

## High Late Presentation to HIV Care Among HIV-Infected Adults in Ouagadougou, Burkina Faso

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**Abstract:** *Background:* Because of its negative impact on HIV-related morbidity and mortality, late presentation to HIV care (LP) can be an obstacle to the HIV epidemic elimination by 2030. We assessed the prevalence and associated factors of LP in HIV-infected adults enrolled at the “*Centre Medical oasis*”, Ouagadougou, Burkina Faso. *Methods:* A cross-sectional study among HIV-infected persons aged 18 years or older, naïve for antiretroviral treatment (ART), and presented for the first time at the HIV clinic was conducted between 2015 and 2019. LP referred to HIV-infected adults presenting with CD4<sup>+</sup> cells count < 350 /µl or WHO clinical 3 or 4 regardless of the CD4<sup>+</sup> cell count. Late presentation to HIV care with advanced disease (LP-AD) included those with CD4<sup>+</sup> cells count < 200 /µl or WHO clinical 3 or 4 regardless of the CD4<sup>+</sup> cell count. Factors associated with LP were identified using logistic regressions models. Results: A total of 357 patients with median age of 34 years (interquartile range [IQR] 28-42) were included. 234 (65.6%) patients were female. Median CD4+ cell count was 305/µl (IQR 142-482). Of the 357 patients, 183 presented late to HIV care, giving a LP prevalence of 51.3% (95% confidence interval [95% CI] 45.9-56.6). Among the latter, 117 (63.9%) patients had also advanced disease. Factors associated with LP were older age (adjusted odds ratio [aOR] 2.50, 95% CI 1.33-4.71, P = 0.004), low educational level (aOR 1.99, 95% CI 1.23-3.21, P = 0.005), single status (aOR 2.07, 95% CI 1.18-3.63, P = 0.011), and family support (aOR 1.93, 95% CI 1.14-3.27, P = 0.014).

**Conclusion:** LP and LP-AD are high among HIV-infected adults in Burkina Faso. Health authorities should urgently develop effective strategies to improve HIV testing, linkage to care, and ART initiation. They should prioritize targeting single young adults with low education.

**Keywords:** Late Presentation, Late Presentation with Advanced Disease, HIV, Burkina Faso

## 1. Introduction

Late presentation to HIV care (LP) refers to human immunodeficiency virus (HIV)-positive persons presenting with CD4<sup>+</sup> count below 350 cells/ $\mu$ l or with an acquired immune deficiency syndrome (AIDS)-defining event regardless of the CD4<sup>+</sup> cell count. The definition also includes a subgroup of HIV-positive persons who have CD4<sup>+</sup> count below 200 cells/ $\mu$ l or presenting with an AIDS-defining event regardless of the CD4 cell count, the so-called “late presentation with HIV advanced disease (LP-AD)” [1]. LP is primarily due to late in HIV diagnosis, or late in linkage to HIV care after the discovering of the HIV status. It results an individual-level consequences including increased risks for morbidity, mortality, and high costs for care [2–7]. LP is furthermore associated with population-level consequences, with especially a role in the onward HIV transmission, as well as a negative impact on antiretroviral treatment (ART) response [8, 9].

LP has been widely investigated in Eastern and Southern African countries where prevalence ranging from 53% to 60% [10, 11]. The determinants are individual (younger age, being male, unpregnant women, depression, alcohol consumption) and structural (living in rural settings, inadequate HIV care facilities, low social support, stigmatization) [12–15]. In contrast, LP was less studied in Western and Central African countries whereas, HIV/AIDS is among the leading causes of disease burden and mortality [16, 17].

The HIV epidemic in Burkina Faso is concentrated in key populations including men who have sex with men (MSM), and female sex workers (FSW), in which HIV prevalence is estimated to 27% and 6%, respectively [18]. A study conducted in 2018 on the cascade of the HIV care indicated that 70% of people living with HIV (PLHIV) knew their status, 62% of these were on ART, and 25% of treated-patients had virologic suppression [19]. While the country is being focused on the elimination of the HIV epidemic to 2030, LP due to its possible consequences may be a major obstacle to achieve this goal. Data on this issue are therefore needed to inform health authorities for developing effective and suitable strategies to HIV testing and treatment.

We assessed the prevalence of LP and its associated factors in HIV-infected adults enrolled in a community-based clinic called “*Centre Médical Oasis*” in Ouagadougou, Burkina Faso.

## 2. Materials and Methods

### 2.1. Study Design, Setting and Patients

We performed a cross-sectional study from data of HIV-

infected patients who were enrolled in “*Centre Médical Oasis*” between 2015 and 2019. The clinic is a part of a community-based organization named “*Association African Solidarité (AAS)*”, which has been created in 1991. It provides comprehensive HIV care and services through a multidisciplinary team including healthcare workers (medical doctor and nurses), psychologists, social workers, and peer-educators. The delivered services include HIV testing and prevention services (condoms, lubricants, oral HIV pre and post exposure prophylaxis), ART initiation and ambulatory follow-up of PLHIV, reference to tertiary hospital of patients who present AIDS-events (i.e., opportunistic infections). As of December 31 2019, 2 125 PLHIV were enrolled and followed-up in “*Centre Médical Oasis*”.

Eligible patients to the study included all HIV-infected adults (i.e., aged 18 years or older), presenting for the first time at the clinic, and naïve for ART. Patients who had no CD4<sup>+</sup> cell count and no information for WHO clinical stage or opportunistic infections at their enrolment were excluded.

### 2.2. Definitions and Outcomes

#### 2.2.1. Late Presentation to HIV Care

Late presentation to HIV care was defined as an HIV-infected adults with CD4<sup>+</sup> cell count < 350 cells/ $\mu$ l or WHO clinical stages 3 or 4 regardless of the CD4<sup>+</sup> cell count. Prevalence of LP was the proportion of patients who met this criterion (i.e., the number of patients with LP divided by the number of enrolled patients).

#### 2.2.2. Late Presentation to HIV Care with Advanced Disease

LP-AD was defined as an HIV-infected adults with CD4<sup>+</sup> cell count < 200 cells/ $\mu$ l or WHO clinical stages 3 or 4 regardless of the CD4<sup>+</sup> cell count. Prevalence of LP-AD was the proportion of patients who met this criterion (i.e., the number of patients with LP-AD divided by the number of enrolled patients).

#### 2.2.3. Explanatory Variables

Additionally to the two main outcomes, we collected others enrolment data of patients using an extraction form. The source of data was the patients’ files. Potential explanatory variables considered were as follow: i) sociodemographic characteristics: age, gender, education, marital status, occupation, place of residence, country of coming from, type of population; ii) HIV diagnosis: place of HIV diagnosis, strategy used for the HIV diagnosis; iii) clinical and biological characteristics: WHO clinical stage, ART initiation, type of HIV, CD4<sup>+</sup> cell count; iv) social support.

**2.3. Statistical Analysis**

First, we calculated both the prevalence of LP and LP-AD. The 95% confidence intervals (CIs) of LP and LP-AD were computed using the binomial method. Second, factors associated with the two outcomes (LP and LP-AD) were identified using logistic regressions models. Potential determinants to be tested were selected a priori on the basis of existing literature about LP. Independent variables associated with LP with  $P < .20$  in univariate analyses were included in the complete multivariate model. A backward procedure based on the log-likelihood method was used to determine the final multivariate model. The goodness of fit of models were assessed using the Hosmer-Lemeshow test.

**2.4. Ethical Considerations**

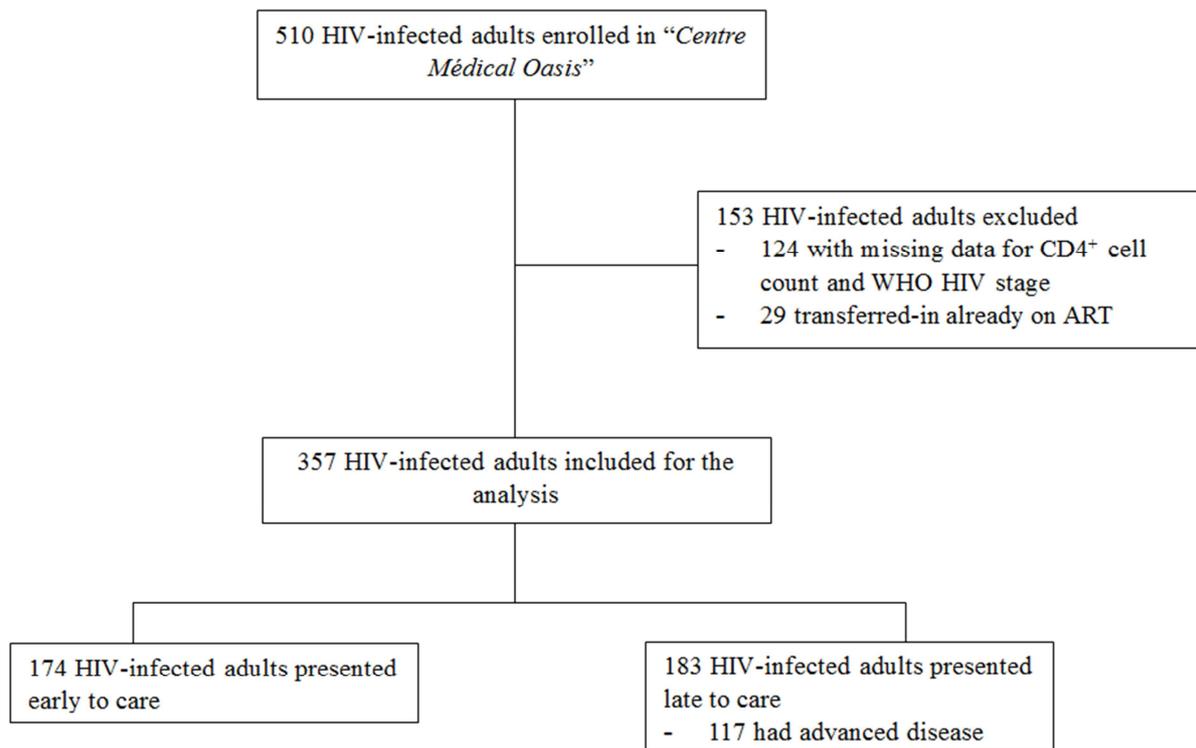
The study was initiated in the context of a graduation in Master of Public Health, Epidemiology option, in Ouagadougou University (i.e., “*Université Joseph Ki-Zerbo*”), in Burkina Faso. The study protocol was approved by the academic committee of the training in Master of Public Health. It also obtained the clearance of the responsible of

the community-based clinic where the study took place. Data collection from patients’ files was anonymous.

**3. Results**

**3.1. Study Population**

A total of 510 HIV-positive adults were enrolled in “*Centre Médical Oasis*” between 2015 and 2019. Of these, 124 patients had missing data for both CD4<sup>+</sup> cell count and WHO clinical stage. Twenty-nine patients were transferred-in from another HIV care centre and were already on ART. Three hundred and fifty-seven patients were included for the present analysis (Figure 1). Their characteristics are shown in table 1. Median age was 34 years (interquartile range [IQR] 28-42). Two hundred and thirty-four patients (65.6%) were female. A large majority of patients (n = 322, 91.0%) had a secondary or lower educational level. Three hundred and thirteen (88.7%) lived in Ouagadougou. One hundred and forty-five (40.6%) were key populations, including 77 (21.6%) FSW, and 68 (19.0%) MSM. Fifty-eight patients (16.6%) were at WHO clinical stages 3 or 4. Median CD4<sup>+</sup> cell count was 305 cell/μl (IQR 142-482).



**Figure 1.** Flow chart of the LP study (Ouagadougou, Burkina Faso, 2015-2019).

**Table 1.** Characteristics of study population.

	N	n or median	% or IQR
Age (years)	351	34	(28-42)
≤ 25		66	(18.8%)
> 25		285	(81.2%)
Sex	357		
Female		234	(65.6%)
Male		123	(34.4%)

	N	n or median	% or IQR
Education level	354		
Never attended at school		91	(25.7%)
Koranic school		5	(1.4%)
Elementary school		83	(23.5%)
Secondary school		143	(40.4%)
University		28	(7.9%)
Other		4	(1.1%)
Marital status	357		
Single		157	(43.9%)
Married (or free union)		138	(38.7%)
Divorced/separated/widower		62	(17.4%)
Occupation	356		
Employee (public or private sector)		57	(16.1%)
Student or pupil		50	(14.0%)
Employee from informal sector		93	(26.1%)
Woman at home		95	(26.7%)
Trader		37	(10.4%)
Other		24	(6.7%)
Place of residence	353		
Ouagadougou		313	(88.7%)
Around Ouagadougou (suburban)		23	(6.5%)
Far from Ouagadougou		17	(4.8%)
Country of coming from	357		
Burkina Faso		323	(90.5%)
Other country		34	(9.5%)
Type of population	357		
General population		212	(59.4%)
Female sex worker		77	(21.6%)
MSM		68	(19.0%)
Place of HIV status discovery	356		
Centre Oasis		320	(89.9%)
Transferred from another centre		36	(10.1%)
Strategy for HIV diagnosis	357		
Drop in centre		155	(43.4%)
Mobile		141	(39.5%)
Transferred from another centre		36	(10.1%)
No precision		25	(7.0%)
WHO HIV stage	348		
1		180	(51.7%)
2		110	(31.6%)
3		54	(15.5%)
4		4	(1.1%)
Type of HIV	357		
HIV 1		335	(93.8%)
HIV 2		9	(2.5%)
HIV 1 & 2		13	(3.7%)
CD4 <sup>+</sup> cell count (cell/μl)	285		
< 200		305	(142-482)
200-350		96	(33.7%)
350-500		74	(26.0%)
≥ 500		48	(16.8%)
ART initiation	357		
Yes		67	(23.5%)
Social support	340		
Yes		334	(93.6%)
No		118	(34.7%)
Family		159	46.8%)
Another person/CBO		63	(18.5%)

Abbreviations: ART, antiretroviral treatment; CBO, community-based organisation; HIV, human immunodeficiency virus; IQR, interquartile range; MSM, men who have sex with men; WHO, world health organization

### 3.2. Late Presentation to HIV Care

Of the 357 patients, 183 presented late to HIV care, giving a prevalence of 51.3% (95% CI 45.9% – 56.6%) (Figure 2A). LP prevalence tended to be lower in MSM than in general

population, but this difference did not reach statistical significance (37.7% versus 53.3%,  $P = 0.052$ ). Moreover, LP prevalence did not differ according to gender (68.8% versus 31.5%,  $P = 0.178$ ).

In multivariate analysis, LP was significantly higher in

patients aged 25 years or older (adjusted odds ratio [aOR] 2.50, 95% CI 1.33-4.71,  $P = 0.004$ ) than in those aged under 25 years (Table 2). It was also higher in patients who had secondary educational level or less (aOR 1.99, 95 CI 1.23-

3.21,  $P = 0.005$ ), in those who were single (aOR 2.07, 95 CI 1.18-3.63,  $P = 0.011$ ), and in those who benefitted from their family support (aOR 1.93, 95 CI 1.14-3.27,  $P = 0.014$ ).

**Table 2.** Factors associated with late presentation to HIV care in "Centre Medical oasis", Ouagadougou, Burkina Faso (logistic regressions).

	LP		Univariate analysis			Multivariate analysis		
	n	(%)	OR	(95% CI)	P	aOR	(95% CI)	P
Sex								
Female	126	(53.8%)	1					
Male	57	(46.3%)	0.74	(0.48-1.15)	0.178			
Age (years)								
≤ 25	22	(33.3%)	1			1		
> 25	158	(55.4%)	2.49	(1.42-4.37)	0.001	2.50	(1.33-4.71)	0.004
Education level								
Secondary school or plus	73	(42.7%)	1			1		
Less than secondary school	108	(60.3%)	2.04	(1.33-3.13)	0.001	1.99	(1.23-3.21)	0.005
Marital status								
Married or in free union	67	(48.6%)	1			1		
Divorced/separated	17	(63.0%)	1.80	(0.77-4.21)	0.174	1.96	(0.81-4.73)	0.135
Single	77	(49.0%)	1.02	(0.64-1.61)	0.933	2.07	(1.18-3.63)	0.011
Widower	22	(62.9%)	1.79	(0.84-3.84)	0.133	1.60	(0.72-3.52)	0.245
Occupation								
Employee with regular salary	51	(54.3%)	1					
No regular salary	131	(50.0%)	0.84	(0.52-1.35)	0.479			
Place of residence								
Ouagadougou	159	(50.8%)	1					
Around Ouagadougou (suburb)	14	(60.9%)	1.51	(0.63-3.58)	0.354			
Far from Ouagadougou	8	(47.1%)	0.86	(0.32-2.29)	0.764			
Coming from country								
Burkina Faso	167	(51.7%)	1					
Other	16	(47.1%)	0.83	(0.41-1.68)	0.607			
Type of population								
General population	113	(53.3%)	1					
Female sex workers	43	(55.8%)	1.11	(0.65-1.87)	0.702			
MSM	27	(39.7%)	0.58	(0.33-1.01)	0.052			
Place of HIV status discovery								
Centre Oasis	163	(50.9%)	1					
Transferred from another centre	19	(52.8%)	1.08	(0.54-2.15)	0.834			
Strategy for HIV screening								
Drop in centre	74	(47.4%)	1					
Mobile	75	(53.2%)	1.24	(0.79-1.96)	0.349			
Transferred from another centre	19	(52.8%)	1.22	(0.59-2.53)	0.586			
No precision	15	(60.0%)	1.64	(0.69-3.88)	0.258			
Type of HIV								
VIH1	168	(91.8%)	1					
VIH2	6	(66.7%)	1.99	(0.49-8.08)	0.337			
VIH1+2	9	(69.2%)	2.24	(0.67-7.40)	0.188			
Social support								
No	51	(43.2%)	1			1		
Family	93	(58.5%)	1.85	(1.14-3.00)	0.012	1.93	(1.14-3.27)	0.014
Another person/CBO	32	(50.8%)	1.36	(0.73-2.51)	0.331	1.59	(0.83-3.05)	0.162

Abbreviations: ART, antiretroviral treatment; CBO, community-based organisation; HIV, human immunodeficiency virus; IQR, interquartile range; MSM, men who have sex with men; WHO, world health organization

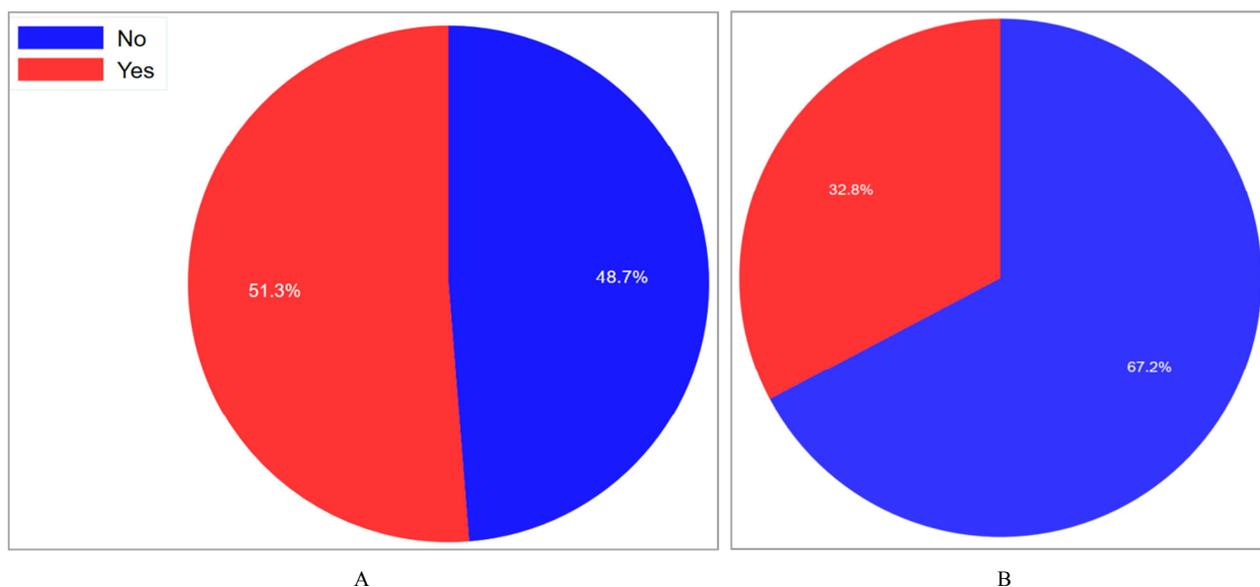


Figure 2. Late presentation to HIV care (A). Late presentation to HIV care with advanced disease (B).

3.3. Late Presentation to HIV Care with Advanced Disease

Of the 357 patients, 117 presented late to HIV care with an advance disease, giving a prevalence of LP-AD of 32.8% (95% CI 27.9% – 37.6%) (Figure 2B). These also represented 2/3 of the overall LP. The LP-AD prevalence was significantly lower in MSM than in general population (20.6% versus 37.7%,  $P = 0.010$ ).

In multivariate analysis, LP-AD was significantly higher in

patients aged 25 years or older (adjusted odds ratio [aOR] 2.90, 95% CI 1.33-6.34,  $P = 0.008$ ) than in those aged under 25 years (Table 3). It was also higher in patients who had secondary educational level or less (aOR 1.97, 95 CI 1.18-3.29,  $P = 0.009$ ), in those who divorced or separated (aOR 2.53, 95 CI 1.05-6.06,  $P = 0.038$ ), in those who benefitted from their family support (aOR 2.09, 95 CI 1.17-3.74,  $P = 0.013$ ), and in those who benefitted from support of another person or a CBO (aOR 2.62, 95 CI 1.29-5.31,  $P = 0.008$ ).

Table 3. Factors associated with late presentation to HIV care with advanced disease (LP-AD) in “Centre Medical oasis”, Ouagadougou, Burkina Faso (logistic regressions).

	LP-AD		Univariate analysis			Multivariate analysis		
	n	(%)	OR	(95% CI)	P	aOR	(95% CI)	P
Sex								
Female	81	(34.6%)	1					
Male	36	(29.3%)	0.78	(0.49-1.25)	0.307			
Age (years)								
≤ 25	10	(15.1%)	1			1		
> 25	105	(36.8%)	3.26	(1.60-6.67)	0.001	2.90	(1.33-6.34)	0.008
Education level								
Secondary school or plus	42	(24.6%)	1			1		
Less than secondary school	74	(41.3%)	2.16	(1.37-3.42)	0.001	1.97	(1.18-3.29)	0.009
Marital status								
Married or in free union	45	(32.6%)	1			1		
Divorced/separated	14	(51.8%)	2.22	(0.97-5.13)	0.060	2.53	(1.05-6.06)	0.038
Single	43	(27.4%)	0.78	(0.47-1.28)	0.329	1.58	(0.87-2.87)	0.132
Widower	15	(42.9%)	1.55	(0.73-3.31)	0.257	1.41	(0.64-3.11)	0.386
Occupation								
Employee with regular salary	31	(33.0%)	1					
No regular salary	85	(32.4%)	0.98	(0.59-1.61)	0.924			
Place of residence								
Ouagadougou	99	(31.6%)	1					
Around Ouagadougou (suburb)	10	(43.5%)	1.66	(0.70-3.92)	0.245			
Far from Ouagadougou	7	(41.2%)	1.51	(0.56-4.09)	0.414			
Coming from country								
Burkina Faso	110	(34.1%)	1					
Other	7	(20.6%)	0.50	(0.21-1.19)	0.117			
Type of population								
General population	80	(37.7%)	1					
Female sex workers	23	(29.9%)	0.70	(0.40-1.23)	0.218			

	LP-AD		Univariate analysis			Multivariate analysis		
	n	(%)	OR	(95% CI)	P	aOR	(95% CI)	P
MSM	14	(20.6%)	0.43	(0.22-0.82)	0.010			
Place of HIV status discovery								
Centre Oasis	104	(32.5%)	1					
Transferred from another centre	12	(33.3%)	1.08	(0.54-2.15)	0.834			
Strategy for HIV screening								
Drop in centre	51	(32.9%)	1					
Mobile	43	(30.5%)	0.89	(0.55-1.46)	0.657			
Transferred from another centre	12	(33.3%)	1.02	(0.47-2.20)	0.961			
Not precized	11	(44.0%)	1.60	(0.68-3.78)	0.281			
Type of HIV								
VIH1	109	(32.5%)	1					
VIH2	4	(44.4%)	1.66	(0.44-6.30)	0.457			
VIH1+2	4	(30.8%)	0.92	(0.28-3.06)	0.894			
Social support								
No	27	(22.9%)	1			1		
Family	61	(38.4%)	2.10	(1.23-3.58)	0.007	2.09	(1.17-3.74)	0.013
Another person/CBO	25	(39.7%)	2.21	(1.14-1.30)	0.019	2.62	(1.29-5.31)	0.008

Abbreviations: ART, antiretroviral treatment; CBO, community-based organisation; HIV, human immunodeficiency virus; IQR, interquartile range; MSM, men who have sex with men; WHO, world health organization

## 4. Discussion

This study conducted on HIV-infected adults enrolled in a community-based clinic in Ouagadougou (Burkina Faso) showed a high prevalence of LP (51.3%). Our finding is comparable with 2010-2016 data reported from European countries where the overall prevalence of LP was 48.4%. Specifically, the figure was however heterogeneous ranging from 32% in Estonia to 64% in Poland [20]. LP prevalence in our study is also consistent with that found in studies from Eastern and Southern African countries, where it was ranged between 50% and 60% [10, 11]. Our figure is however lower than that found at the Douala general hospital in Cameroon (90%) [16]. This difference may be partly explained by the fact that the Douala general Hospital is a tertiary care centre, the highest level for care in the health system. Conversely, the “*Centre Medical Oasis*” is a primary healthcare centre in which it is mainly delivered ambulatory HIV care.

The high frequency of LP underscores the need for Burkina Faso health authorities to address this issue. It is indeed urgent to improve the screening of HIV, the linkage to care, and the initiation of ART in HIV-infected persons. In concordance with the updated WHO guidelines on HIV/AIDS, the country integrated innovative interventions and tools (i.e., HIV self-testing, index case HIV testing, universal test and treat) into the national politic to fight the HIV epidemic [19, 21–24]. Our findings can serve for the ongoing rolling-out of these interventions to optimize the HIV response. Indeed, the young adults aged 25 years or plus, with at least secondary educational level, and having single status were at higher risk for both LP and LP-AP. These should therefore be particularly targeted in the above-mentioned interventions. Meanwhile, it would also be useful to initiate or continue further implementation research on these strategies.

Two third of the patients who classified as LP had also advanced disease (63.9%). This finding is different than that

describe at the Liege University hospital (Belgium) where LP-AD represented 54.6% of LP [25]. Importantly, it highlights the burden of LP-AD and the potential risk for the HIV transmission, as the finding means that a large majority of people presenting to care was infected for a long time. It also calls to develop effective specialized care units for providing tailored services for HIV-infected persons with advanced disease [26–29].

LP-AD was significantly lower in MSM than in the general population (20.6% versus 37.7%,  $P = 0.010$ ). Although the frequency of MSM presented late with advanced disease was relatively high, the finding may however be interpreted as encouraging. Indeed, it could be attributed to the interventions for key populations including MSM and FSW. Since the 2010s, Burkina Faso National Programme to fight HIV/AIDS and international Non-Governmental Organizations particularly targeted key populations with impactful HIV interventions (e.g., community-based HIV testing and treatment, distribution of condoms and lubricants). The “*Centre Medical Oasis*” is one of the clinics involved in the implementation of these interventions. This finding can therefore be an advocacy to pursuit the national action for key populations.

The main strength of this study is that it provides the first evidences on the determinants of LP and LP-AD in Burkina Faso. They allowed us to highlight the need to urgently address them. The findings have however limitations. First, the study was performed in a single community-based clinic for HIV. Consequently, our findings might not be fully representative of the whole country. Second, as it is common with studies performed from data collected on patients’ files, there were missing data resulting the exclusion of some of the patients. It is however worth mentioning that the patients who excluded were not different for those who included in the study. Third, the only quantitative approach did not allow us to thoroughly understand certain findings, especially the relationship between the support of the family and the LP.

## 5. Conclusion

LP and LP-AD are high among HIV-infected adults in Burkina Faso. Health authorities should urgently develop effective strategies to improve HIV testing, linkage to care, and ART initiation. These should prioritize targeting single young adults with low education.

## Authors' Contributions

TTED coordinated the study, analysed the data, and wrote the first draft of the manuscript. DLD contributed to the coordination of the study, and revised the manuscript. AS and EM collected the data. IY, LAK, IT, ITT, AN, and DEK revised the manuscript. AHD and NM supervised the interpretation of the data and the writing of the manuscript. All authors approved the manuscript.

## Potential Conflicts of Interest

The authors declare that they have no conflict of interest.

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