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SURVIVAL ANALYSIS OF LOSS TO FOLLOW-UP OF ANTI-RETROVIRAL THERAPY (ART) IN HIV PATIENTS IN SAMARINDA CITY

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ABSTRACT

Loss to follow (LTFU) -up among HIV patients, defined as failure to continue therapy as schduled, increases the risk of drug resistance, deteriorating health conditions, and death due to HIV-related complications. This study aimed to analyze the survival of HIV patients againts LTFU events among those undergoing antiretroviral therapy (ART) in Samarinda City. Secondary data from the SIHA database (2023-2024) were utilized. Kaplan-Meier analysis was applied to evaluate the factors of gender, residence, population group, and timing of ART initiation associated with the risk of LTFU. The results showed that gender and residance were not significantly associated with the risk of LTFU. However, specific population groups, such as children of PLHIV and pregnant women, exhibited higher vulnerability and lower survival rates (log rank = 0.015). ART initiation within ≤ 1 month significantly improved survival probability compared to initiation after > 1 month. These finding highlight that while gender and residance do not significantly influence LTFU, the vulnerability of spesific populations and the critical importance of early ART initiation are key factors. It is recommende to develop targeted interventions focusing on vulnerable groups, such as children of PLHIV and pregnant women, to enhance their survival rate. Additionally, strategies promoting ART initiation within ≤ 1 month are esential to improve treatment sustainability.

Keywords : *HIV, antiretroviral therapy, loss to follow-up, Kaplan-Meier, vulnerable populations.*

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INTRODUCTION

HIV/AIDS remains a significant global health problem. Indonesia is the 5th most at-risk country for HIV/AIDS in Asia (1). The HIV/AIDS Information System-*Sistem Informasi HIV/AIDS* (SIHA) reported the highest increase in 2016 compared to 2015 at 10,315 cases and in 2017 there were 48,300 HIV cases and 9,280 AIDS cases with a proportion of 36.2% HIV positive and 32.8% AIDS in women in Indonesia. East Kalimantan Province has the highest number of HIV cases in Kalimantan with 1,202 HIV cases and 358 AIDS cases in 2017 with a proportion of 34% HIV positive and 42.8% AIDS in women (2).

Anti-retroviral therapy has been proven effective in extending life expectancy and improving the quality of life of people living with HIV/AIDS (PLHIV) by suppressing viral replication to undetectable levels. However, one of the major challenges in ART is loss to follow-up, which is a condition when HIV patients fail to continue therapy within the specified time period. This can increase the risk of drug resistance, worsening health conditions, and death from HIV complications (3,4).

Samarinda is one of the cities in Indonesia with a high number of HIV cases, making it challenging to ensure patient adherence to ART. Based on data from the Samarinda Health Office in 2023, out of 584 HIV patients, 69 patients failed to follow-up, while 50 patients died. These figures show that despite the availability of ART, there are barriers that prevent patients from continuing optimal treatment (5).

Several factors that can affect loss to follow-up in ART include socioeconomic conditions, stigma, access to health facilities, and family support. Previous studies have shown that patients from high-risk population groups, such as men who have sex with men (MSM) or partners of people living with HIV, have a higher risk of dropping out of treatment. In Samarinda, the high-risk population group reached 91 people, while MSM totaled 214 people, which is a concern in identifying the determinants of loss to follow-up (6,7). In addition, demographic differences such as gender, age, and residential domicile also have

the potential to affect adherence to treatment. Of the total 584 patients in Samarinda, the majority were male (446 people) and mostly aged between 20-29 years (247 people). Meanwhile, 297 patients resided outside Samarinda, which may have limited access to health facilities, contributing to the increased risk of loss to follow-up (6,8–10).

One important indicator of successful ART is the time it takes for patients to receive ARTs after diagnosis (11,12). The data shows that 107 patients took more than one month to start treatment, while 477 patients started treatment within one month of diagnosis. This length of time affects the success of therapy, as the sooner treatment is started, the greater the chance of suppressing viral replication (5). Therefore, this paper aims to look at the resilience of HIV patients undergoing ART until finally deciding loss to follow-up on ART among HIV patients in Samarinda City. Resilience in ART is expected to provide insights for improving strategies in ART therapy management and reducing treatment dropout rates in the future.

METHODS

This study utilized integrated data from the HIV/AIDS Information System (SIHA) of Samarinda City. The system records HIV patient data and treatment monitoring conducted by HIV program managers at healthcare facilities. The research data were obtained from the HIV patient register, covering the period from 2023 to September 2024. The study involved 68 patients as respondents. Survival analysis was conducted to examine the median time to loss to follow-up (LTFU) among patients undergoing antiretroviral therapy (ART). LTFU is defined as patient absence from the treatment program for ≥90 days since the last visit and SIHA status has been recorded as LTFU. The Kaplan-Meier analysis was used to illustrate monthly survival based on gender, domicile, population group, and the time interval to receiving ART.

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The gender variable was categorized as male and female, reflecting the biological sex of the individuals. Domicile was grouped based on the respondents' place of residence—either outside Samarinda City or within Samarinda City—to identify geographical differences in health outcomes or access to services. The population group variable classified respondents based on specific risk factors or social contexts, including MSM (men who have sex with men), individuals with sexually transmitted infections, clients of sex workers, high-risk groups (e.g., individuals with behaviors or conditions that increase health risks), pregnant women, children of people living with HIV (PLHIV), and the general population. The time interval to receiving ART was categorized as less than or more than 10 days following the confirmed diagnosis.

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RESULTS

The characteristics of the respondents (age, gender, place of residence, population group, and duration of ART initiation) are presented in Table 1 below:

Table 1
Respondent Characteristics

Characteristic	N	%
Age (mean; min–max)	**31.5 (16–62)**	
Gender		
Male	51	75
Female	17	25
Place of Residence		
Outside Samarinda City	46	67.6
Samarinda City	22	32.4
Population Group		
MSM (Men who have Sex with Men)	26	38.2
Sexually Transmitted Infection	2	2.9
Clients of Sex Workers	2	2.9
High-Risk Group	15	22.1
Pregnant Women	3	4.4
Children of PLHIV	4	5.9
General Population	16	23.5
Duration of ART Initiation		
> 1 Month	3	4.4
≤ 1 Month	65	95.6

Source: Samarinda City Health Office SIHA Data, 2023-2024

The average age of the 68 respondents was 31.5 years, with an age range of 16 to 62 years. The majority of respondents were male (75%), while females accounted for only 25%. In terms of domicile, most respondents lived outside Samarinda City (67.6%), while 32.4% resided within the city. Based on population group, the largest proportion was MSM (men who have sex with men) at 38.2%, followed by the general population (23.5%) and the high-risk group (22.1%). Other groups included children of people living with HIV (5.9%), pregnant women (4.4%), and both individuals with sexually transmitted infections

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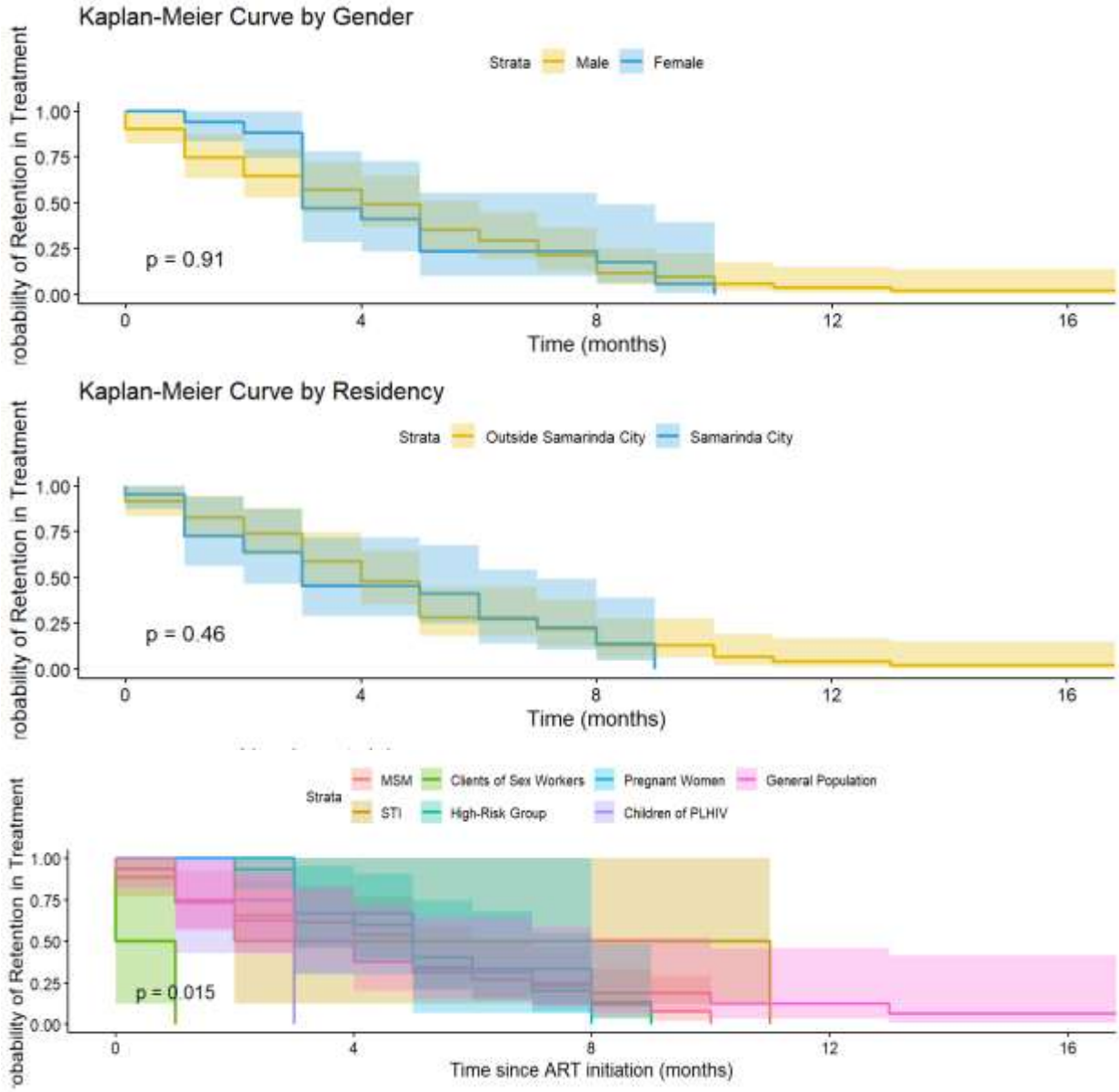
and clients of sex workers (2.9% each). The majority of respondents initiated ART within ≤ 1 month (95.6%), while only 4.4% started ART after more than 1 month. These findings indicate a diverse distribution based on demographic characteristics and population groups.



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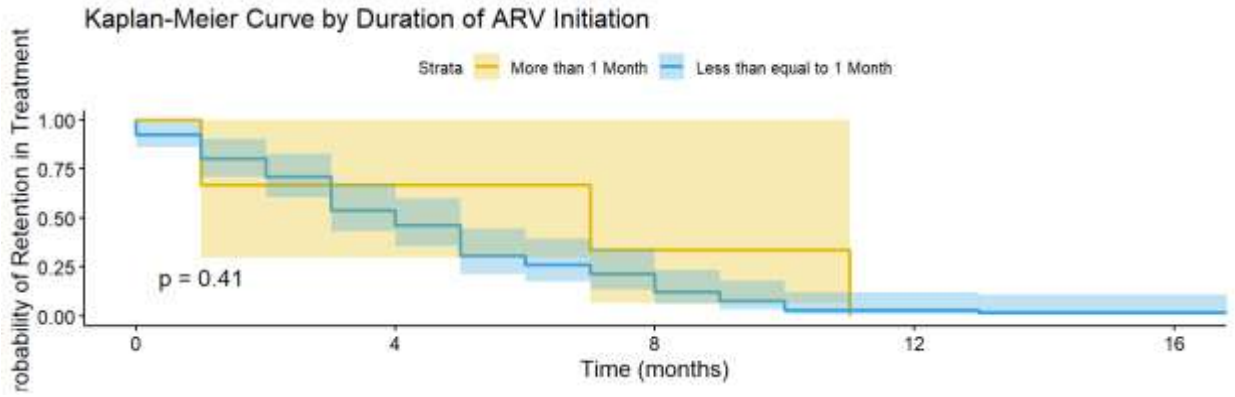

Figure 1. Distribution of loss to follow-up based on Kaplan-Meier analysis by (1) gender, (2) place of residence, (3) population group, and (4) duration of ART initiation.

The Kaplan-Meier analysis of loss to follow-up (LTFU) among HIV patients showed that gender and domicile did not have a significant influence on the risk of LTFU, as the survival curves for males and females, as well as for residents of Samarinda City and those from outside the city, remained nearly parallel throughout the observation period. However, differences in survival patterns were observed among population groups, where children of people living with HIV/AIDS (PLHIV) and pregnant women exhibited lower survival rates, indicating a higher vulnerability to LTFU compared to other groups. In addition, the duration of ART initiation proved to be a significant factor, with ART initiation within ≤ 1 month associated with a higher probability of survival compared to initiation after > 1 month.

Table 2
Results of *Log Rank (Mantel-Cox)*

Log Rank (Mantel-Cox)	Chi-Square	df	Sig.
Gender	0.012	1	0.911
Place of Residence	0.545	1	0.46
Population Group	15.743	6	0.015
Duration of ART Initiation	0.688	1	0.407

The Log-Rank (Mantel-Cox) test results indicated that the variables of gender (p = 0.911) and domicile (p = 0.46) did not have a significant association with survival related to LTFU among respondents receiving ART. The duration of ART initiation also did not show a significant effect on survival (p = 0.407). In contrast, the population group variable showed a significant association with survival related to LTFU (p = 0.015), with a Chi-Square value of 15.743 and degrees of freedom (df) of 6. This indicates that variations within population groups contribute significantly to differences in the risk of LTFU, while the other variables did not demonstrate a meaningful impact in this model.

DISCUSSION

Loss to follow-up (LTFU) among HIV-positive patients undergoing antiretroviral therapy (ART) remains a major challenge in achieving optimal treatment outcomes. The findings of this study indicate that population group significantly affects LTFU survival, whereas gender, domicile, and ART initiation timing did not show significant differences in the Kaplan-Meier analysis. Several factors influencing LTFU have been identified in previous research, including patient demographics, social determinants, and treatment-related characteristics (13,14). However, there are differences with the results of previous studies such as gender, domicile, and time of ART initiation, which showed no differences in LTFU resistance.

Previous studies have provided mixed results regarding the impact of gender on LTFU. Sub-Saharan studies found no overall significant difference between men and women in the incidence of LTFU (15). However, other studies suggest that men have a higher risk of LTFU due to lower engagement in health services and other economic barriers (16). While there are nuanced gender differences in the nature and dynamics of social support, both men and women can achieve relatively equal levels of support on ART, and this support is crucial in reducing the risk of LTFU (17–19)

Associations between geographic factors, including rural and urban residence, with access to services and retention in ART programs have been previously identified. Some studies report that patients in urban areas have easier access to health facilities compared to patients in rural areas (20,21). However, in this study, there was no significant difference in LTFU between respondents residing in Samarinda City and outside of Samarinda City who underwent ART in Samarinda City health facilities. The research report suggests that a well-integrated healthcare system can reduce geographic barriers.

Certain population groups, such as children of PLHIV and pregnant women, face particular barriers to sustained medication adherence. This finding is in line with studies conducted in Africa that identified social stigma, childcare responsibilities, and health vulnerability as significant risk factors for LTFU in these groups (22). The timing of ART initiation has been shown to be an integral determinant of outcomes related to retention and survival. WHO (2016) notes that ART initiation in the first month after diagnosis significantly reduces LTFU and improves long-term health outcomes. Early initiation of ART provides patients with immediate health improvements and thus may be more motivated to adhere to ART (23).

A limitation of this study is the small sample size. Overall, only 68 eligible samples were analyzed during the period of 2023 and 2024. Another limitation is the uncertainty of whether the respondents in question actually experienced LTFU or had died so that they were categorized as LTFU because they used secondary data through the SIHA system.

CONCLUSION AND RECOMMENDATIONS

Population group was found to have a significant association with survival, while gender, domicile, and ART initiation timing showed no significant differences in the Kaplan-Meier analysis. Therefore, programs targeting vulnerable population groups at the community level are necessary to encourage early ART initiation. Although gender and

domicile status were not significantly associated with LTFU in Samarinda City, tailored interventions for children of PLHIV, pregnant women, and other high-risk groups remain essential. It is recommended that further studies be conducted with a prospective design and a larger sample size to obtain more robust and reliable results.

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