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FACTORS ASSOCIATED WITH LOSS TO FOLLOW-UP (LTFU) AMONG PEOPLE LIVING WITH HIV/AIDS: A SCOPING REVIEW

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Abstrak

HIV/AIDS masih menjadi masalah kesehatan global dengan jumlah kasus yang terus meningkat, termasuk di Indonesia. Salah satu tantangan utama dalam pengelolaan HIV adalah *Loss to Follow-Up* (LtFU), yaitu kondisi ketika pasien tidak menghadiri kunjungan klinis selama lebih dari 90 hari. LtFU mengancam keberhasilan terapi antiretroviral (ARV) karena meningkatkan risiko resistensi obat, kegagalan pengobatan, morbiditas, dan mortalitas. Scoping review ini bertujuan untuk mengidentifikasi determinan yang berhubungan dengan LtFU pada orang dengan HIV/AIDS. Penelusuran literatur dilakukan pada basis data nasional dan internasional terhadap studi yang diterbitkan pada periode 2021–2025, dengan total 38 artikel yang memenuhi kriteria inklusi. Hasil analisis tematik menunjukkan bahwa LtFU dipengaruhi oleh faktor multidimensional, meliputi faktor demografis (usia muda, laki-laki, belum menikah/bercerai), sosial ekonomi dan geografis (tinggal di pedesaan, jarak jauh ke fasilitas kesehatan, pendidikan rendah, kehilangan pendapatan), faktor klinis dan biomedis (jumlah CD4 rendah, viral load tinggi, stadium HIV lanjut, malnutrisi, koinfeksi TB), faktor terapi dan kepatuhan (kepatuhan ART rendah, tidak ada perubahan regimen, inisiasi ART dini, tidak adanya terapi profilaksis), serta faktor psikososial dan sistem pelayanan kesehatan (stigma, tidak membuka status HIV, persepsi merasa sehat, efek samping obat, keterbatasan dukungan tenaga kesehatan, dan lemahnya sistem penelusuran pasien). Kesimpulannya, penanganan LtFU memerlukan intervensi multidimensional yang mengintegrasikan strategi klinis, edukatif, sosial, dan sistem pelayanan kesehatan untuk meningkatkan retensi pasien dalam perawatan HIV.

Kata Kunci: Terapi Antiretroviral, HIV/AIDS, Loss to Follow-Up

Abstract

HIV/AIDS remains a global health problem with an increasing number of cases, including in Indonesia. One major challenge in HIV management is Loss to Follow-Up (LtFU), defined as patients missing clinical visits for more than 90 days, which threatens antiretroviral (ARV) treatment success by increasing the risk of drug resistance, treatment failure, morbidity, and mortality. This scoping review aimed to identify determinants associated with LtFU among people living with HIV/AIDS. Literature searches were conducted in national and international databases for studies published between 2021-2025, yielding 38 eligible studies. Result of thematic analysis finding indicate that LTFU is influenced by multidimensional factors, including demographic (young age, male, unmarried/divorced), socio-economic and geographic (rural residence, long distance to healthcare facilities, low education, loss of income), clinical and biomedical (low CD4 count, high viral load, advanced HIV stage, malnutrition, TB coinfection), treatment and adherence (low ART adherence, no regimen change, early ART initiation, absence of prophylactic therapy), and psychosocial and health system factors (stigma, non-disclosure, perceived wellness, side effects, limited provider support, weak tracing systems). In conclusion, addressing LTFU requires multidimensional interventions integrating clinical, educational, social, and system-level strategies to enhance patient retention in HIV care.

***Keywords**: Antiretroviral Therapy, HIV/AIDS, Loss to Follow-Up*

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INTRODUCTION

HIV/AIDS remains a major global public health challenge (Ariyani et al., 2021). In 2024, an estimated 39.9 million people were living with HIV worldwide, including 38.6 million adults and 1.4 million children (UNAIDS, 2025). Although significant progress has been made in prevention and treatment, HIV cases continue to increase in both developed and developing countries (World Health Organization. In Asia, 410,000 people were living with HIV in 2023, with 69,000 new infections reported (WHO, 2025).

In Indonesia, HIV/AIDS remains a critical health issue. By December 2024, cumulative HIV cases reached 427,201, representing 78.7% of the national target for case detection. During January–June 2025, 22,331 people were diagnosed with HIV from over two million individuals tested, and 18,749 received antiretroviral (ARV) therapy (Kemenkes RI, 2025). Despite improvements in testing and treatment coverage, challenges in continuity of care persist.

Global HIV control efforts are guided by the UNAIDS 95-95-95 targets for 2030, which aim to ensure that 95% of people living with HIV (PLWHA) know their status, 95% receive antiretroviral therapy (ART), and 95% achieve viral suppression (UNAIDS, 2025). Indonesia's national strategy aligns with these goals through early detection via VCT and PITC services, free ARV provision, stigma reduction, and integration of HIV services with other health programs (Triana, 2024), (Salbila & Usiono, 2023).

ART is the cornerstone of HIV/AIDS management, as it suppresses viral replication, improves immune function, and reduces morbidity and mortality (Purnamawati, 2021), (Fadilah et al., 2024). Successful ART outcomes depend largely on long-term adherence and continuity of care (Kristoni & Astuti, 2021),(Tekle et al., 2024). High adherence to ART (>95%) is essential to maintain viral suppression and prevent drug resistance (Tchakoute et al., 2022), (Muchtar et al., 2023). The widespread use of ARV has contributed to a decline in HIV/AIDS-related deaths from 1.5 million in 2023 to 1.1 million in 2024 (Kemenkes RI, 2021).

One of the major barriers to effective HIV treatment is Loss to Follow-Up (LtFU), defined as the absence of clinical visits for more than 90 days after the last appointment (Fibriansari & Cahyadi, 2021). The likelihood of LtFU tends to increase with longer treatment duration (Shrestha et al., 2025). LtFU increases the risk of uncontrolled viral replication, drug resistance, opportunistic infections, and mortality (Andriani et al., 2024), (Shrestha et al., 2025). Even short interruptions in ARV intake can significantly increase viral load and transmission risk (Haerati et al., 2020), (Supriyatni et al., 2023).

Previous studies indicate that LtFU is influenced by multiple factors, including individual, social, and health system determinants. Individual factors include age, duration of therapy, knowledge, perceptions of illness, perceived susceptibility and severity, and treatment adherence (Fibriansari & Cahyadi, 2021),(Dayyab et al., 2021), (Manowati et al., 2019). Social factors such as family support and persistent stigma also play a critical role in influencing continuity of care (Tiffany & Yuniartika, 2023), (Andriani et al., 2024). Health system–related factors include the absence of standard operating procedures (SOPs) for managing LtFU, limited treatment-support tools, accessibility of VCT clinics, and referral pathways (Anggraeni & Faiqatul, 2020), (Putri et al., 2025), (Mukarromah & Azinar, 2021).

Understanding these determinants is essential for developing effective strategies to improve retention in HIV care. Interventions such as patient tracing systems have been shown to be effective in re-engaging patients who have disengaged from care (Alizade et al., 2021), (Beres et al., 2021). This study aims to identify the determinants associated with the occurrence of LTFU among people living with HIV/AIDS.

METHODE

Design

This study used a scoping review design to map existing evidence on determinants of Loss to Follow-Up (LtFU) among people living with HIV/AIDS. The review followed the methodological framework developed by Arksey and O'Malley and refined by Levac et al. (Westphaln et al., 2021). The primary research question guiding this review was: What factors contribute to Loss to Follow-Up among people living with HIV/AIDS?

Search Strategy

A comprehensive literature search was conducted using ScienceDirect, and Springer to identify peer-reviewed studies. Google Scholar was additionally used as a supplementary source to retrieve grey literature and ensure broader coverage. The search strategy employed Medical Subject Headings (MeSH) terms and Boolean operators, using the following keywords: ("HIV"[MeSH Terms] OR "HIV Infections"[MeSH Terms] OR HIV OR AIDS) AND ("Antiretroviral Therapy, Highly Active"[MeSH Terms] OR "antiretroviral therapy" OR ART OR HAART) AND ("Lost to Follow-Up"[MeSH Terms] OR "Loss to follow up" OR LTFU OR "treatment interruption" OR "non-adherence" OR "retention in care").

Inclusion criteria were as follows; 1) Studies focusing on LtFU among HIV/AIDS patients, 2) Research that measured determinants or causes of LtFU, 3) Primary studies

(quantitative, qualitative, mixed methods, case study, cross-sectional, case-control, cohort/retrospective), 4) Published between 2021-2025, and 5) Available in full text, open access, and English language. Exclusion criteria included irrelevant topics, duplicate articles, and studies filtered out using Mendeley reference software.

Study Selection

Article selection was conducted through several databases, namely Google Scholar (n = 870), ScienceDirect (n = 200), and Springer (n = 108), resulting in a total of 1,178 articles identified at the initial stage. The articles were screened based on predefined inclusion and exclusion criteria, leading to the elimination of 1,102 articles in the initial screening and leaving 76 articles for further assessment. A subsequent screening process was carried out by excluding duplicate articles and those with irrelevant topics, resulting in the removal of 38 articles. After completing all stages of the selection process, a total of 38 articles met the eligibility criteria and were deemed suitable for analysis in this study. The entire process of article identification, screening, and selection is systematically presented in the PRISMA flow diagram (Figure 1).

Data Extraction

A total of 38 studies were systematically reviewed. Data were extracted manually using a spreadsheet and included the following parameters: author, year, study title, methodology, main findings, and identified risk factors. The extraction process aimed to systematically organize essential information from each article for thematic and comparative analysis.

Quality Appraisal (Risk of Bias)

The methodological quality and risk of bias of the included studies were assessed using the Critical Appraisal Skills Programme (CASP) checklist, tailored to the study design of each article. The appraisal was conducted independently by two reviewers, and any discrepancies were resolved through discussion to reach consensus.

Of the 38 studies included in this scoping review, 21 studies were classified as having high methodological quality, 12 studies demonstrated moderate quality, and 5 studies were assessed as low quality. Studies rated as high quality generally exhibited clear research aims, appropriate study designs, adequate methodological rigor, and transparent reporting of results. Studies categorized as moderate quality showed minor methodological limitations, such as incomplete control of confounding variables or limited discussion of potential biases. Studies rated as low quality were primarily characterized by insufficient methodological detail, potential selection bias, or unclear outcome measurement.

The results of the quality appraisal were considered in the interpretation of findings and integrated into the discussion to contextualize the strength and limitations of the synthesized evidence. While the majority of included studies demonstrated acceptable to high methodological quality, the presence of studies with moderate and low quality suggests that some findings should be interpreted with caution. Nevertheless, the overall body of evidence provides a robust overview of the determinants of loss to follow-up among people living with HIV/AIDS.

Data Analysis

Extracted data were analyzed descriptively and thematically to identify patterns, similarities, and differences among studies. The synthesis process involved collating, summarizing, and reporting results in alignment with the review objectives. Reference management and comparison of findings were facilitated using Mendeley software.

Diagram Prisma

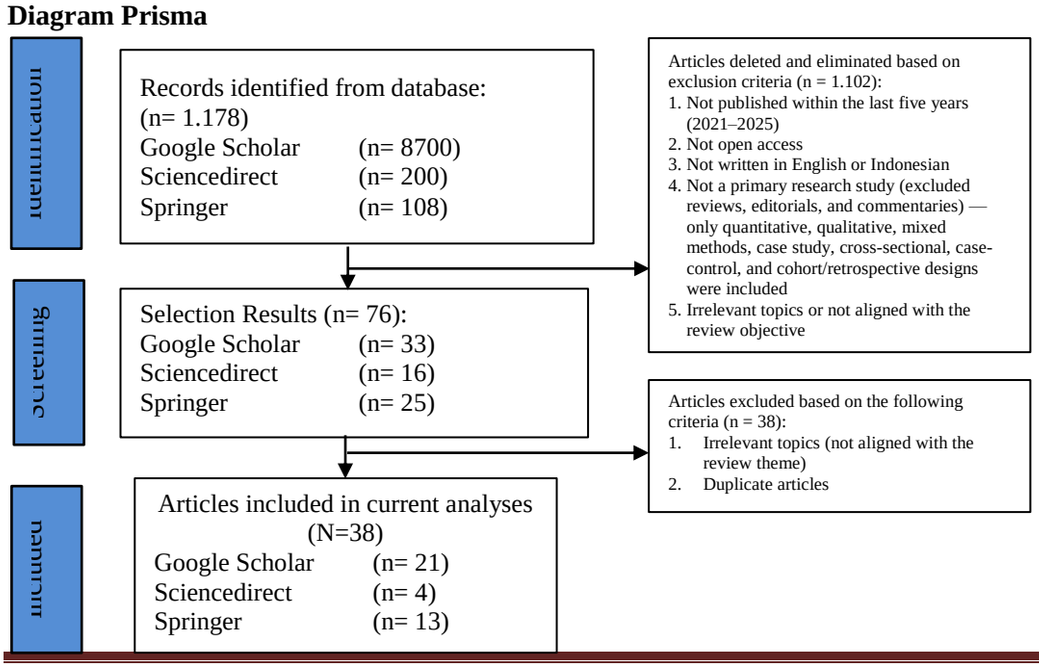

Figure 1. Literature Search Process Using PRISMA Flowchart

RESULT AND DISCUSSION

Table 1. Data Extraction Summary

No	Author (Title)	Result	Factor Risk
1.	Determinants of loss to follow-up among people living with HIV receiving antiretroviral therapy in a universal test and treat setting: A retrospective cohort study in Nepal (Shrestha et al., 2025).	Contact tracing did not significantly increase return to care (aRD: 3%, CI −2%–8%, p = 0.23). Observational data showed higher return within the first week after tracing (IR 5.74; 95% CI: 3.78–8.71). More effective in patients lost >6 months.	- Duration of loss to follow-up (>6 months vs <3 months).
2.	HIV/AIDS, lost to follow up, antiretroviral therapy (Addo et al., 2022).	ART adherence was 44.6%. Factors increasing adherence: access <30 minutes (OR 0.41), income loss during ART collection (OR 1.71), side effects (OR 1.74), self-efficacy (OR 1.86), and reminders from healthcare workers (cues to action) (OR 1.91).	- Distance to facility, income loss, side effects, self-efficacy, health worker reminders.
3.	Incidence and predictors of treatment failure among children with HIV on first-line antiretroviral therapy in Wolaita zone, Southern Ethiopia: A multicenter retrospective cohort study (Mena et al., 2023)	ART failure incidence: 3.2/1000 person-months (95% CI: 2.4–4.6). Significant factors: single caregiver (AHR = 4.86), widowed/divorced (AHR = 3.75), short follow-up (AHR = 4.95), and low baseline CD4 (AHR = 4.70).	- Caregiver's marital status, short follow-up duration, low baseline CD4 count.
4.	Electronic Medical Record Data Missingness and Interruption in Antiretroviral Therapy (IIT) Among Adults and Children Living With HIV in Haiti: Retrospective Longitudinal Study (Secor et al., 2024).	Children experienced more IIT than adults (33% vs 23.4% at 6 months, p < 0.001) and had more missing data (44.5% vs 25.9%). Each missing indicator increased IIT risk by 1.34 times (95% CI: 1.08–1.66) among children. In adults, missing all three indicators was significant (RR 1.32; 95% CI: 1.03–1.70).	- Missing EMR data (TB, WHO stage, weight), child age, number of missing indicators.
5.	Predictors of loss to follow up from antiretroviral therapy among adolescents with HIV/AIDS in Tanzania (Tesha et al., 2022).	Among 25,484 adolescents, 42% experienced LTFU. Predictors: age 15–19 years (aHR 1.57), HIV/TB coinfection (aHR 1.58), care at health centers (aHR 1.12) or clinics (aHR 1.10), malnutrition (aHR 2.27), residence in Lake Zone, and advanced HIV stage.	- Age, coinfection, type of facility, malnutrition, residence (Lake Zone), HIV stage.
6.	Time to lost to follow-up and its predictors among adult patients receiving antiretroviral therapy retrospective follow-up study Amhara Northwest Ethiopia (Telayneh et al., 2022).	LTFU incidence density 13.45 per 100 person-years; median time 77 months. Significant predictors: ART adherence (AHR 3.04), last functional status (AHR 2.74), INH prophylaxis (AHR 1.65).	LTFU incidence density, ART adherence, last functional status.
7.	Predictors of Loss to Follow-Up among HIV-Infected Adults after Initiation of the First-Line Antiretroviral Therapy at Arba Minch General Hospital, Southern Ethiopia: A 5-Year Retrospective Cohort Study (Gebremichael et al., 2021).	Among 508 patients, 9.1% experienced LTFU (incidence 5.3 per 100 person-years). Predictors: age <35 years (aHR 1.96), rural residence (aHR 1.98), baseline weight >60 kg (aHR 2.19), moderate adherence (aHR 11.5), poor adherence (aHR 12.03).	- Age <35, rural residence, baseline weight >60 kg, moderate/poor adherence.
8.	Influence of lost to follow up from antiretroviral therapy among retroviral infected patients at tuberculosis centers in public hospitals of benishangul-gumuz, Ethiopia (Degavi, 2021).	Of 1,122 patients, 25.3% were LTFU. Higher risk in males (AOR 1.68), aged 15–24 years, with no formal education, and civil servants. Protective factor: parental awareness of HIV status (AOR	- Male, age 15–24, no education, civil servant; parental HIV awareness protective.

No	Author (Title)	Result	Factor Risk
		0.5).	
9.	Loss to follow-up of patients in HIV care in Burundi: A retrospective cohort study (Nshimirimana et al., 2022)	Of 29,829 patients, cumulative LTFU rose from 2.3% (12 months) to 25.3% (72 months). Overall incidence 11.2 per 100 person-years. Higher risk for those starting ART after 2016 (aHR 1.75) or ≤7 days post-diagnosis (aHR 1.27).	- ART initiation after 2016, ART within ≤7 days of diagnosis.
10.	Loss to follow-up in "test and treat era" and its predictors among HIV-positive adults receiving ART in Northwest Ethiopia: Institution-based cohort study (Bantie et al., 2022).	LTFU incidence 9.7 per 100 person-years. Predictors: rapid ART initiation (AHR 2.08), male sex (AHR 1.96), unmarried (AHR 1.83), non-disclosure (AHR 2.00), poor/moderate adherence (AHR 4.35).	- Rapid ART start, male sex, unmarried, non-disclosure, poor/moderate adherence.
11.	High rate of loss to follow-up and virological non-suppression in HIV-infected children on antiretroviral therapy highlights the need to improve quality of care in South Africa (Liere et al., 2021).	Among 2,739 children, 29.5% were LTFU and 30.2% experienced virological failure.	- Virological failure associated with LTFU; other factors: Mopani district, low CD4, ART < 5 years, male (5–9 years), cotrimoxazole use (10–14 years).
12.	Determinants of Loss to Follow Up Among Adult People Living with HIV Enrolled in Antiretroviral Therapy in West Wollega Public Hospitals, Oromia, Ethiopia (Biratu & Gesese, 2024).	Risk factors identified among adult PLHIV enrolled in ART.	- Rural residence (AOR 3.46), male (AOR 2.65), no formal education (AOR 4.35), CD4 ≤ 350 (AOR 5.25), poor functional status (AOR 4.29), WHO stage III–IV (AOR 2.65), TB co-infection (AOR 2.82).
13.	Survival probability and factors associated with time to loss to follow-up and mortality among patients on antiretroviral treatment in central Kenya (Wekesa et al., 2022).	36-month retention: 68.8%; LTFU: 27.1%; death: 4.1%. Median time to LTFU: 11 months.	- Male, unmarried, advanced HIV stage, no TB treatment, late program entry.
14.	Time until loss to follow-up, incidence, and predictors among adults taking art at public hospitals in southern Ethiopia (Dessu et al., 2021).	Incidence: 6.48 per 1,000 person-months.	- Distance >5 km (AHR 3.71), no phone (AHR 2.52), no INH (AHR 2.15), BMI <18.5 (AHR 1.87), no primary caregiver (AHR 2.59).
15.	Incidence and predictors of loss to follow-up among children attending art clinics in northeast ethiopia: A retrospective cohort study (Menshw et al., 2021).	Incidence: 6.3 per 100 child-years.	- Male (AHR 2.1), age 1–5 years (AHR 1.6), poor adherence (AHR 6.6), moderate adherence (AHR 2.2), no regimen change (AHR 4.1), WHO III–IV (AHR 2.2), stunting (AHR 2.2).
16.	Rate of and Risk Factors for Loss to Follow up in HIV-Infected Patients in Korea: The Korea HIV/AIDS Cohort Study (Seong et al., 2023).	Incidence: 85 per 1,000 person-years.	- Protective factors: ART (HR 0.25), older age, female. Risk factor: baseline viral load ≥1,000,001 (HR 1.55).
17.	Factors Contributing to Loss to Follow-Up from HIV Care Among Men Living with HIV/AIDS in Kibaha District, Tanzania (Mandawa & Mahiti, 2022).	Qualitative study exploring reasons for discontinuation from HIV care.	- Individual: stigma, non-disclosure, ART side effects, perception of good health. Social: financial hardship, job mobility, spiritual beliefs. System: negative provider behavior, lost clinic card.
18.	Predictors of the observed high prevalence of loss to follow-up in ART-experienced adult PLHIV: a retrospective longitudinal cohort study in the Tanga Region, Tanzania (Mushy et al., 2023).	LTFU: 26.4% of 57,173 patients.	- Age 15–19 (HR 1.85), male (HR 2.00), divorced (HR 1.35), poor adherence (HR 1.50), unsuppressed VL (HR 2.15), 2nd-line ART (HR 1.13), no DTG (HR 7.51), WHO III–IV (HR 2.51). Protective: living with partner, ART <1 year, pregnancy.
19.	Tracing People Living With Human Immunodeficiency Virus Who Are Lost to Follow-up at Antiretroviral Therapy Programs in Southern Africa: A Sampling-Based Cohort Study in 6 Countries (Ballif et al., 2022).	Of 3,256 patients, 71% were traced: 34% still in care (17% silent transfer), 23% disengaged, 11% dead.	- Mortality risk higher among males, children, ART <1 year, LTFU ≥1 year, rural residents.
20.	Exploring Estimates and Reasons for Lost to Follow-Up Among People Living With HIV on Antiretroviral Therapy in Kisumu	Of 787 LTFU patients, 53.3% were self-transferred, 46.7% stopped care.	- Main causes: psychosocial (65.2%), structural (29.6%), clinical (3.0%).

No	Author (Title)	Result	Factor Risk
	County, Kenya (Samba et al., 2022).		
21.	Long-term HIV treatment outcomes and associated factors in sub-Saharan Africa: multicountry longitudinal cohort analysis (Inzaule et al., 2022).	84% of deaths and 56% of LTFU occurred during the first year of ART.	- LTFU: VL ≥1000, CD4 ≤50, age <30, malnutrition. Mortality: CD4 ≤50. Virological failure: age <40, CD4 ≤200, poor adherence, male.
22.	Incidence and Predictors of Loss to Follow Up among Patients Living with HIV under Dolutegravir in Bunia, Democratic Republic of Congo: A Prospective Cohort Study (Buju et al., 2022).	Incidence: 33.48 per 1,000 person-months.	- Higher risk among ART-naïve patients and Sudanese ethnicity in conflict zones.
23.	Lost to Follow-up and Predictors Among HIV-Exposed Infants in Northwest Ethiopia (Wubneh et al., 2021).	LTFU rate: 6.0%.	- Mothers living in rural areas (AHR 3.5), mothers with ≥3 children (AHR 3.0), low-birth-weight infants (AHR 3.2).
24.	Antiretroviral treatment failure and associated factors among hiv-infected children on antiretroviral therapy: A retrospective study (Getawa et al., 2021).	ART failure prevalence: 12.5%.	- Male (AOR 3.15), TB co-infection (AOR 2.37), ART >36 months, regimen change (AOR 9.22).
25.	Adherence to Antiretroviral Therapy among HIV/AIDS in Federal Medical Centre, Owerri (Vincent et al., 2021).	Most respondents (88%) had high knowledge of ART.	Emphasized the need for patient education, minimizing side effects, family support, and adherence counseling before ART initiation.
26.	Incidence and predictors of lost to follow up among children receiving antiretroviral therapy a computing risk regression model (Mekonnen et al., 2025).	455 patients; 13.19% LTFU; incidence 3.67/100 child-years. Predictors: age <5 years, rural residence, no regimen change, ART side effects.	- Age <5 years (aSHR 2.95), rural residence (aSHR 3.39), no regimen change (aSHR 1.98), ART side effects (aSHR 1.92).
27.	Incidence of loss to follow-up and its predictors among HIV-infected under-five children after initiation of antiretroviral therapy in West Amhara Comprehensive Specialized Referral Hospitals, Northwest Ethiopia: a multicenter retrospective follow-up study (Alemu et al., 2024).	420 children; 7.14% LTFU; incidence 3.4/1000 PMO. Predictors: rural residence, poor adherence, lack of cotrimoxazole/INH, advanced WHO stage.	- Rural residence (AHR 3.64), poor adherence (AHR 4.37), no cotrimoxazole (AHR 3.75), no INH (AHR 3.40), WHO stage III/IV (AHR 5.43).
28.	Antiretroviral Therapy Adherence and Clinic Attendance Over Time Among People in Argentina Living with HIV and Lost to Care (Sued et al., 2025).	Alcohol use linked to low adherence and more missed appointments. Self-efficacy, motivation, patient–doctor communication, and private insurance are protective.	- Alcohol ↑ → adherence ↓ and missed visits ↑; self-efficacy, motivation, and patient–doctor communication ↑ adherence; private insurance ↓ missed visits.
29.	A competing risk analysis of predictors of time to lost to follow-up among adults with TB/HIV coinfection in Bahir Dar (Demelash et al., 2025).	LTFU incidence: ART 3.9/1000 PMO; TB 19.17/1000 PMO. Predictors (ART): rural residence, WHO stage IV, Hb <11, opportunistic infection (OI). Predictors (TB): divorced/widowed, drug side effects, poor adherence.	- ART: rural (SDHR 3.39), WHO IV (SDHR 2.88), Hb <11 (SDHR 3.56), OI (SDHR 3.65); TB: divorced (SDHR 2.81), widowed (SDHR 5.92), drug side effects (SDHR 2.87), poor adherence (SDHR 5.72).
30.	Development and validation of a risk prediction model for lost to follow-up among adults on active antiretroviral therapy in Ethiopia: a retrospective follow-up study (Fentie et al., 2022).	Incidence 11.19/100 PY. Predictors: rural residence, lack of prophylaxis, advanced stage of morbidity (ASM), poor adherence, normal BMI, high viral load. Model AUC = 85.9%.	- Rural residence, no prophylaxis (CTX/INH), ASM, poor adherence, normal BMI, viral load >1000 — model accurately predicts LTFU risk.
31.	Identifying risk factors for loss to follow-up in adults living with HIV in a high-burden district in Ghana (Mensah et al., 2025).	401 patients; LTFU: 46% (90 days), 26% (180 days), 15% (270 days). Protective factors: primary/secondary education, treatment >5 years. No significant clinical factors.	- Basic education (aOR 0.32) & secondary/higher (aOR 0.51) ↓ LTFU risk; treatment ≤5 years ↑ LTFU risk; no significant clinical variables.
32.	Antiretroviral treatment failure and associated factors among people living with HIV at Logbaba district hospital, Cameroon (Ngono et al., 2025).	320 patients; ART failure 18.1%. Predictors: age 36–50 years, previous use of modern therapy, second-line regimen, regimen change, non-adherence.	- Age 36–50 (aOR 3.33), prior modern therapy (aOR 3.35), second-line regimen (aOR 4.20), regimen change (aOR 3.72), non-adherence (aOR 7.48).

No	Author (Title)	Result	Factor Risk
33.	TB / HIV co-infection in homelessness and factors associated with loss to follow-up of tuberculosis treatment : a retrospective cohort (Otavio et al., 2025).	High TB treatment discontinuation. Predictors: no DOT, positive sputum, re-entry case. Protective: sputum re-examination.	- No DOT (aOR 13.47), positive sputum (aOR 3.44), re-entry case (aOR 2.10); sputum re-exam protective (aOR 0.52).
34.	Rate and predictors of loss to follow-up in HIV care in a low-resource setting: analyzing critical risk periods (Endebu et al., 2024).	737 new patients; 22.4% LTFU (2 years), half within first 6 months. Incidence 18.3/1000 PMO. Predictors: incomplete address, poor adherence.	- Incomplete address (IRR 1.61), poor adherence (IRR 1.78); highest risk in first 6 months.
35.	Retrospective cohort study of predictors of loss to follow up among adolescents and young adults living with HIV on ART in Dar es Salaam, Tanzania, 2015–2019 (Mwakilasa et al., 2025).	15,874 AYLHIV; 15% LTFU within 1 year. Predictors: age 20–24 years, CD4 350–499, Ubungo facility, entry 2018–2019. Protective: private facility, TB coinfection, WHO III.	- Age 20–24, CD4 350–499, Ubungo facility, entry 2018–2019 ↑ LTFU risk; private facility, TB co-infection, WHO III ↓ LTFU risk.
36.	Self-transfers and factors associated with successful tracing among persons lost to follow-up from HIV care, Sheema District, Southwestern Uganda: retrospective medical records review, 2017–2021 (Ssemwogerere et al., 2022).	740 LTFU patients; 76% self-transferred. Factors: age 18–30, female, WHO stage I–II. Having a phone number ↑ tracing success.	- Age 18–30 (aPR 1.13), female (aPR 1.18), WHO I–II (aPR 2.34) → self-transfer; phone number ↑ tracing success (aPR 1.10).
37.	Undernutrition increased the risk of loss to follow-up among adults living with HIV on ART in Northwest Ethiopia: a retrospective cohort study (Alebel et al., 2022).	12.9% LTFU; incidence 5.3/100 PY. Undernutrition doubled LTFU risk.	- Undernutrition (AHR 2.1; 95% CI 1.4–3.2).
38.	Factors associated with loss to follow up among HIV-exposed children: a historical cohort study from 2000 to 2017, in Porto Alegre, Brazil (Calvo et al., 2022).	6,836 children; 25.8% LTFU. Predictors: maternal age ≤22, black/mixed race, low education, IDU, HIV diagnosis during ANC/delivery.	- Maternal age ≤22 (aRR 1.25), black/mixed race (aRR 1.13), education ≤3 yrs (aRR 1.45), 4–7 yrs (aRR 1.14), IDU (aRR 1.29), HIV diagnosis at ANC/delivery (aRR 1.37).

Discussion

This scoping review synthesizes evidence from 38 studies published between 2021 and 2025 and demonstrates that Loss to Follow-Up (LtFU) among people living with HIV/AIDS (PLHIV) is a multifactorial phenomenon shaped by the interaction of individual, socioeconomic, clinical, psychosocial, and health system determinants. Rather than operating in isolation, these factors collectively influence patients' ability and motivation to remain engaged in lifelong antiretroviral therapy (ART) care.

1. Demographic Factors

Demographic factors were found to have a significant influence on LtFU. Several studies identified younger age as a major predictor of LtFU, particularly among adolescents and young adults. Tesha et al. (2022) found that adolescents aged 15–19 years had a higher risk (aHR 1.57) of LtFU (Tesha et al., 2022), while Mushy et al. (2023) reported a similar pattern (HR 1.85). Young age is often associated with high mobility, limited understanding of ART, and weak social support, leading to poor adherence (Mushy et al., 2023). Adolescents and young adults frequently relocate for education or employment, making it difficult to maintain regular clinic visits. Knowledge influences an individual's attitudes and behaviors (Reski et al., 2024). In addition, inadequate awareness about the importance of adherence often leads to missed doses and follow-up visits. Adolescents may lack family or social support, reducing motivation and supervision for long-term therapy. The developmental stage of adolescence; characterized by identity exploration, stigma sensitivity, and resistance to authority—can further affect ART adherence (Gebremichael et al., 2021).

Male gender is also linked with a higher risk of LtFU. Degavi (2021) reported an AOR of 1.68 for males (Degavi, 2021), while Biratu & Gesese (2024) found a 2.65-fold higher risk compared to females. Underlying factors include gender-based stigma, where men are often reluctant to seek healthcare due to social norms emphasizing independence and physical resilience, which reduces routine clinic attendance. Many men perceive themselves as healthy and do not feel the need for treatment, even when HIV care is required. In some regions, healthcare facilities are more accessible to women due to maternal and child health programs, creating additional barriers for men (Biratu & Gesese, 2024).

Marital status also plays a significant role in LtFU. Unmarried, divorced, or widowed patients show a higher risk than those who are married. Gebremichael et al. (2021) and Mushy et al. (2023) revealed that lack of spousal or family support in managing

treatment leads to decreased ART adherence. Patients without consistent partners are more likely to miss appointments or medication doses due to the absence of reminders or social motivation (Gebremichael et al., 2021; Mushy et al., 2023). Conversely, married patients tend to have better adherence because of emotional, financial, and social support from partners, such as help remembering medication schedules, assistance with transportation costs, and encouragement to maintain regular care (Addo et al., 2022).

Across the reviewed literature, demographic characteristics, particularly younger age and male gender—emerged consistently as high-risk profiles for LtFU (Gebre et al., 2025). These findings suggest that conventional, clinic-centered ART models may be insufficient for populations characterized by high mobility, competing social demands, and weaker health-seeking behaviors (Maskew et al., 2022). From a policy perspective, this underscores the need for age- and gender-responsive retention strategies, such as adolescent-friendly services, flexible clinic hours, peer navigation programs, and differentiated service delivery models targeting men, including community-based ART distribution and workplace outreach.

2. Socioeconomic and Geographical Factors

Socioeconomic and geographical conditions play a crucial role in determining the risk of LtFU among people living with HIV/AIDS (PLHIV). Limited access, low education, and poor economic conditions influence the ability of patients to consistently follow antiretroviral therapy (ART) regimens. Multiple studies confirmed that rural residence increases the risk of LtFU compared to urban residence. Biratu & Gesese (2024), Alemu et al. (2024), and Fentie et al. (2022) identified rural dwelling as a significant determinant (Alemu et al., 2024; Biratu & Gesese, 2024)·(Fentie et al., 2022)· Long travel distances, limited transportation, and high travel costs hinder patients from attending ART appointments regularly. Dessu et al. (2021) reported that living more than 5 km from a clinic increases the risk of LtFU by 3.71 times. In rural areas, public transportation is often limited or unaffordable, while clinics may have fewer resources, stockouts, or irregular schedules, forcing patients to travel to urban centers for ART (Dessu et al., 2021).

Low educational attainment is also strongly linked to LtFU due to limited knowledge about HIV, ART, and the importance of long-term adherence. Degavi (2021) found that patients with no formal education were at higher risk of LtFU (Degavi, 2021). Poor health literacy can result in misunderstanding medication instructions, missing ART refill dates, and failure to recognize clinical warning signs. Calvo et al. (2022) also reported that mothers with ≤3 years of schooling had a higher likelihood of their children experiencing LtFU (aRR 1.45). Low education is often associated with reduced motivation to engage in long-term treatment and seek social support (Calvo et al., 2022). Economic constraints are another determinant. Addo et al. (2022) highlighted that income loss during ART collection acts as a major barrier, especially for individuals relying on daily wages (Addo et al., 2022). Economic hardship contributes to LtFU through travel expenses, lost income during clinic visits, and prioritization of basic needs such as food over healthcare.

Socioeconomic and geographical barriers further reinforce disengagement from care. Rural residence, long travel distances, low educational attainment, and economic vulnerability were repeatedly associated with higher LtFU risk. These determinants highlight structural inequities in access to HIV services and point to the importance of decentralizing ART delivery, strengthening primary healthcare facilities, and integrating transportation or livelihood support into HIV programs (Purcell et al., 2025). Policymakers should consider multi-sectoral interventions that address not only clinical care but also social protection mechanisms to mitigate indirect costs associated with treatment retention.

3. Clinical and Biomedical Factors

Clinical and biomedical characteristics are key determinants of LtFU, as patients' health conditions affect their ability and motivation to continue ART regularly. Poor immunological status, such as low CD4 count, significantly increases LtFU risk. Mena et al. (2023) reported that patients with low CD4 counts had an AHR of 4.70 for LtFU. Those with high viral loads often require more complex regimens and closer monitoring, which can be burdensome. Patients with low CD4 or advanced HIV stage may experience fatigue, opportunistic infections, and severe symptoms, limiting physical ability to attend clinics. These health burdens can also lead to depression, internalized stigma, and hopelessness, further increasing the likelihood of missed visits (Mena et al., 2023). Inzaule et al. (2022) found that patients with viral loads ≥1000 copies/mL had a higher risk of LtFU (Inzaule et al., 2022).

Malnutrition, stunting, and low body weight are additional risk factors, particularly among children. Menshw et al. (2021) found that boys aged 1–5 years with stunting had an

LtFU risk of AHR 2.2, while Alebel et al. (2022) reported a twofold increase among undernourished patients (AHR 2.1) (Alebel et al., 2022). Poor nutrition reduces energy, increases drug toxicity, and lowers tolerance for ART, leading to poor adherence. Malnutrition is often associated with poverty and limited access to nutritious food, compounding ART challenges. TB coinfection is another major risk factor. Tesha et al. (2022) and Biratu & Gesese (2024) reported that HIV patients with TB were more likely to experience LtFU. Dual treatment for HIV and TB increases regimen complexity and drug interaction risks, while side effects such as nausea, hepatotoxicity, or neuropathy can reduce treatment motivation. Frequent clinic visits for both ART and TB follow-up increase the likelihood of missed appointments (Biratu & Gesese, 2024),(Tesha et al., 2022).

Clinical and biomedical factors, such as low CD4 count, high viral load, malnutrition, and TB co-infection, were strongly linked to LtFU, suggesting a bidirectional relationship between disease severity and care disengagement (Gebre et al., 2025). Patients with advanced disease may be physically and psychologically less capable of maintaining regular clinic attendance, while disengagement from care further accelerates clinical deterioration. These findings support the integration of nutritional support, mental health screening, and intensified follow-up for clinically vulnerable patients within ART programs, particularly during the early stages of treatment.

4. Treatment and Adherence Factors

Directly impacts virological success and patient retention. Gebremichael et al. (2021) found that patients with poor adherence had a 12-fold higher risk of LtFU compared to those with good adherence, while Telayneh et al. (2022) reported a 3.04-fold increase (Gebremichael et al., 2021; Telayneh et al., 2022). Non-adherent patients are more likely to miss appointments, experience drug side effects, and lose engagement with healthcare providers. Poor adherence is often linked to limited ART knowledge, internal stigma, and lack of social support.

Rapid ART initiation (≤7 days after diagnosis) without adequate psychosocial preparation also increases LtFU risk. Bantie et al. (2022) and Nshimirimana et al. (2022) found that patients starting ART immediately were more likely to discontinue treatment compared to those who received prior counseling (Bantie et al., 2022),(Nshimirimana et al., 2022). Patients may not be mentally ready to manage the demands of lifelong therapy, and insufficient education about ART and side effects leads to poor commitment. In pediatric patients, lack of ART regimen adjustment also contributes to LtFU (Menshw et al., 2021). Children who experience side effects without regimen modification often develop discomfort or treatment fatigue, reducing adherence. Drug tolerance may vary with growth, making regimen adaptation crucial to maintaining retention.

5. Psychosocial and Health System Factors

Psychosocial and health system-related factors significantly contribute to LtFU. Stigma, nondisclosure of HIV status, perceived wellness, and ART side effects are key barriers. Mandawa & Mahiti (2022) found that stigma and non-disclosure reduced treatment adherence and retention (Mandawa & Mahiti, 2022). Patients who fear discrimination from family or the community often avoid clinic visits. Lack of disclosure limits family support for medication reminders, transportation, or encouragement. Better family support is associated with improved self-care practices among patients with chronic illnesses (Nugraha & Madinah, 2025). The high-risk group of Men Who Have Sex with Men (MSM) living with HIV/AIDS requires support from both the community and healthcare providers to ensure an integrative approach to treatment (Herman et al., 2024).

Addo et al. (2022) emphasized that low self-efficacy and inadequate healthcare worker support (cues to action) reduce adherence and increase LtFU (Addo et al., 2022). Patients who feel healthy may underestimate the importance of continuous ART, while untreated physical or psychological side effects diminish motivation to continue therapy (Mukarromah & Azinar, 2021). The role of healthcare workers is crucial in enhancing understanding of HIV/AIDS, particularly in its prevention and treatment (Asmawati & Mayanti, 2025).

Healthcare quality and accessibility also play crucial roles. Mandawa & Mahiti (2022) and Endebu et al. (2024) reported that loss of clinic cards, incomplete patient addresses, and poor provider attitudes increase LtFU. Administrative barriers, poor record-keeping, and lack of empathy or counseling create dissatisfaction and discomfort with services. Unfriendly facilities and complex procedures add further burdens (Mandawa & Mahiti, 2022),(Addo et al., 2022). Additionally, Buju et al. (2022) reported that patients living in conflict zones or belonging to ethnic minority groups face higher LtFU risk due to mobility, insecurity, and poor access to healthcare (Buju et al., 2022).

Comparison With Previous Reviews

The findings of this review are broadly consistent with earlier large-scale systematic and

scoping reviews conducted prior to 2021, which also identified age, gender, socioeconomic status, stigma, and health system barriers as key drivers of LtFU. However, this review adds value by incorporating more recent evidence that reflects evolving ART policies, such as rapid ART initiation and differentiated service delivery models. The persistent identification of similar determinants across time and settings suggests that, despite policy advancements, structural and psychosocial barriers to retention remain inadequately addressed in many contexts.

Limitations of the Review

Several limitations should be considered when interpreting the findings of this scoping review. First, the review was limited to studies published in English, which may have excluded relevant evidence from non-English-speaking regions. Second, although multiple international databases were searched, the possibility of publication bias and missed grey literature cannot be excluded. Third, while the CASP checklist was used to appraise methodological quality, the inclusion of studies with moderate and low quality indicates that some findings should be interpreted cautiously. Finally, as a scoping review, this study aimed to map existing evidence rather than quantify effect sizes, limiting causal inference.

Implications for Future Research

Consistent with the primary objective of scoping reviews, this study identifies several research gaps. Future studies should prioritize longitudinal and mixed-methods designs to better capture the dynamic and contextual nature of LtFU. There is a need for intervention-focused research evaluating the effectiveness of differentiated ART delivery models, psychosocial support interventions, and digital health solutions in improving retention. Additionally, more evidence is needed from key populations, conflict-affected settings, and low-resource rural areas to inform equitable and context-sensitive HIV care strategies.

CONCLUSION

Overall, Loss to Follow-Up (LtFU) among people living with HIV/AIDS is influenced by multiple determinants. Demographic factors include young age, male gender, and marital status. Socioeconomic and geographic factors comprise living in rural areas, low educational attainment, and limited access to health facilities. Clinical factors such as low CD4 count, high viral load, malnutrition, and TB co-infection also contribute significantly. Care and adherence-related factors include poor ART adherence, early initiation of ART, and non-optimized treatment regimens. Psychosocial and health system factors—such as stigma, non-disclosure of HIV status, service quality issues, and regional conflicts—further exacerbate the risk. A comprehensive and holistic intervention approach integrating patient education, social support, adherence monitoring, and systemic improvements in healthcare quality and facility accessibility is essential to significantly reduce the incidence of LtFU.

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