Factors Associated with Loss to Follow-Up (LtFU) among People Living with HIV/AIDS

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Track Record Article	Abstract
	Loss to follow-up (LtFU) among people living with HIV/AIDS (PLWHA) receiving antiretroviral (ARV) therapy remains a significant challenge, contributing to treatment failure, drug resistance, and ongoing HIV transmission. This study aimed to identify factors associated with LtFU among PLWHA on ARV therapy in Demak Regency. Method: A quantitative observational analytic study with a cross-sectional design was conducted among 199 PLWHA meeting inclusion criteria. Data were collected using validated questionnaires addressing knowledge, attitudes, perceptions, family support, peer support, stigma, healthcare worker support, quality of health services, access to services, and health service policies. Data were analyzed using SPSS with univariate analysis, bivariate chi-square tests, and multivariate logistic regression at a 0.05 significance level with 95% confidence intervals (CI). Results in bivariate analysis indicated that all independent variables were significantly associated with LtFU (p < 0.05). Multivariate analysis identified six independent predictors: poor knowledge (OR = 4.68; 95% CI: 1.57–13.94), negative attitude (OR = 5.65; 95% CI: 1.98–16.08), poor perception (OR = 4.95; 95% CI: 1.69–14.45), inadequate family support (OR = 14.40; 95% CI: 3.75–55.37), poor service quality (OR = 4.40; 95% CI: 1.54–12.62), and a weak health service system reflecting limited access and provider support (OR = 5.61; 95% CI: 1.79–17.57). Collectively, these factors explained 72.65% of the variation in LtFU. In conclusion, LtFU is driven by a combination of cognitive, psychosocial, and structural determinants, with family support and health system factors being the most influential. Effective interventions should prioritize enhancing family involvement, patient education, and counselling, as well as improving service accessibility, quality, and responsiveness to ensure sustained retention in HIV care. ***Keywords: Antiretroviral, HIV/AIDS, Loss to Follow-Up, Risk Factors.***

INTRODUCTION

HIV/AIDS remains a complex global health issue, with 39.9 million people living with HIV worldwide in 2023 (UNAIDS, 2025). In Asia, 410,000 people were living with HIV, including 69,000 new cases, while Indonesia reported 427,201 cumulative cases by December 2024, with 18,749 PLHIV receiving antiretroviral therapy (ART) in the first half of 2025 (Kemenkes RI, 2025; WHO, 2025). Global and national HIV control efforts target the 95–95–95 goals for 2030, emphasizing early diagnosis, ART coverage, viral suppression, and prevention through PrEP and community education (UNAIDS, 2025). Indonesia's National HIV/AIDS Strategy 2020–2024 emphasizes early detection through Voluntary Counseling and Testing (VCT) and Provider-Initiated Testing and Counseling (PITC), expansion of free ART access, strengthening prevention among high-risk populations, reducing stigma and

discrimination, and integrating HIV services with other health programs. Treatment approaches focus on antiretroviral therapy (ART) to suppress HIV replication, accompanied by patient support, monitoring of drug resistance, and management of comorbid conditions (Salbila & Usiono, 2023).

ART effectively suppresses viral load, improves immune status, and reduces mortality from opportunistic infections (Tekle et al., 2024; Muchtar et al., 2023; Tchakoute et al., 2022). Adherence to ART is a key determinant of successful HIV/AIDS control (Supriyatni et al., 2023). One of the major challenges in HIV/AIDS management is the occurrence of *loss to follow-up* (LtFU). The incidence of LtFU tends to increase with longer duration of treatment (Shrestha et al., 2025). LtFU undermines ART effectiveness, increases drug resistance risk, and worsens clinical outcomes. Even irregular ART intake, such as missing one or two doses per week, can lead to increased viral load, heightened transmission risk, and a greater likelihood of opportunistic infections (Andriani et al., 2024).

Factors influencing LtFU include patient knowledge, attitudes, perceptions, social and family support, stigma, treatment adherence, therapy duration, and residence or referral origin (Putri et al., 2025; Tiffany & Yuniartika, 2023). Other determinants include age characteristics, duration of therapy, ART regimen, knowledge, perceptions, social support, and treatment adherence (Dayyab et al., 2021). Barriers to ART adherence include insufficient knowledge and the perception of feeling healthy, which leads patients to believe that ART is unnecessary (Mukarromah & Azinar, 2021). Family support, perceived susceptibility, and perceived severity have been identified as factors associated with LtFU, while knowledge, accessibility of VCT clinics, and ART adherence were not consistently associated (Andriani et al., 2024). Active patient tracing has been shown to reduce LtFU and improve retention (Alizade et al., 2021).

Given the impact of LtFU on ART success and HIV/AIDS control, identifying its determinants is essential (Beres et al., 2021). This study aims to identify factors associated with the occurrence of *loss to follow-up* among people living with HIV/AIDS as an effort to support the effectiveness of HIV/AIDS control programs.

METHODS

This study is a quantitative survey design with a cross-sectional approach. The study population consisted of all registered people living with HIV/AIDS (PLWHA) receiving antiretroviral therapy (ART) in Demak Regency during the study period, totaling 199 individuals. A total population sampling technique was applied, so the entire accessible

population was included as the study sample (n = 199). Because all registered ART patients in Demak Regency were included, the findings have strong generalizability for the Demak context; however, caution is needed when extrapolating the results to other regions with different demographics, health systems, and sociocultural characteristics. Participants met the following inclusion criteria: registered residency in Demak Regency (based on national identification), aged 19–59 years, having complete and traceable medical records, and providing written informed consent to participate. The study was conducted in accordance with established ethical principles, including voluntary participation, informed consent, confidentiality, anonymity, and the use of data solely for research purposes. Ethical approval for this study was granted by the Ethics Committee of the Faculty of Public Health, Universitas Diponegoro, Semarang, under Ethical Clearance Number 346/EA/KEPK-FKM/2025.

Data were collected using a structured questionnaire that met validity criteria (r > 0.361), covering variables of knowledge (0.487–0.739), attitudes (0.584–0.732), perceptions (0.475–0.815), family support (0.423–0.807), peer support (0.451–0.808), healthcare support (0.613–0.887), stigma (0.619–0.872), healthcare services (0.406–0.811), access (0.679–0.872), and policy factors (0.630–0.822). Reliability testing yielded Cronbach's alpha of 0.875-0.940 (>0.6), indicating good internal consistency. Data processing included editing, coding, data entry, and data cleaning. Data analysis comprised univariate analysis, bivariate analysis using the chi-square test, and multivariate analysis using logistic regression

RESULT

Respondent Characteristics

Table 1. Frequency Distribution of Characteristics of Respondents Living with HIV/AIDS

Variable	f	%	Mean (Median)	SD (Min–Max)
Age				
19–40 years	157	78.9	37.42 (36.00)	9.694 (22–60)
≥40 years	42	21.1		
Sex				
Female	110	55.3	0.45 (0.00)	0.498 (0–1)
Male	89	44.7		
Education Level				
Elementary School	36	18.1		
Junior High School	54	27.1	2.63 (3.00)	1.060 (1–4)
Senior High School	57	28.6		
Higher Education	52	26.1		
Duration of HIV Infection				
<5 years	100	50.3	5.61 (5.00)	3.107 (1–19)
≥5 years	99	49.7		
CD4 Count				
<200 cells/mm³	49	24.6	346.25 (350.00)	150.565 (85–620)
≥200 cells/mm³	150	75.4		

Variable	f	%	Mean (Median)	SD (Min–Max)
Clinical Stage				
Stage 1	128	64.3		
Stage 2	50	25.1	1.47 (1.00)	0.709 (1–4)
Stage 3	19	9.5		
Stage 4	2	1.0		
ART Regimen				
First-line	74	37.2	0.63 (1.00)	0.485 (0–1)
Second-line	125	62.8		
Coinfection				
None	134	67.3	0.33 (0.00)	0.470 (0–1)
Present	65	32.7		

The majority of respondents were in the productive age group of 19–40 years (78.9%; mean age 37.42 years), with a higher proportion of females (55.3%) than males. Most respondents had a secondary to higher level of education, although a considerable proportion had only primary education. The duration of living with HIV was relatively balanced between those with < 5 years and ≥ 5 years (mean 5.61 years), indicating that many cases were detected within the last five years in line with expanded screening services. Clinically, most respondents had CD4 counts ≥ 200 cells/mm³, were classified as WHO clinical stage 1, were receiving second-line ART regimens, and did not have comorbid infections, suggesting that the majority of patients were in a relatively stable and controlled condition.

Bivariate Analysis (Association Between Independent Variables and LtFU)

In the bivariate analysis, extremely high odds ratios were observed for healthcare provider support (OR = 102.308; 95% CI: 13.7–759.885) and access to services (OR = 95.926; 95% CI: 12.9–712.2). Therefore, these variables were combined into a single composite variable, namely the Health Service System, with the following results.

Table 2. Association Between Independent Variables and Loss to Follow-Up (LtFU)

Variable	LtFU		Non-LtFU		Total		p-value	OR (95% CI)
	n	(%)	n	(%)	N	(%)		
Knowledge								
Poor	76	59.4	7	9.9	83	41.7	0.000	13.363
Good	52	40.6	64	90.1	116	58.3		(5.6–31.46)
Attitude								
Negative	83	64.8	14	19.7	97	48.7	0.000	7.5
Positive	45	35.2	57	80.3	102	51.3		(3.77–14.94)
Perception								
Poor	85	66.4	12	16.9	97	48.7	0.000	9.719
Good	43	33.6	59	83.1	102	51.3		(4.7–19.98)
Family Support								
Poor	74	57.8	5	7.0	79	39.7	0.000	18.089
Good	54	42.2	66	93.0	120	60.3		(6.8–47.93)
Peer Support								
Poor	81	63.3	20	28.2	101	50.8	0.000	4.395
Good	47	36.7	51	71.8	98	49.2		(2.34–8.249)

Variable	LtFU		Non-LtFU		Total		p-value	OR (95% CI)
	n	(%)	n	(%)	N	(%)		
Stigma								
Poor	62	48.4	20	28.2	82	41.2	0.007	2.395 (1.28–4.464)
Good	66	51.6	51	71.8	117	58.8		
Service Quality								
Poor	78	60.9	17	23.9	95	47.7	0.000	12.058 (5.624–25.85)
Good	50	39.1	54	76.1	104	52.3		
Health Service Policy								
Poor	81	63.3	15	21.1	96	48.2	0.000	6.434 (3.2–12.62)
Good	47	36.7	56	78.9	103	51.8		
Health Service System								
Poor	76	59,4	8	11,3	84	42,2	0.000	11,5 (5,0-26,0)
Good	52	40,6	63	88,7	115	57,8		

Bivariate analysis showed that all factors were significantly associated with loss to follow-up (LtFU) among PLHIV on ART (p < 0.05). Poor knowledge (OR = 13.36), negative attitudes (OR = 7.5), and poor perceptions (OR = 9.72) were strongly associated with increased LtFU risk. Social factors were critical: inadequate family support (OR = 18.09) and lack of peer support (OR = 4.40), along with higher stigma (OR = 2.40), elevated the likelihood of disengagement. Structural determinants also contributed: poor service quality (OR = 12.06), unfavorable health policies (OR = 6.43), and weak overall health system performance (OR = 11.50) were linked to higher LtFU. These findings indicate that cognitive, social, and health system factors jointly influence retention, underscoring the need for integrated interventions that address education, support, stigma reduction, and service improvements.

Multivariate Analysis (Factors Associated with Loss to Follow-Up)

Multivariate analysis, including all variables in a multiple logistic regression test using the Enter method, produced the final model as follows:

Table 3. Multivariate Logistic Regression Analysis of Factors Associated with Loss to Follow-Up (LtFU)

Variable	B	S.E	Wald	Sig	Exp(B)	95% CI for Exp(B)
Knowledge (Poor)	1,544	0,557	7,691	0,006	4,682	1,573–13,941
Attitude (Negative)	1,731	0,534	10,511	0,001	5,647	1,983–16,080
Perception (Poor)	1,599	0,547	8,536	0,003	4,946	1,692–14,454
Family Support (Poor)	2,667	0,687	15,066	0,000	14,401	3,745–55,374
Service Quality (Poor)	1,482	0,537	7,608	0,006	4,403	1,536–12,624
Health Service System (Poor)	1,724	0,583	8,753	0,003	5,608	1,790–17,574
Constant	−7,820	1,173	44,463	0,000	0,000	
R^2	0,7265					

Multivariate logistic regression identified six independent predictors of Loss to Follow-Up (LtFU) among PLHIV on ART. Poor knowledge (OR = 4.68), negative attitude (OR = 5.65), and poor perception of treatment and services (OR = 4.95) significantly increased the

risk. Social factors were dominant: inadequate family support was the strongest predictor (OR = 14.40). Structural determinants also contributed, with poor service quality (OR = 4.40) and weaknesses in the overall health service system (OR = 5.61) elevating the likelihood of LtFU. The model explained 72.65% of the variation in LtFU (R² = 0.7265). The predictive logit model:

Logit(p) = −7,820 + 1,544 (Knowledge) + 1,731 (Attitude) + 1,599 (Perception) + 2,667 (Family Support) + 1,482 (Service Quality) + 1,724 (Health Service System)

Coefficients indicate the increase in log odds of LtFU when a variable is unfavorable. Family support and health service context had the strongest effects, highlighting that interventions should prioritize strengthening family involvement and improving health system support, alongside addressing patient knowledge, attitudes, and perceptions.

DISCUSSION

Association Between Knowledge and Loss to Follow-Up (LtFU)

This study demonstrated a very strong association between knowledge and loss to follow-up (LtFU). Most patients who experienced LtFU had poor knowledge (59.4%), whereas the majority of retained patients had good knowledge (90.1%). Patients with poor knowledge had around 13 times higher odds of LtFU (OR=13.363; 95% CI: 5.6–31.46; p=0.000). Adequate knowledge enables patients to understand the importance of continuous ART, routine monitoring, and the risks of treatment interruption (Andriani et al., 2024). Low knowledge reduces patients' understanding of HIV, the benefits of ART, the risks of treatment interruption, and the need for routine monitoring, leading to poor adherence and higher risks of LtFU, treatment failure, drug resistance, and worse clinical outcomes. Knowledge is shaped by education, health literacy, and treatment literacy, which are consistently associated with retention in HIV care and influenced by formal education and learning exposure (Putri et al., 2025), including formal education level (Salimo et al., 2025). Within the Health Belief Model, knowledge serves as a predisposing factor that increases awareness of disease severity and consequences, while a poor understanding of transmission is linked to inadequate prevention practices and greater internalized stigma (Wulandari & Rukmi, 2021).

Association Between Attitude and Loss to Follow-Up (LtFU)

Patients' attitudes toward ART were strongly and significantly associated with LtFU. Among those who experienced LtFU, 64.8% had negative attitudes, while most patients retained in care had positive attitudes (80.3%). Patients with negative attitudes were 7.5 times more likely to experience LtFU than those with positive attitudes (OR=7.5; 95% CI: 3.77–

14.94). LtFU itself is linked to serious consequences such as drug resistance, disease progression, and increased mortality. Negative attitudes are often reinforced by poor social support, stigma, and weak patient provider relationships, all of which increase LtFU, whereas stigma-reduction interventions through counseling, peer support, and community education can improve retention. Behavioral theories such as the Health Belief Model and the Theory of Planned Behavior describe attitudes as predisposing factors that shape intentions to act. A positive attitude toward ART is associated with greater perceived benefits, improved quality of life, and increased motivation to attend follow-up visits (Deeks et al., 2021).

Association Between Perception and Loss to Follow-Up (LtFU)

About half of the respondents had good perceptions of ART (51.3%), while 48.7% had poor perceptions. Positive perception is theoretically linked to motivation to remain on treatment, yet many patients still hold doubts despite knowing ART benefits. Perception strongly influences adherence behavior and the risk of LtFU. This study showed a very strong association between perception and LtFU (p=0.000; OR=9.719; 95% CI: 4.726–19.986). Stigma and discrimination further increase the likelihood of treatment discontinuation (Arisudhana & Artati, 2022). Perceptions are influenced by the quality of counseling and how well side effects are explained and managed (Seunanden et al., 2025). Negative views related to side effects, stigma, and weak social support have been repeatedly linked to non-adherence and poor retention, including in young populations in different settings (Mufidah, 2025).

Association Between Family Support and Loss to Follow-Up (LtFU)

This study found that 60.3% of respondents perceived their family support as good, while 39.7% reported inadequate family support. Family support encompasses multiple dimensions, including emotional, informational, instrumental, material, and psychosocial reinforcement, all of which contribute to the well-being of people living with HIV/AIDS (PLWHA). Strong emotional support has been shown to enhance self-esteem, reduce depressive symptoms, and improve psychological adaptation among PLWHA. Cross-tabulation analysis in this study demonstrated a statistically significant association between family support and LtFU. Among respondents with poor family support, 57.8% experienced LtFU, compared with only 7.0% among those with good family support. The Fisher's Exact Test yielded a p-value of 0.000, indicating strong statistical significance. The odds ratio of 18.089 (95% CI: 6.8–47.93) suggests that PLWHA with inadequate family support were nearly 18 times more likely to experience LtFU than those with good family support. Several studies have identified inadequate family support as a significant predictor of LtFU (Kurniawan et al., 2022).

Multivariate analysis also indicated that family support was the most dominant factor, with an OR of 14,401. Family support plays a critical role in reducing the risk of LtFU by providing emotional, practical (e.g., medication reminders and accompaniment to clinic visits), and informational assistance, thereby strengthening patients' engagement with HIV and ART services. In contrast, the absence of family support manifested through rejection, household stigma, or pressure to pursue alternative treatments has been strongly associated with treatment discontinuation and disengagement from care (Knight & Schatz, 2022). Therefore, effective retention strategies should incorporate family-based interventions, including family education, strengthening caregiving capacity, psychosocial support, and stigma reduction within the household, as these approaches are essential to prevent LtFU and improve clinical outcomes among people living with HIV (Klau et al., 2022).

Social factors, including family and broader social support as well as stigma, contribute significantly to patients' risk of failing to return to care. Multinational studies have identified limited social support and socioeconomic barriers as key predictors of LtFU (Salimo et al., 2025; Bankere et al., 2024). Evidence from Indonesia further supports these findings, with studies in Jakarta demonstrating a significant association between family support and adherence to ART, and more recent research in Jember confirming the relationship between family support and ART adherence among mothers living with HIV. Overall, social support particularly from family members plays a vital role in reducing non-adherence and LtFU while enhancing patient engagement with healthcare services (Shivambu et al., 2023). Adolescents living with HIV often experience limited family or social support, resulting in lower motivation and supervision for long-term therapy adherence (Gebremichael et al., 2021).

Association Between Peer Support and Loss to Follow-Up (LtFU)

About half of the respondents reported inadequate peer support (50.8%). Peer support among people living with HIV/AIDS (PLWHA) provides emotional, informational, and motivational assistance that complements formal health services and helps address stigma-related psychological burdens (Knight & Schatz, 2022). This study showed a significant association between peer support and LtFU. Among those who experienced LtFU, 63.3% had poor peer support, while better-supported patients had lower LtFU. Patients with inadequate peer support had 4.4 times higher odds of LtFU. Peer support strengthens self-efficacy and helps overcome practical barriers to clinic attendance and medication use. Structured peer-led programs integrated into health services improve retention and outcomes (Ahmed et al., 2023), whereas the absence of peer support predicts higher LtFU after ART initiation (Øgård-Repål et al., 2023).

Association Between Stigma and Loss to Follow-Up (LtFU)

In this study, 58.8% of respondents reported low/manageable stigma, while 41.2% experienced higher stigma. HIV-related stigma is shaped by social context, family support, and experiences of discrimination (Arisudhana & Artati, 2022). Stigma can lead to isolation and avoidance of health services, increasing the risk of disengagement from care (Mufidah, 2025). A significant association was found between stigma and LtFU (p=0.007); patients with higher stigma had 2.4 times greater risk of LtFU. This aligns with evidence that stigma is a major barrier to clinic attendance, retention, and ART adherence (Dessie & Zewotir, 2024). Anticipated stigma, such as fear of disclosure, particularly hinders continued engagement in care (Perger et al., 2025). Stigma has been identified as a predictor of LtFU across care settings, indicating the importance of stigma-reduction strategies (Abugah & Yabelang, 2025).

Association Between Healthcare Services and Loss to Follow-Up (LtFU)

Nearly half of the respondents perceived HIV healthcare services as inadequate (47.7%). Quality HIV services are essential for sustaining the continuum of care from diagnosis to viral suppression, yet many PLWHA remain disengaged from treatment despite ART availability in Indonesia. This study showed a strong association between perceived service quality and LtFU. Patients who rated services as poor had almost 12 times higher odds of LtFU than those who perceived good services. Disengagement from care increases the risk of non-adherence, drug resistance, opportunistic infections, and failure to achieve viral suppression. Similar findings in other settings highlight the role of service factors, family support, and patient perceptions in preventing LtFU (Andriani et al., 2024). Service quality is multidimensional, encompassing provider attitude, waiting time, information clarity, and physical environment, all of which influence adherence and retention (Edwards et al., 2025). Flexible and patient-centered delivery models have been shown to improve satisfaction and retention (Baleeta et al., 2023).

Association between Health Policy and Loss to Follow-Up (LtFU)

About half of the respondents perceived HIV service policies as good (51.8%), while 48.2% rated them poor. HIV service policies regulate access, procedures, quality standards, and patient protection to support ART adherence and continuity of care. At a broader level, health policy direction strongly influences LTFU outcomes (Mugenyi et al., 2022), in line with global HIV targets that emphasize consistent, accessible, and patient-centered services (Dhir, 2025). A significant association was found between perceived policy quality and LtFU (p=0.000). Most patients who experienced LtFU perceived policies as poor (63.3%), whereas retained patients mostly perceived them as good (78.9%). Patients exposed to poor policy

conditions had about 6.4 times higher odds of LtFU (OR=6.434; 95% CI: 3.2–12.62). The highest LTFU risk occurs in the first 6–12 months after ART initiation, requiring strong early-policy support and monitoring (Endebu et al., 2024). Comprehensive, consistently implemented policies covering facility capacity, referral systems, and patient tracking are essential to overcoming contextual barriers (Mugenyi et al., 2022).

Association Between Healthcare Service System and Loss to Follow-Up (LtFU)

This study found a strong association between the healthcare service system and Loss to Follow-Up (LtFU). Patients experiencing a poor health service system had 11.5 times higher odds of LtFU compared with those in a good system (OR = 11.5; 95% CI: 5.0–26.0; p < 0.001). This composite variable integrates two key dimensions: limited access to services and inadequate support from healthcare providers, indicating that LtFU is driven not only by individual factors but also by systemic service barriers (Kebede et al., 2021). Access to care is a critical determinant of ART continuity. Ease of access includes travel time, distance, and transportation availability. More broadly, access also reflects linkage to care, retention, affordability, acceptability of services, and the presence of social and legal support for stigmatized patients (Timilsina et al., 2024; Gebremichael et al., 2021; Mlangeni et al., 2025; Cristina et al., 2025). Systematic reviews show that physical and economic access constraints are major determinants of poor ART retention (Kebede et al., 2021). Decentralized and community-based ART delivery models that bring services closer to patients significantly reduce LtFU and are essential for achieving global HIV targets (Hoang et al., 2022).

Factors Associated with Loss to Follow-Up (LtFU)

The multivariate logistic regression analysis identified six independent predictors of Loss to Follow-Up (LtFU): knowledge, attitude, perception, family support, service quality, and the health service system. The model explained approximately 72.6% of the variation in LtFU, indicating high predictive power. The regression equation shows that each unfavorable condition increases the log odds of disengagement from care substantially, with family support having the largest effect. Poor knowledge, negative attitudes, and unfavorable perceptions significantly increased the risk of disengagement from care, supporting previous studies that found that low treatment literacy and negative beliefs about therapy are strongly associated with non-adherence and attrition (Mandawa & Mahiti, 2022). Consistent with global evidence, LtFU is multifactorial, involving individual, social, and health-system factors. Common predictors reported across countries include young age, low socioeconomic and educational status, limited social or family support, transportation barriers, advanced disease, low CD4 count, and ART side effects (Kebede et al., 2021). Limited HIV/ART knowledge reduces

understanding of the need for lifelong treatment, increasing discontinuation risk, while strong family support improves motivation and retention and helps buffer stigma (Andriani et al., 2024; Salimo et al., 2025).

Limitations of the Study

This study identifies key behavioral, social, and structural determinants of Loss to Follow-Up (LtFU) among PLHIV on ART, including poor knowledge, negative attitudes, poor perceptions, inadequate family support, low service quality, and weaknesses in the health service system. The findings suggest that interventions targeting these factors such as strengthening family involvement, improving patient education and counseling, and enhancing service accessibility and quality could substantially reduce LtFU and improve long-term HIV treatment outcomes. Addressing these determinants may also enhance viral suppression rates, reduce drug resistance, and lower HIV transmission at the population level, contributing to the achievement of UNAIDS 95–95–95 targets and sustainable HIV control.

However, the study has limitations. Data were collected via self-report questionnaires, which are subject to information bias, including recall bias and social desirability bias, particularly on sensitive topics such as stigma, adherence, and disclosure. Moreover, policy-level and health system factors such as financing mechanisms, referral policies, workforce workload, ART availability, and local-level implementation of national HIV strategies were not fully explored, which may limit understanding of systemic determinants influencing LtFU. Despite these constraints, the study provides actionable evidence for designing multi-level interventions to improve retention in HIV care.

CONCLUSION

The majority of people living with HIV/AIDS in Demak Regency were of productive age, predominantly female, with secondary or higher educational attainment and relatively stable clinical conditions, as indicated by CD4 counts ≥ 200 cells/mm^3, early disease stage, use of second-line ART regimens, and minimal comorbidities. Loss to Follow-Up (LtFU) among HIV/AIDS patients on antiretroviral therapy is strongly associated with a combination of individual, social, and health system factors. Bivariate analysis showed that poor knowledge, negative attitudes, unfavorable perceptions, weak family and peer support, perceived stigma, low service quality, unsupportive policies, and an inadequate health service system were all significantly related to higher LtFU risk. Among these, family support, service quality, and the overall health service system demonstrated particularly large effect sizes. Multivariate analysis confirmed that six factors independently predict LtFU: knowledge, attitude, perception, family

support, service quality, and the health service system. Family support emerged as the most dominant factor, followed by weaknesses in the health service system and negative patient attitudes. Together, these variables explained about 72.7% of the variation in LtFU, indicating that disengagement from care is largely driven by modifiable psychosocial and service-related conditions.

To reduce LtFU, health facilities should implement targeted interventions: mobile-based patient reminders, decentralized ARV distribution, flexible clinic hours, and fast-track services. Structured education and counseling, with family support, empathetic communication, and routine service quality monitoring, are critical to systematically address the main barriers and improve treatment retention.

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