs, lost working time, and nutritional constraints, even when ART medicines are provided without charge. The combined effect of these factors has not been adequately examined among HIV positive residents of Eastleigh, creating an important local evidence gap.

Psychosocial conditions can either support or undermine adherence. Depression, HIV related stigma, weak social support, substance use, stressful life events, and low self efficacy have all been associated with poorer ART adherence, while disclosure to trusted individuals and supportive family or peer networks can strengthen treatment routines (Chan et al., 2020; Tolossa et al., 2021; Mengesha et al., 2023). Health systems experiences also matter because respectful communication, short waiting times, reliable medicine supply, and convenient access reduce the practical and relational costs of remaining in care (Mcinziba et al., 2023; Sineke et al., 2022). Assessing these domains together allows adherence to be understood as a product of interacting personal and structural influences rather than as an individual behaviour alone.

The main objective of the study was to assess psychosocial and health systems factors associated with antiretroviral therapy treatment adherence among HIV positive residents of Eastleigh, Nairobi City County. Specifically, the study determined the prevalence of ART adherence, assessed socio demographic factors associated with adherence, assessed psychosocial factors associated with adherence, and examined health systems factors associated with adherence.

2.0 Literature Review and Theoretical Perspective

2.1 ART Adherence

Optimal ART adherence has historically been associated with sustained viral suppression and lower risks of virological failure, drug resistance, opportunistic infection, and onward transmission. Although treatment regimens have become more forgiving over time, adherence remains central to long term treatment success and is commonly evaluated through self report, pharmacy refill records, pill counts, viral load monitoring, or electronic monitoring (WHO, 2021). Differences in measurement partly explain the wide variation in reported adherence across populations because self reported adherence may be influenced by recall and social desirability bias (Almeida et al., 2024). Combining adherence indicators can therefore provide a more realistic picture of treatment behaviour.

Kenyan evidence shows that substantial adherence gaps can persist even in urban facilities where ART is available. Wambugu and Ndwiga (2018) reported an adherence rate of 67.34% in a Nairobi setting, while more recent work in informal settlements has linked poor adherence with poverty, social exclusion, long queues, and unsupportive clinic environments (Mwangi et al., 2025). The Eastleigh context is important because ART clients live within a dense commercial environment in which cultural conservatism, economic pressure, and concern about disclosure may operate simultaneously. These features make aggregate national adherence estimates insufficient for designing locally responsive interventions.

2.2 Socio Demographic Factors

Socio demographic characteristics shape ART adherence through access to resources, health literacy, household support, and competing responsibilities. Across sub Saharan Africa, women frequently show better adherence and viral suppression than men, partly because women have more regular contact with health services and may have stronger care related support networks (Hlophe et al., 2023; Marinda et al., 2022). Men may face barriers associated with employment

schedules, masculine norms of self reliance, and reluctance to be seen attending HIV services (Nguyen et al., 2023; Haas et al., 2023). Age also matters, with younger adults often reporting greater disruption from mobility, peer pressures, unstable livelihoods, and difficulty integrating lifelong treatment into daily routines.

Education and income influence adherence through different but related mechanisms. Lower education can reduce understanding of treatment instructions, side effects, dosage schedules, and the implications of missed doses, while greater health literacy can improve communication with providers and informed treatment decisions (Sineke et al., 2022; Nhlolongolwane & Shonisani, 2024). Economic vulnerability creates indirect treatment costs such as transport, food, childcare, and lost income while waiting at clinics, meaning that free medicines do not eliminate the financial burden of treatment (Mcinziba et al., 2023; Almeida et al., 2024). In low income urban populations, these opportunity costs can lead patients to postpone appointments or refills during periods of financial stress.

Marital status and household structure can either facilitate or complicate adherence. Partners and family members may provide reminders, emotional support, financial assistance, and help with clinic attendance, but household conflict and fear of disclosure can make medication privacy difficult (Mcinziba et al., 2023; Kimera et al., 2023). These dynamics may be particularly important in extended or polygamous households where disclosure decisions affect several relationships. Duration on ART may also influence adherence as patients develop stable routines and greater familiarity with treatment over time, although adherence fatigue can remain a concern in long term care (Palimaru et al., 2023).

2.3 Psychosocial Factors

HIV related stigma is a multidimensional barrier that includes anticipated discrimination, internalized shame, and enacted mistreatment. Fear of being identified at an HIV clinic or of having one's status disclosed can encourage missed appointments, concealment of medicines, and disengagement from care (Nawfal et al., 2024; *Frontiers in Public Health*, 2025). Saleem et al. (2023) found that HIV stigma remained associated with adherence even after accounting for disclosure and social support. In culturally cohesive communities, stigma may extend beyond the individual to concerns about family reputation, employment, and social standing, increasing the psychological cost of visible engagement with HIV care.

Depression and broader psychological distress can reduce motivation, concentration, memory, energy, and engagement with care. Research from South Africa and Mozambique has linked both diagnosed depression and subclinical symptoms to poorer adherence and viral outcomes (Haas et al., 2023; Nguyen et al., 2023). Brown et al. (2023) further demonstrated that internalized stigma, depression, and social support can operate through interconnected pathways, suggesting that mental health and stigma should not be addressed separately. Routine mental health screening within ART services is therefore relevant even where severe clinical depression is not common.

Social support and disclosure can protect adherence by providing reminders, practical assistance, emotional reassurance, and a supportive environment for medication taking. A meta analysis by Mengesha et al. (2023) found that disclosure to at least one trusted person was positively associated with ART adherence in sub Saharan Africa, while Palimaru et al. (2023) linked supportive relationships with stronger habit formation around treatment. Disclosure is nevertheless context dependent because poorly supported disclosure can lead to rejection, discrimination, or violence

(Nawfal et al., 2024). The quality and safety of the relationship into which disclosure occurs is therefore as important as disclosure itself.

Substance use, coping strategies, intimate partner violence, and stressful life events may further shape adherence. Alcohol or drug use can disrupt medication routines and clinic engagement, while maladaptive coping can reinforce avoidance and disengagement (Magidson et al., 2020; Belus et al., 2022). Adaptive coping strategies that connect medication taking to daily routines, prayer, family responsibilities, and life goals may strengthen adherence over time (Saya et al., 2022; Palimaru et al., 2023). Intimate partner violence can compromise adherence through psychological trauma, restricted movement, forced concealment of status, and unstable household conditions (Nawfal et al., 2024).

2.4 Health Systems Factors

Health systems can facilitate adherence when services are respectful, predictable, geographically accessible, and reliably supplied. Provider patient communication is particularly important because clear counselling, confidentiality, respectful treatment, and culturally competent interaction influence patient trust and willingness to remain engaged in care (Sineke et al., 2022; Frontiers in Public Health, 2025). Poor communication, judgmental attitudes, and breaches of confidentiality can have the opposite effect by reinforcing stigma and discouraging clinic attendance. These issues are especially important where language and cultural norms shape how illness, disclosure, and authority are understood.

Waiting times and geographic access impose direct and opportunity costs on ART clients. Long queues can lead to lost wages, disruption of informal work, childcare difficulties, and frustration, while long travel distances increase transport costs and the visibility of clinic attendance (Mcinziba et al., 2023; Palimaru et al., 2023). Decentralized and community based ART models can reduce these burdens by bringing services closer to patients and reducing congestion in major facilities (Frescura et al., 2022; Magidson et al., 2020). Reliable medicine supply is equally essential because stockouts can interrupt otherwise good adherence even when patients attend appointments as scheduled.

The study was guided by Cognitive Behavioral Theory, which emphasizes the relationship between cognition, emotion, and behaviour. In the ART context, beliefs about HIV, perceived stigma, depressive thoughts, coping responses, and expectations about treatment can influence medication taking and engagement with care (Corey, 2009a; Corey, 2009b). The theory was appropriate because the study examined psychological and behavioural factors while recognizing that these operate within social and health system environments. The conceptual approach therefore treated ART adherence as the dependent outcome influenced by socio demographic, psychosocial, and health systems factors, with ART policy and organizational support acting as contextual influences.

3.0 Materials and Methods

3.1 Study Design and Setting

The study used an analytical cross sectional design and a quantitative approach to determine factors associated with ART adherence at a defined period. It was conducted in Eastleigh, Nairobi City County, a densely populated urban area east of Nairobi's central business district. Three public Comprehensive Care Centres were included: Pumwani Level 4 Hospital, Eastleigh Health Centre, and Biafra/Eastleigh Lions Clinic. These facilities were selected because they serve a large

proportion of ART clients residing in Eastleigh and provided an appropriate setting for examining individual and health system factors concurrently.

3.2 Study Population and Sampling

The study population comprised adults aged 18 years and above living with HIV, receiving ART at one of the three selected Comprehensive Care Centres, and residing in Eastleigh for at least six months. The combined clinic registers contained about 2,700 adult clients, with approximately 900 attending appointments in a typical month. A two stage sampling procedure was used: the three facilities were purposively selected and eligible participants were then recruited through systematic random sampling. With a planned sample of 272, a sampling interval of approximately three was applied after a random start, and every third eligible client was approached until the required sample was attained.

3.3 Sample Size

The initial sample size was calculated using the Fisher formula, based on a previously reported ART adherence prevalence of 67.34% in Nairobi. The preliminary estimate of 340 was adjusted for the finite monthly clinic population of 900, producing a minimum sample of 247 participants. A 10% allowance for nonresponse increased the target to 272. Of the 272 questionnaires distributed, 263 were completed and included in analysis, corresponding to a response rate of 96.7%.

3.4 Measures

ART adherence was assessed using a three day medication recall and adherence index, with participants classified as adherent when they achieved at least 95% of prescribed doses and nonadherent when they fell below 95%. Socio demographic variables included sex, age, marital status, education, income, employment, family structure, and duration of ART use. Psychosocial factors included depressive symptoms, HIV related stigma, substance use, stressful life events, coping, intimate partner violence, disclosure, and social support. Depression was assessed using the PHQ 9, stigma using an HIV stigma scale, and social support using the Oslo Social Support Scale, while health systems measures covered provider communication, refill waiting time, distance to facility, and medication accessibility.

3.5 Instrument Quality and Pilot Testing

The questionnaire was adapted from established adherence and psychosocial instruments and reviewed for relevance and clarity. A pilot study involving 28 respondents was conducted at Mbagathi Hospital, a Level 4 facility in Nairobi with characteristics comparable to the study sites, to identify ambiguity and practical challenges. Internal consistency of the stigma and depression measures was assessed using Cronbach's alpha, with values above 0.70 treated as acceptable based on the study protocol (Tavakol & Dennick, 2011). Content validity was supported through review by the university supervisor before field implementation.

3.6 Data Collection and Analysis

Data were collected during scheduled clinic visits between July and October 2025. Trained research assistants administered the study tools in a manner designed to preserve privacy and reduce disclosure risk. Data were coded, cleaned, and analysed using IBM SPSS Statistics Version 26. Frequencies and percentages summarized categorical variables, chi square tests assessed bivariate associations with ART adherence, and statistically significant predictors were entered

into a binary logistic regression model at a 95% confidence level with $p < 0.05$ considered statistically significant.

3.7 Ethical Considerations

Ethical clearance was obtained from the Kenyatta University Institutional Research Ethics Committee, followed by authorization from the National Commission for Science, Technology and Innovation and relevant Nairobi health authorities. Participation was voluntary and based on informed consent, and respondents could withdraw without penalty. No identifying information was recorded on questionnaires, interviews were conducted with adequate privacy, and confidentiality was emphasized because of the sensitivity of HIV status and psychosocial experiences. Four research assistants were trained on informed consent, respectful interviewing, confidentiality, and secure handling of completed questionnaires.

4.0 Results

A total of 263 of the 272 targeted participants completed the study, yielding a 96.7% response rate. Nearly half received care from Pumwani Hospital, while the remainder attended Bifra/Eastleigh Lions Clinic and Eastleigh Health Centre. The sample included adults across a wide age range and socioeconomic circumstances, allowing the four study objectives to be examined across demographic, psychosocial, and health system domains.

4.1 Prevalence of ART Adherence

The first objective determined the prevalence of ART adherence among HIV positive residents of Eastleigh. Overall, 213 of the 263 participants, representing 81.1%, were classified as adherent, while 50 participants, representing 18.9%, were nonadherent. The mean number of doses taken during the three day recall period was 8.7 with a standard deviation of 2.3. Although the overall adherence level was relatively high, it remained below the 95% threshold used in the study to define optimal adherence, indicating that almost one in five participants remained at risk of suboptimal treatment outcomes.

Table 1. Prevalence and short term ART adherence indicators

Indicator	Result
Participants analysed	263
Adherent	213 (81.1%)
Nonadherent	50 (18.9%)
Mean three day dose recall	8.7
Standard deviation	2.3

4.2 Socio Demographic Factors Associated with ART Adherence

The second objective assessed socio demographic factors associated with adherence. Sex was significantly associated with adherence, with females recording 86.7% adherence compared with 75.0% among males ($\chi^2 = 5.81$, $p = 0.016$). Age was also significant ($\chi^2 = 6.34$, $p = 0.042$), with adherence increasing from 74.4% among participants aged 18 to 34 years to 84.5% among those

aged 45 years and above. Marital status was significant ($\chi^2 = 8.71$, $p = 0.013$), and married participants showed the highest adherence at 86.2%.

Income was the strongest socio demographic correlate at the bivariate level. Participants earning more than KES 10,000 had an adherence rate of 92.2%, compared with 70.1% among those earning KES 10,000 or less ($\chi^2 = 20.85$, $p < 0.001$). Duration on ART was also significant, with participants on treatment for at least two years recording 83.4% adherence compared with 74.3% among those on ART for less than two years ($\chi^2 = 4.55$, $p = 0.033$). Education and employment showed higher adherence in more advantaged categories but were not statistically significant when analysed across their original categories.

Table 2. Socio demographic characteristics and ART adherence

Factor	Category	Adherent	Nonadherent	Total	χ^2	df	p value
Sex	Male	96 (75.0%)	32 (25.0%)	128	5.81	1	0.016*
	Female	117 (86.7%)	18 (13.3%)	135			
Age (years)	18–34	58 (74.4%)	20 (25.6%)	78	6.34	2	0.042*
	35–44	68 (82.9%)	14 (17.1%)	82			
	45+	87 (84.5%)	16 (15.5%)	103			
Marital Status	Married	138 (86.2%)	22 (13.8%)	160	8.71	2	0.013*
	Single	41 (73.2%)	15 (26.8%)	56			
	Divorced/Widowed/Separated	34 (72.3%)	13 (27.7%)	47			
Educational Status	None	48 (76.2%)	15 (23.8%)	63	7.53	3	0.057
	Primary	83 (76.1%)	26 (23.9%)	109			
	Secondary	53 (89.8%)	6 (10.2%)	59			
	Tertiary	29 (90.6%)	3 (9.4%)	32			
Income Level	≤ KES 10,000	94 (70.1%)	40 (29.9%)	134	20.85	1	<0.001***
	> KES 10,000	119 (92.2%)	10 (7.8%)	129			
Employment Status	Self-employed	96 (84.2%)	18 (15.8%)	114	4.14	3	0.247
	Unemployed	60 (74.1%)	21 (25.9%)	81			
	Formally Employed	47 (85.5%)	8 (14.5%)	55			
	Others	10 (76.9%)	3 (23.1%)	13			
ARV Duration	< 2 years	52 (74.3%)	18 (25.7%)	70	4.55	1	0.033*
	≥ 2 years	161 (83.4%)	32 (16.6%)	193			

. * $p < 0.05$; *** $p < 0.001$.

4.3 Psychosocial Factors Associated with ART Adherence

The third objective assessed psychosocial factors associated with adherence. Depressive symptoms showed a clear gradient: adherence declined from 93.3% among participants with minimal or no depressive symptoms to 47.4% among those with severe symptoms ($\chi^2 = 36.68$, $p < 0.001$). HIV related stigma showed a similar pattern, with adherence of 95.5% among participants with low stigma, 80.5% among those with moderate stigma, and 59.2% among those with high stigma ($\chi^2 = 36.94$, $p < 0.001$). These results identified psychological distress as a major barrier to sustained treatment behaviour.

Intimate partner violence was significantly associated with lower adherence, which was 65.0% among exposed participants compared with 83.9% among those not reporting violence ($\chi^2 = 8.94$, $p = 0.003$). Disclosure was protective: participants who had disclosed their HIV status recorded 84.8% adherence compared with 66.0% among those who had not disclosed ($\chi^2 = 11.62$, $p < 0.001$). Social support was also significant ($\chi^2 = 12.12$, $p = 0.002$), with adherence increasing from 68.2% among participants with poor support to 90.6% among those with strong support. Smoking, alcohol consumption, and stressful life events were not statistically significant in the bivariate analysis.

Table 3. Psychosocial factors and ART adherence

Factor	Category	Adherent	Nonadherent	Total	χ^2	df	p value
Depressive Symptoms	Minimal/None	84 (93.3%)	6 (6.7%)	90	36.68	4	<0.001***
	Mild	65 (87.8%)	9 (12.2%)	74			
	Moderate	39 (75.0%)	13 (25.0%)	52			
	Moderately Severe	16 (57.1%)	12 (42.9%)	28			
	Severe	9 (47.4%)	10 (52.6%)	19			
HIV-Related Stigma	Low	105 (95.5%)	5 (4.5%)	110	36.94	2	<0.001***
	Moderate	66 (80.5%)	16 (19.5%)	82			
	High	42 (59.2%)	29 (40.8%)	71			
Smoking Status	Never Smoked	162 (81.8%)	36 (18.2%)	198	0.52	2	0.771
	Past Smoker	32 (80.0%)	8 (20.0%)	40			
	Current Smoker	19 (76.0%)	6 (24.0%)	25			
Alcohol Consumption	Never Consumed	127 (84.7%)	23 (15.3%)	150	4.88	2	0.087
	Past Use	37 (82.2%)	8 (17.8%)	45			
	Current Use	49 (72.1%)	19 (27.9%)	68			
Intimate Partner Violence	No	187 (83.9%)	36 (16.1%)	223	8.94	1	0.003**
	Yes	26 (65.0%)	14 (35.0%)	40			
Stressful Life Events	No	170 (81.7%)	38 (18.3%)	208	0.31	1	0.577
	Yes	43 (78.2%)	12 (21.8%)	55			
Status Disclosure	Disclosed	178 (84.8%)	32 (15.2%)	210	11.62	1	<0.001***
	Not Disclosed	35 (66.0%)	18 (34.0%)	53			
Social Support	Poor	45 (68.2%)	21 (31.8%)	66	12.12	2	0.002**
	Moderate	91 (81.3%)	21 (18.8%)	112			
	Strong	77 (90.6%)	8 (9.4%)	85			

** $p < 0.01$; *** $p < 0.001$.

4.4 Health Systems Factors Associated with ART Adherence

The fourth objective examined health systems factors associated with adherence. Provider communication showed a strong relationship with adherence ($\chi^2 = 29.40$, $p < 0.001$): 92.3% of

participants who were very satisfied with communication were adherent, compared with 41.7% among those who were very dissatisfied. Waiting time was also significant ($\chi^2 = 10.31$, $p = 0.016$), with adherence declining from 90.6% among participants waiting less than 30 minutes to 66.7% among those waiting more than two hours. This pattern suggests that service efficiency may affect the feasibility of regular refill attendance, especially for clients balancing informal employment and household responsibilities.

Distance to the facility was significantly associated with adherence in the detailed bivariate table ($\chi^2 = 8.96$, $p = 0.030$). Adherence declined from 88.7% among participants living within one kilometre of the ART facility to 64.5% among those travelling more than five kilometres. Medication accessibility was also significant ($\chi^2 = 14.10$, $p < 0.001$), with adherence of 86.8% when medicines were always available compared with 60.0% among participants reporting frequent stockouts. These findings indicate that adherence depended not only on willingness to take ART but also on the efficiency, proximity, and reliability of the service environment.

Table 4. Health systems factors and ART adherence

Factor	Category	Adherent	Nonadherent	Total	χ^2	df	p value
Provider Communication	Very Satisfied	72 (92.3%)	6 (7.7%)	78	29.40	4	<0.001***
	Satisfied	92 (85.2%)	16 (14.8%)	108			
	Neutral	30 (73.2%)	11 (26.8%)	41			
	Dissatisfied	14 (58.3%)	10 (41.7%)	24			
	Very Dissatisfied	5 (41.7%)	7 (58.3%)	12			
Waiting Time for Refill	< 30 minutes	58 (90.6%)	6 (9.4%)	64	10.31	3	0.016*
	30–60 minutes	90 (83.3%)	18 (16.7%)	108			
	1–2 hours	45 (73.8%)	16 (26.2%)	61			
	> 2 hours	20 (66.7%)	10 (33.3%)	30			
Distance to Facility	< 1 km	63 (88.7%)	8 (11.3%)	71	8.96	3	0.030*
	1–3 km	90 (82.6%)	19 (17.4%)	109			
	3–5 km	40 (76.9%)	12 (23.1%)	52			
	> 5 km	20 (64.5%)	11 (35.5%)	31			
Medication Accessibility	Always Available	158 (86.8%)	24 (13.2%)	182	14.10	2	<0.001***
	Occasional Stockout	43 (70.5%)	18 (29.5%)	61			
	Frequent Stockout	12 (60.0%)	8 (40.0%)	20			

* $p < 0.05$; *** $p < 0.001$.

4.5 Multivariable Predictors of ART Adherence

Variables that were significantly associated with adherence at the bivariate level were entered simultaneously into a binary logistic regression model. Multi level ordinal variables were first collapsed into binary categories because only 50 participants were nonadherent, which limited the number of parameters that could be estimated reliably; in each case the category with the lower observed adherence was treated as the reference, so that adjusted odds ratios above 1.00 denote a greater likelihood of adherence. Twelve variables were entered: sex, marital status and monthly

income; depressive symptoms, HIV related stigma, intimate partner violence, status disclosure and social support; and provider communication, waiting time for refill, distance to the facility and medication accessibility. Age and duration on ART also met the bivariate screening threshold but were not carried forward, because the small number of nonadherent cases limited the parameters the model could support and these two variables recorded the weakest bivariate associations; both are therefore reported at the bivariate level only. Collinearity diagnostics were acceptable, with tolerance values ranging from 0.62 to 0.89 and variance inflation factors from 1.12 to 1.61. The model was statistically significant (omnibus $\chi^2 = 89.64$, $df = 12$, $p < 0.001$) and the Hosmer and Lemeshow test was nonsignificant ($\chi^2 = 6.27$, $df = 8$, $p = 0.617$), indicating acceptable calibration. The Nagelkerke R^2 was 0.482 and the model correctly classified 86.3% of participants, an improvement on the 81.0% obtainable by classifying every participant as adherent.

Table 5. Binary logistic regression model fit.

Indicator	Result
Omnibus Test χ^2	89.64 ($df = 12$, $p < 0.001$)
Hosmer & Lemeshow Test χ^2	6.27 ($df = 8$, $p = 0.617$)
Nagelkerke R^2	0.482
Overall Prediction Accuracy	86.3%
Number of predictors entered	12
Events (nonadherent cases)	50

Eleven of the twelve predictors retained statistical significance after mutual adjustment (Table 6). Low perceived HIV related stigma produced the largest effect, with 5.61 times the odds of adherence relative to moderate or high stigma (95% CI 1.92–16.38, $p = 0.002$), followed by the absence of moderate to severe depressive symptoms (AOR = 3.94, 95% CI 1.82–8.52, $p < 0.001$) and monthly income above KES 10,000 (AOR = 3.62, 95% CI 1.58–8.29, $p = 0.002$). Among the health systems variables, satisfaction with provider communication (AOR = 3.18, 95% CI 1.48–6.84, $p = 0.003$), uninterrupted medicine availability (AOR = 2.42, 95% CI 1.18–4.97, $p = 0.016$) and a refill waiting time of less than one hour (AOR = 1.91, 95% CI 1.01–3.61, $p = 0.046$) remained independently associated with adherence. Status disclosure, absence of intimate partner violence, moderate to strong social support, female sex and being married each approximately doubled the odds of adherence. Distance to the facility was the only variable that did not retain significance after adjustment (AOR = 1.69, 95% CI 0.88–3.24, $p = 0.115$), suggesting that its bivariate association operated largely through socioeconomic position rather than as an independent barrier within the compact geography of Eastleigh.

Table 6. Predictors of ART adherence from binary logistic regression

Predictor	Category	Adherent n/N (%)	cOR (95% CI)	AOR (95% CI)	p
Sex	Male (ref)	96/128 (75.0)	1.00	1.00	—
	Female	117/135 (86.7)	2.17 (1.15–4.10)	1.72 (1.01–2.94)	0.047
Marital status	Not married (ref)	75/103 (72.8)	1.00	1.00	—
	Married	138/160 (86.2)	2.34 (1.25–4.38)	1.88 (1.05–3.38)	0.034
Monthly income	≤ KES 10,000 (ref)	94/134 (70.1)	1.00	1.00	—
	> KES 10,000	119/129 (92.2)	5.06 (2.41–10.65)	3.62 (1.58–8.29)	0.002
Depressive symptoms	Moderate–severe (ref)	64/99 (64.6)	1.00	1.00	—
	None/mild	149/164 (90.9)	5.43 (2.77–10.64)	3.94 (1.82–8.52)	< 0.001
HIV related stigma	Moderate/high (ref)	108/153 (70.6)	1.00	1.00	—
	Low	105/110 (95.5)	8.75 (3.34–22.90)	5.61 (1.92–16.38)	0.002
Intimate partner violence	Yes (ref)	26/40 (65.0)	1.00	1.00	—
	No	187/223 (83.9)	2.80 (1.33–5.87)	2.11 (1.01–4.42)	0.047
Status disclosure	Not disclosed (ref)	35/53 (66.0)	1.00	1.00	—
	Disclosed	178/210 (84.8)	2.86 (1.45–5.66)	2.23 (1.05–4.73)	0.037
Social support	Poor (ref)	45/66 (68.2)	1.00	1.00	—
	Moderate/strong	168/197 (85.3)	2.70 (1.41–5.18)	2.06 (1.02–4.16)	0.044
Provider communication	Not satisfied (ref)	49/77 (63.6)	1.00	1.00	—
	Satisfied	164/186 (88.2)	4.26 (2.24–8.10)	3.18 (1.48–6.84)	0.003
Waiting time for refill	≥ 1 hour (ref)	65/91 (71.4)	1.00	1.00	—
	< 1 hour	148/172 (86.0)	2.47 (1.32–4.62)	1.91 (1.01–3.61)	0.046
Distance to facility	≥ 3 km (ref)	60/83 (72.3)	1.00	1.00	—
	< 3 km	153/180 (85.0)	2.17 (1.16–4.08)	1.69 (0.88–3.24)	0.115
Medication accessibility	Any stockout (ref)	55/81 (67.9)	1.00	1.00	—
	Always available	158/182 (86.8)	3.11 (1.65–5.87)	2.42 (1.18–4.97)	0.016
Constant				0.09	< 0.001

cOR = crude odds ratio; AOR = adjusted odds ratio; CI = confidence interval; ref = reference category. Reference categories are those with the lower observed adherence, so AOR > 1.00 denotes greater odds of adherence.

5.0 Discussion

5.1 Prevalence of ART Adherence

The study found an overall self reported ART adherence level of 81.1%, with a mean three day dose recall of 8.7 ± 2.3 . This indicates that most participants maintained treatment reasonably well but that the cohort remained below the 95% adherence threshold applied in the study. The result falls within the broad range reported in sub Saharan Africa, where Almeida et al. (2024) documented adherence estimates from 43% to 84%. It also exceeds the 67.34% adherence reported by Wambugu and Ndwiga (2018) in another Nairobi setting, suggesting relatively strong treatment continuity in Eastleigh despite persistent barriers.

The 18.9% nonadherent group remains clinically important because aggregate success can mask a vulnerable minority with repeated missed doses or refill interruptions. Regional evidence similarly shows that strong ART coverage does not automatically translate into universal viral suppression, particularly when adherence support is not sustained over time (UNAIDS, 2023). Palimaru et al. (2023) emphasized the role of habit formation in maintaining long term medication taking, while Reif et al. (2020) noted that the effects of adherence interventions may weaken beyond initial treatment periods. The Eastleigh findings therefore support continued adherence reinforcement even among long term ART clients rather than limiting counselling to treatment initiation.

5.2 Socio Demographic Factors

Female participants were significantly more adherent than males, with adherence of 86.7% and 75.0%, respectively. This pattern is consistent with research showing poorer viral outcomes and weaker engagement with HIV care among men in several sub Saharan African settings (Haas et al., 2023; Marinda et al., 2022). Masculine norms, work demands, and reluctance to use facility based services may make regular clinic attendance more difficult for men (Nguyen et al., 2023). Gender responsive adherence interventions in Eastleigh should therefore consider service hours and communication strategies that are compatible with men's employment and social roles.

Age and marital status were also significant, with older and married participants showing better adherence. Married respondents achieved 86.2% adherence compared with 73.2% among single participants and 72.3% among those divorced, widowed, or separated. Household and partner support can provide reminders, emotional encouragement, shared disclosure, and practical assistance with clinic attendance (Mcinziba et al., 2023). The finding suggests that interpersonal stability can support adherence, although this benefit may depend on whether disclosure within the household is safe and supportive.

Income showed the strongest socio demographic association, with adherence of 92.2% among participants earning more than KES 10,000 compared with 70.1% among those earning KES 10,000 or less. This supports evidence that indirect costs of ART, including transport, nutrition, time away from work, and childcare, remain important even where medicines are free (Mcinziba et al., 2023; Almeida et al., 2024). Saya et al. (2022) similarly linked ART adherence to economic participation and livelihood security in Uganda. The Eastleigh findings therefore show that free treatment does not remove the economic burden of remaining consistently engaged with care.

Duration on ART was significantly associated with adherence, with participants on treatment for at least two years showing better adherence than those with shorter treatment duration. This may reflect the gradual development of stable medication routines and increased familiarity with clinic processes (Palimaru et al., 2023; Nhlolongwane & Shonisani, 2024). The result also identifies the early treatment period as a potentially vulnerable phase requiring structured follow up, repeated adherence counselling, and practical problem solving. Although education and employment were not significant across all original categories, adherence was visibly higher among participants with secondary or tertiary education and among formally employed or self employed participants, indicating a broader socioeconomic gradient.

5.3 Psychosocial Factors

Psychosocial conditions produced the largest adjusted effects observed anywhere in the study, and all five psychosocial variables retained independent significance after mutual adjustment. Participants with no or only mild depressive symptoms had 3.94 times the odds of adherence

compared with those reporting moderate to severe symptoms (AOR = 3.94, 95% CI 1.82–8.52, $p < 0.001$). At the bivariate level, depressive symptoms showed a pronounced dose response pattern, with adherence declining steadily as symptom severity increased. This is consistent with evidence that depression can reduce motivation, memory, energy, and engagement with care, thereby increasing missed doses and virological risk (Haas et al., 2023; Marinda et al., 2022). Nguyen et al. (2023) further showed that even subclinical symptoms can undermine adherence, supporting routine screening that does not focus only on severe depression.

HIV related stigma was similarly important, with adherence falling from 95.5% in the low stigma group to 59.2% among participants reporting high stigma. Nawfal et al. (2024) identified anticipated stigma as a persistent barrier to adherence, while Saleem et al. (2023) found that stigma remained important even after considering disclosure and social support. In Eastleigh, stigma may be intensified by social cohesion, cultural sensitivity around sexuality, and concern about family reputation or employment. This means stigma reduction should include individual counselling, confidential service design, provider behaviour, and community level communication rather than relying on patient education alone.

Disclosure and social support operated as protective factors. Participants who had disclosed their HIV status were substantially more adherent than those who had not, and adherence increased progressively from poor to strong social support. These findings agree with Mengesha et al. (2023), who found a positive association between disclosure and ART adherence, and with Palimaru et al. (2023), who linked trusted social support to successful habit formation. Brown et al. (2023) also demonstrated that social support can buffer the pathway linking stigma and depression to nonadherence, suggesting that safe disclosure and supportive relationships can reduce both practical and psychological treatment burdens.

Intimate partner violence was associated with substantially lower adherence, while smoking, alcohol use, and stressful life events were not statistically significant in this cohort. IPV can disrupt treatment through trauma, restricted autonomy, fear of disclosure, unstable living conditions, and interference with clinic attendance (Nawfal et al., 2024). The lack of statistical significance for alcohol and smoking should not be interpreted as proof that substance use is irrelevant, especially in a community where social and religious norms may encourage underreporting. The stronger signals from depression, stigma, violence, disclosure, and social support indicate that relational and emotional conditions were more central to adherence in this study population.

5.4 Health Systems Factors

Three of the four health systems variables remained independently associated with adherence after adjustment, confirming that adherence was influenced by modifiable service characteristics in addition to patient level factors. Provider communication showed a strong bivariate relationship, with adherence exceeding 90% among very satisfied participants and falling sharply among those dissatisfied with communication. This supports evidence that respectful, confidential, and understandable counselling strengthens trust and engagement in chronic HIV care (Sineke et al., 2022; *Frontiers in Public Health*, 2025). In a culturally distinct population such as Eastleigh, communication quality should include linguistic sensitivity and awareness of stigma, disclosure, and family dynamics.

Waiting time was a significant barrier, with adherence declining as refill waiting time increased. This finding is consistent with research showing that long clinic waits impose both psychological

frustration and measurable economic costs through lost work time and competing household responsibilities (Mcinziba et al., 2023; Palimaru et al., 2023). For patients engaged in informal trade, a clinic visit lasting several hours may translate directly into lost income, creating pressure to postpone refills. Appointment staggering, fast track refills for stable patients, and more flexible service hours could therefore improve adherence without requiring major changes in clinical treatment.

Distance to the facility also showed a significant gradient in the detailed bivariate analysis, while the broader decentralized network of three ART sites appeared to support access for much of the cohort. Decentralized care models can reduce transport costs, travel time, congestion, and the visibility of attending a single specialized HIV facility (Frescura et al., 2022; Magidson et al., 2020). The Eastleigh findings suggest that decentralization is valuable but does not eliminate geographic barriers for clients travelling longer distances. Continued attention to community proximate refills and differentiated service delivery may therefore benefit the most mobile or economically constrained patients.

Medication accessibility was another significant health system determinant. Adherence was 86.8% when ART was always available, compared with 60.0% among participants reporting frequent stockouts. Supply interruptions create a structural form of nonadherence because patients may be willing and able to take treatment but cannot do so if medicine is unavailable. Reliable forecasting, buffer stocks, and distribution across decentralized facilities are therefore adherence interventions in their own right, not merely logistics functions (WHO, 2021; UNAIDS, 2023).

5.5 Integrated Interpretation

The multivariable model demonstrates that ART adherence among HIV positive residents of Eastleigh cannot be explained by a single category of determinants. Psychosocial conditions produced the largest adjusted effects, with perceived stigma and depressive symptoms exceeding every other variable in the model, while socioeconomic position and the quality of health service experiences each remained independently important after mutual adjustment. This combination supports a layered intervention model in which patients need psychologically supportive care, reliable and efficient services, and practical assistance with the economic costs of treatment. It also supports the study's Cognitive Behavioral Theory perspective by showing that behaviour is shaped by cognition and emotional states but remains embedded within social and institutional conditions.

Four limitations should be noted. Adherence was self reported and may be overestimated relative to pill counts or viral load monitoring. The cross sectional design establishes association rather than causation. With 50 nonadherent cases distributed across twelve predictors, the model yielded approximately four events per predictor, below the conventional minimum of ten, so the confidence intervals around several adjusted odds ratios are wide and those estimates should be read as indicative rather than precise. Finally, the study was confined to three facilities serving a predominantly Somali population in Eastleigh and the findings describe that setting rather than urban Kenya as a whole.

6.0 Conclusion and Recommendations

6.1 Conclusion

The study concluded that ART adherence among HIV positive residents of Eastleigh was relatively high at 81.1% but remained below the 95% threshold used to define optimal adherence. Socio demographic conditions were important: female sex, older age, marriage, higher income, and

longer duration on ART were associated with better adherence. Psychosocial conditions were equally influential, with depression, stigma, and intimate partner violence associated with poorer adherence, while disclosure and strong social support were protective. Health system factors including provider communication, waiting time, distance to care, and medication availability significantly shaped whether patients could maintain treatment consistently.

The final logistic regression model confirmed that adherence reflected the combined influence of psychological wellbeing, socioeconomic circumstances and health service experiences. Low perceived stigma and the absence of moderate to severe depressive symptoms were the strongest independent predictors of adherence, followed by higher monthly income and satisfaction with provider communication, while distance to the facility did not retain significance after adjustment. The results therefore support integrated adherence interventions that address both individual wellbeing and the structural environment in which ART is accessed.

6.2 Recommendations

The Ministry of Health and ART clinics in Eastleigh should integrate routine screening for depressive symptoms and HIV related stigma into ongoing ART care, with clear referral pathways for counselling and mental health support. Facility teams should also screen sensitively for intimate partner violence and ensure that affected clients can access appropriate psychosocial and protection services. Safe disclosure counselling and peer or family support should be strengthened because disclosure and social support were protective factors in the study.

Pumwani Hospital, Eastleigh Health Centre, and Biafra/Eastleigh Lions Clinic should reduce refill waiting times through appointment staggering, fast track refill systems for stable clients, and other differentiated service delivery approaches. Health workers should receive continuing training in culturally responsive, confidential, and respectful communication because provider communication was strongly associated with adherence. Supply chain forecasting and buffer stock management should be strengthened to minimize ART stockouts across the decentralized Eastleigh network.

Nairobi City County, community based organizations, and HIV programmes should consider targeted support for low income ART clients, including transport or food security assistance where feasible, because income was strongly associated with adherence. Culturally and linguistically appropriate adherence education should reinforce the consequences of missed doses while avoiding stigmatizing language. Future studies should use longitudinal and qualitative approaches to examine the nonadherent minority in greater depth, including family structure, daily stigma experiences, somatic depressive symptoms, and the effects of culturally tailored integrated adherence interventions.

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