

Research Article

Prevalence and characteristics of emotional distress and neurocognitive impairment in people living with HIV assisted at the Elavoco Center in Huambo/Angola

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Abstract: As life expectancy among people living with HIV (PLWH) increases, there is a growing recognition of the importance of a psychological and neurocognitive well-being. This study aims to ascertain the prevalence of emotional distress and neurocognitive impairment in PLWH receiving care at the Elavoco Center. 204 participants were assessed with the Hospital Anxiety and Depression Scale and the Mini-Mental State Examination. Results indicate that 62.7% of the participants exhibit significant levels of emotional distress, with 62.7% and 53.2% experiencing significant levels of anxiety and depression, respectively. Furthermore, 58.3% demonstrate impairment in global neurocognitive functioning. Participants reporting emotional distress have lower levels of education and monthly income. Gender, limited daily access to food and potable water are associated with an increased risk of distress. Participants displaying neurocognitive impairments are older, have fewer years of formal education, exhibit depressive symptoms, and have longer periods of infection. Results are indicative of a high prevalence of emotional distress among PLWH and highlight the significance of factors such as education, income, and access to necessities like food and clean water. Consequently, the development and implementation of mental health and social services to address these critical concerns are imperative.

Keywords: psychosocial; depression; anxiety

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Introduction

In 2015, there were 2.1 million new human immunodeficiency virus (HIV) infections worldwide, contributing to a total of 36.7 million individuals living with HIV, with 25.5 million of them residing in sub-Saharan Africa, with almost 1.4 million new diagnoses per year [1]. In Angola, approximately 340,000 individuals are living with HIV, but only 180,000 are aware of their status. The prevalence rate in adults aged 15 to 49 years old is 1.5 [1.2-1.7], being higher in women (2.0 [1.7-2.3]). The HIV incidence per 1,000 population is 0.7 [0.53-0.94] [2].

HIV and acquired immunodeficiency syndrome (AIDS) continue to pose significant threats to development, economic growth, and poverty reduction in Africa. In fact, infection and disease increase poverty, which in turn leads to the spread of infection, in a vicious circle [3].

In 2015, global antiretroviral therapy (ART) coverage reached 46%, with the most significant progress seen in eastern and southern Africa. In this region, coverage rose from 24% in 2010 to 54% in 2015 [1]. In Angola, the estimate coverage of ART is in line with this reality (46% [40%-54%]) [2].

With the increase in life expectancy and the adoption of World Health Organization guidelines promoting ART for all people living with HIV (PLWH), there is a growing focus on managing other co-morbidities [4-6]. Proposals include conducting epidemiological research to investigate the impact of common mental health disorders in PLWH and to assess effective approaches for integrating mental healthcare into HIV treatment. In this context, it is crucial to conduct studies on mental health disorders, especially in sub-Saharan Africa, where the majority of PLWH reside [6].

Studies conducted in Africa indicate high levels of mental health problems, with nearly half of PLWH experiencing some form of mental health issue [7]. These problems are linked to delayed diagnosis, suboptimal HIV treatment outcomes, and increased mortality risk [8]. Among these problems, depression is the most extensively studied and common, with pooled prevalence estimates ranging from 9% to 64% in PLWH [5-7]. Some of this depression can be attributed to the challenges of coping with the diagnosis, disease symptoms, bereavement, social rejection, ART, and socioeconomic conditions [4]. Furthermore, it has been established that patients experiencing mild and short-term depression face a 37% increased risk of missing appointments, a 23% increased risk of a detectable viral load, and a doubled mortality rate [9].

The estimated prevalence of anxiety symptoms among PLWH varies from 9% to 40% [10,11]. Anxiety in PLWH was associated with delayed care-seeking behavior [10] and it seems to be more prevalent in younger people (< 40 yrs.) [12].

HIV is a neurotropic virus that, through a “Trojan horse” mechanism, crosses the blood-brain barrier, leading to neurological complications, including neurocognitive impairments. HIV-associated neurocognitive disorder (HAND) is an acquired neurocognitive impairment that involves at least two cognitive domains and may or may not interfere with daily activities. It is categorized into three stages: asymptomatic neurocognitive impairment, mild neurocognitive disorder, and HIV-associated dementia [13]. Thus, the presence of neurocognitive impairment constitutes the fundamental criteria to determine the presence of HAND. The determination of neurocognitive impairment should be based on appropriately normed tests [13].

The estimated global prevalence of HAND is 42.6%, with more than half of the cases corresponding to asymptomatic neurocognitive impairment [14]. In sub-Saharan Africa, the prevalence of HAND is slightly higher, at 45.2%, but there is currently no data available from Angola [14]. However, the dimension of this reality urges the necessity to establish a standardized HAND diagnostic process [15]. Some of the factors associated with HAND include gender, current cluster of differentiation 4 (CD4) T-cell count, education level, and country development level [15].

Given the significance of psychological, neurocognitive, and social aspects in the context of HIV infection, the present study aims to determine the prevalence of emotional distress (anxiety and depression) and neurocognitive impairment in PLWH receiving assistance at the Elavoco Center in Huambo, Angola. Additionally, this study seeks to explore the relationship between sociodemographic and clinical variables and various aspects of mood and neurocognitive functioning.

Materials and Methods

Participants

A convenience sample of individuals presenting to the Elavoco Center sequentially comprised 204 HIV-positive individuals, with ages ranging between 18 and 54 years. Individuals who faced challenges in comprehending the initial sociodemographic questionnaire were excluded from participation. A history of neurological or psychiatric conditions, or any other medical conditions that could interfere with neurocognitive functioning, were exclusion criteria.

Psychological Assessment

Initially, participants were administered a questionnaire to gather sociodemographic and economic information. Emotional distress, anxiety, and depression were assessed using the Hospital Anxiety and Depression Scale (HADS), while neurocognitive functioning was evaluated through the Mini-Mental State Examination (MMSE). These instruments were selected because psychometric indicators and normative data have previously been established in Angola [16].

Hospital Anxiety and Depression Scale (HADS)

The HADS consists of two scales: one for anxiety and one for depression. Each scale has a score range from 0 to 21 points. An appropriate balance of sensitivity and specificity is achieved with a cutoff score of 8 points [17]. Therefore, scores falling within the range of 0 to 7 are categorized as “normal” or without clinical significance, while scores above 8 are clinically significant and further divided into the following categories: scores between 8 and 10 are considered “mild to moderate”; scores between 11 and 21 are classified as “severe” [16]. Both scales contribute to a common factor: emotional distress. A total score equal or superior to 15 is considered acceptable for the diagnosis of emotional distress [16,18,19].

Mini-Mental State Examination (MMSE)

The MMSE is a neurocognitive screening instrument widely used to identify cognitive impairment [20]. It evaluates various cognitive domains, including orientation (both temporal and spatial), short-term

memory, calculation, praxis, language, and visuospatial ability. The scores obtained from these assessments were converted into z-scores using a normalization formula established in a previous Angolan study [21]:

$$[\text{Obtained Score} - (17.89 + .476 \times \text{School Years})]/4.25$$

Z scores equal or inferior to -2 were considered impaired.

Statistical analysis

Statistical analysis was carried out through the IBM SPSS Statistics 27.0 software.

Initially, frequencies and percentages were obtained for each variable. Then, Student's *t* tests were performed to compare continuous variables and Pearson's Chi square tests with odd ratios (OR) and risk estimates to compare qualitative variables.

Finally, forward stepwise regressions were performed to determine the predictors of emotional distress, anxiety, depression, and neurocognitive functioning.

Procedure

The study obtained the authorization from the Elavoco Center directive board. The study was conducted in accordance with the Declaration of Helsinki. All participants gave their informed consent.

Participants were recruited at their arrival at the Center. Interviews and assessments were performed in a closed room.

Results

Most of the participants are female (87.3%), have children (92%), own a house (69.1%), have an average monthly income of 29602.94 KWZ, approximately 32.60 Euros, have daily access to food (83.3%) and electricity (81.9%), but no daily access to drinking water (54.2%) (Table 1).

The average time since knowing about the infection was 58.63 months, the main mode of transmission was sexual contact (heterosexual only) (59.4%), most take medication daily (98%) and have not been hospitalized due to HIV infection or other co-infections (79.4%). The majority do not consume alcohol (80.09%) or drugs (95.1%) (Table 2).

Table 1. Sociodemographic characteristics of the participants.

	<i>n</i>	%	M	SD	[Min.-Max.]
Sex					
Male	26	12.7			
Female	178	87.3			
Age			36.02	9.5	[18-72]
Schooling			7.85	3.55	[0-13]
Marital state					
Single	102	50			
Married/Cohabitation	75	36.8			
Divorced/Separated	6	2.9			
Widow	21	10.3			
Do you have children?					
Yes	185	92			
No	16	8			
How many?			3.99	2.67	[0-22]
Do you own a house?					
Yes	141	69.1			
No	61	30.4			
Do you have a monthly salary?					
Yes	111	55			
No	91	45			
How much? (KWZ)			29602.94	59794.68	[0-250000]
Do you have daily access to food?					
Yes	169	83.3			
No	34	16.7			
Do you have access to electricity?					
Yes	167	81.9			
No	37	18.1			
Do you have daily access to potable water?					
Yes	93	45.8			
No	110	54.2			

Table 2. Clinical characteristics of the participants.

	<i>n</i>	%	<i>M</i>	<i>SD</i>	[<i>Min.-Max.</i>]
Duration of the infection (months)			58.63	53.9	[1-264]
Mechanism of infection					
Sexual	120	59.4			
Plasma derivatives (Transfusion)	33	16.3			
Drug addiction	3	1.5			
Unknown	46	22.8			
Medication frequency					
Daily	200	98			
Alternated days	1	0.5			
Other frequency	3	1.5			
Have you been admitted?					
Yes	42	20.6			
No	162	79.4			
How many times? Where?			1.58	0.747	[1-4]
Central Hospital	27	64.3			
Sanatorium	14	33.3			
Other	1	2.4			
Do you consume alcohol?					
Yes	39	19.1			
No	165	80.09			
Do you use drugs?					
Yes	10	4.9			
No	194	95.1			

Prevalence of emotional distress, depression, anxiety, and neurocognitive impairment

The results obtained by the participants on the psychological tasks are shown in Table 3. The average scores obtained on the HADS indicate scores above the clinical cutoff for emotional distress and anxiety, while, on the MMSE, the mean score also indicates impairment.

Table 3. Results obtained on the psychological tests.

	<i>M</i>	<i>SD</i>	[<i>Min.-Max.</i>]
HADS			
Distress	16.26	7.66	[0-41]
Anxiety	8.56	4.35	[0-21]
Depression	7.7	4.05	[0-21]
MMSE (raw score)	26.37	4.023	[11-30]
MMSE (z)	-2.04	1.56	[-8.98-0.83]

An analysis of Table 4 reveals that 62.7% of the participants exhibit clinically significant levels of emotional distress. Additionally, 62.7% of the participants demonstrate clinically significant levels of anxiety, with 33.8% of them experiencing severe anxiety levels. Furthermore, most participants (53.2%) display significant levels of depression and, within this group, 24.6% exhibit severe depression levels. In terms of neurocognitive functioning, most participants (56.4%) exhibit impairment in global neurocognitive functioning.

Table 4. Prevalence of emotional distress, anxiety, depression, and neurocognitive impairment.

	<i>n</i>	%
Distress		
Without clinical significance (0-14)	75	36.9
Clinically significant (15-42)	128	62.7
Anxiety		
Without clinical significance (0-7)	76	37.3
Mild/moderate (8-10)	59	28.9
Severe (11-21)	69	33.8
Depression		
Without clinical significance (0-7)	95	46.8
Mild/moderate (8-10)	58	28.6
Severe (11-21)	50	24.6
Neurocognition		
Non-impaired ($z > -2$)	89	43.6
Impaired ($z \leq -2$)	115	56.4

Variables related to emotional distress

Participants experiencing clinically significant levels of emotional distress have notably lower levels of education and monthly income compared to those without emotional distress (Table 5). Levels of emotional distress differed according to participants' gender, daily access to food, and access to potable water. Female participants have a 3.875-fold higher risk of emotional distress than males. Participants who do not have daily access to food have a 2.6-fold increased risk of emotional distress, while participants with no access to potable water have a 1.96-fold increased risk of experiencing distress (Table 6).

Table 5. Comparison of schooling and monthly salary according to levels of emotional distress.

	Distress		t	p
	Without clinical significance (0-14)	Clinically significant (15-42)		
Schooling (M ± SD)	8.89 ± 3.403	7.27 ± 3.513	3.223	0.001
Monthly salary (M ± SD)	43040 ± 71077.696	21960.94 ± 50979.601	2.449	0.015

Table 6. Levels of emotional distress according to sex, daily access to food and potable water.

	Without clinical significance (0-14)	Clinically significant (15-42)	χ^2	OR	Confidence interval 95%
Male					
n	17	9			
Adjusted residuals	3.2	-3.2	10.352*		
Female					
n	58	119		3.875	[1.629-9.221]
Adjusted residuals	-3.2	3.2			
Daily access to food					
n	42	50			
Adjusted residuals	2.3	-2.3	5.258**		
No daily access to food					
n	33	77		2.623	[1.08-6.356]
Adjusted residuals	-2.3	2.3			
Access to potable water					
n	68	100			
Adjusted residuals	2.2	-2.2	4.792***		
No access to potable water					
n	7	27		1.960	[1.099-3.495]
Adjusted residuals	-2.2	2.2			

* $p = .002$; ** $p = .028$; *** $p = .032$

Variables related to anxiety

Participants with clinically significant anxiety symptoms present a significantly lower monthly income than that obtained by individuals without significant anxiety (Table 7).

Female participants have a 3.81-fold increased risk of clinically significant anxiety (Table 8). The lack of daily access to food increases the risk of anxiety by 3.3-fold (Table 8).

Table 7. Comparison of the monthly salary according to the levels of anxiety.

	Anxiety		t	p
	Without clinical significance (0-7)	Clinically significant (8-21)		
Monthly salary (M ± SD)	40776.32 ± 7679.67	22968.75 ± 51437.13	2.073	0.039

Table 8. Anxiety levels according to sex and daily access to food.

			χ^2	OR	Confidence interval 95%
	Without clinical significance (0-7)	Clinically significant (8-21)			
Male					
<i>n</i>	17	9			
<i>Adjusted residuals</i>	3.2	-3.2	10.087*		
Female					
<i>n</i>	59	119		3.810	[1.602-9.059]
<i>Adjusted residuals</i>	-3.2	3.2			
Daily access to food					
<i>n</i>	70	99			
<i>Adjusted residuals</i>	2.6	-2.6	6.830**		
No daily access to food					
<i>n</i>	6	28		3.3	[1.298-8.391]
<i>Adjusted residuals</i>	-2.6	2.6			

* $p = .002$; ** $p = .001$ **Variables related to depression**

Participants with clinical symptoms of depression are older, have fewer years of schooling and receive a lower monthly salary than individuals without symptoms of depression (Table 9).

Table 9. Comparison of age, schooling and monthly salary according to the levels of depression.

	Depression		<i>t</i>	<i>p</i>
	Without clinical significance (0-7)	Clinically significant (8-21)		
Age (M \pm SD)	34.17 \pm 7.77	37.69 \pm 10.63	-2.659	0.008
Schooling (M \pm SD)	8.74 \pm 3.459	7.10 \pm 3.472	1.635	0.001
Monthly salary (M \pm SD)	42526.32 \pm 71831.04	18509.26 \pm 44381.628	2.902	0.004

Females are 2.922 times more likely to have significant symptoms of depression compared to males (Table 10). The risk of clinically significant depression is also increased by 2.458-fold in participants without daily access to food (Table 10).

Table 10. Depression levels according to sex and daily access to food.

			χ^2	OR	Confidence interval 95%
	Without clinical significance (0-7)	Clinically significant (8-21)			
Male					
<i>n</i>	18	8			
<i>Adjusted residuals</i>	2.5	-2.5	6.027*		
Female					
<i>n</i>	77	100		2.922	[1.207-7.075]
<i>Adjusted residuals</i>	-2.5	2.5			
Daily access to food					
<i>n</i>	85	83			
<i>Adjusted residuals</i>	2.3	-2.3	5.094**		
No daily access to food					
<i>n</i>	10	24		2.458	[1.107-5.455]
<i>Adjusted residuals</i>	-2.3	2.3			

* $p = .02$; ** $p = .025$ **Variables related to neurocognitive impairment**

From the analysis of Table 11, participants with alterations in neurocognitive functioning are older, have fewer years of schooling and have been infected for a longer time.

Participants who present clinically significant depressive symptoms have a 2.130-fold increased risk of having altered neurocognitive functioning (Table 12).

Table 11. Comparison of age, schooling and duration of the infection according to the level of neurocognitive functioning.

	Neurocognitive Functioning		t	p
	Non-impaired (z > -2)	Impaired (z ≤ -2)		
Age (M ± SD)	28.96 ± 4.66	41.07 ± 8.89	-11.743	< 0.001
Schooling (M ± SD)	9.44 ± 3.041	6.72 ± 3.464	5.797	< 0.001
Duration of the infection (M ± SD)	45.82 ± 45.5	67.78 ± 57.6	-2.91	0.004

Table 12. Levels of neurocognitive functioning according to depression.

	Non-impaired (z > -2)	Impaired (z ≤ -2)	χ^2	OR	Confidence interval 95%
n	49	46			
Adjusted residuals	2.6	-2.6	6.913*		
Clinically significant (8-21)					
n	36	72		2.130	[1.208-3.757]
Adjusted residuals	-2.6	2.6			

*p = .01

Predictors of emotional distress, anxiety, depression and neurocognition

The predictors for each dimension are presented in Table 13.

The predictive model of emotional distress ($R^2 = .407$; Adjusted $R^2 = .166$; Mean square regression = 491.262; Mean square error = 49.74; $F = 9.875$; $p < .001$), points to schooling as the main predictor, followed by sex (Table 13).

With respect to anxiety, the predictive model ($R^2 = .373$; Adjusted $R^2 = .139$; Mean square regression = 173.709; Mean square error = 16.58; $F = 8.064$; $p < .001$) reveals sex and schooling as the strongest predictors, followed by the duration of the infection and daily access to food.

The predictive model of depression ($R^2 = .415$; Adjusted $R^2 = .372$; Mean square regression = 128.481; Mean square error = 13.454; $F = 9.55$; $p < .001$) points to monthly salary as the main predictor, followed by sex, daily access to water and food, and finally sex.

Neurocognition ($R^2 = .865$; Adjusted $R^2 = .748$; Mean square regression = 122.621; Mean square error = .619; $F = 198.2$; $p < .001$) is predicted by age, schooling, and monthly salary.

Table 13. Predictors of emotional distress, anxiety, depression and neurocognition.

	Predictor	Unstandardized Coefficients (B)	Standardized Coefficients (Beta)	t	p
Distress	Constant	8.176		2.321	.021
	Schooling	-.449	-.208	-3.191	.002
	Sex	4.288	.187	2.879	.004
	Access to food	3.635	.178	2.702	.007
	Monthly Salary	-2.253	-.176	-2.686	.008
Anxiety	Constant	3.891		1.933	.055
	Sex	2.769	.213	3.223	.001
	Schooling	-.233	-.190	-2.852	.005
	Duration of the infection	-.015	-.181	-2.727	.007
	Access to food	1.858	.160	2.414	.017
Depression	Constant	2.122		1.032	.303
	Monthly Salary	-1.295	-.192	-2.924	.004
	Schooling	-.194	-.170	-2.578	.011
	Access to water	1.368	.169	2.508	.013
	Access to food	1.695	.157	2.401	.017
	Sex	1.815	.150	2.343	.020
Neurocognition	Constant	1.170		4.145	<.001
	Age	-.121	-.739	20.13	<.001
	Schooling	.129	.294	8.021	<.001
	Monthly Salary	4.296	.165	4.640	<.001

Discussion

The present study aimed to determine the prevalence of emotional distress, anxiety, depression and neurocognitive impairment in PLWH, attending the Elavoco Center.

The Elavoco counselling and testing center is associated with the Huambo Central Hospital and provides healthcare to PLWH, including the supply of medication, medical and nursing care, as well as psychosocial care. Patients come not only from the Huambo province, but also from other provinces, such as Benguela, Huíla, Cuanza Sul, Moxico, Cuando-Cubango and Bié, among others. Most participants are female, reflecting the prevalence rate of HIV infection by sex in Africa and Angola [2]. The age of the participants peaks at 54 years, which is close to the country's life expectancy of 61.88 years.

Emotional distress, although frequent in this population, has a significant variance in prevalence rates. Studies point to values ranging from 11.6% [22] and 19% [23] up to 52.9% [24]. A study with HIV-positive pregnant women, in Angola, found that two-thirds had significant emotional distress [25]. These variations could be due to the use of different instruments (e.g., Brief Symptom Inventory, Hopkins Symptom Checklist, General Health Questionnaire) and different clinical settings and socioeconomic environments. Irrespective of these possible reasons, our study clearly points to a higher level of emotional distress. A South African study [26] showed a mean total score of 10.72 on HADS, clearly inferior to the one we found in our sample (16.26). Besides clinical differences of the participants in the two studies (e.g., infection duration), socioeconomic specificities and the fact that during our study there was a pandemic (severe acute respiratory syndrome coronavirus 2, SARS-CoV-2) in progress could account for such higher levels of distress. The same thoughts could be applied to the analysis of the anxiety and depression levels. Clinically relevant anxiety was found in the majority of our sample, clearly above the ones reported in several studies in the sub-Saharan region [10,27,28] and around the world [11]. This may relate to the early recognition that the burden of anxiety for PLWH was high during the coronavirus disease 2019 (COVID-19) lockdown, in socioeconomically disadvantaged populations [29]. Levels of clinically relevant depression are also high, but more in line with the values found in literature [6,7,23,30]. It has been consistently reported that depression is higher in PLWH than in the general population, and that it is more burdensome in low and middle income countries than in high income countries [11].

Emotional distress was found to be related to being female and having lower schooling, monthly income, daily access to food and potable water. In our study, being female represented almost a 4 times increased risk for emotional distress and anxiety and 3 times more risk for depression. These results foster the idea that women are more likely to exhibit depression and anxiety symptoms [5], while men are more prone to substance abuse [7]. This vulnerability seems to be related to the disproportioned burden of caregiving, assigned to women in most low- and middle-income settings. This aspect may contribute to the extension of the effects of depression on the family, rather than being limited to the individual [30].

According to some, an association between education level and mental symptoms has not been demonstrated in Africa [7]. For instance, in a South African study, a higher level of education was associated with decreased likelihood of a depressive episode, but this was only statistically significant in unadjusted analyses. Other variables, such as being female, proved to have a greater impact on the emotional dimensions [30]. However, a Ugandan study reported the influence of education on depression when comparing those without education with those with post-primary education [23]. In our study, schooling is an important predictor of every dependent variable. Possibly due to its relation to income and living conditions, education is a protective factor of mental health [31].

Monthly income and financial insecurity have been related to psychiatric morbidity [7] and, in our study, it was related to emotional distress, anxiety and depression. In fact, reduced monthly income affects daily access to food. This is a central aspect with a significant effect on emotional functioning. Alongside with access to potable water, this is a priority target of social intervention in this population. The regression model excluded monthly salary as a predictor of anxiety, possibly due to its relationship with schooling. The prevalence of neurocognitive impairment found in our sample is high. Despite the wide prevalence range of HAND in literature (20% to 90%), our value is higher than the estimated prevalence in sub-Saharan Africa [14]. In our study, neurocognitive impairment was not further assessed in order to determine its implications on daily functioning, thus enabling the diagnosis of either mild cognitive disorder or HIV-related dementia [32]. Although the neuropsychological assessment was brief, and several other tests with superior sensitivity for neurocognitive impairment (e.g., the Addenbrooke's Cognitive Examination III) could have been used, the assessment was performed with an instrument that has normative data for the target population.

Schooling was related to neurocognitive functioning, a fact that has been attributed to the cognitive reserve [15]. In addition, older participants were also found to have a worse neurocognitive functioning. This association between age and worse global neuropsychological performance is consensual both in the general population and in people with HIV [14]. In fact, in our study, age was the strongest predictor of neurocognition. However, in this population, the duration of the infection also related to increased age, which could have an important role due to its effects on the immune system and the direct effects of HIV on the brain [14].

Depressive symptoms were found to be closely related to neurocognitive functioning. It is known that, with the progression of the disease, depression and other affective symptoms are common, and that there

is an overlap between the symptoms of depression and HAND [33,34]. The observed 2-fold increased risk of having altered neurocognitive functioning in the presence of clinically relevant depressive symptoms reinforces the need to consider interventions directed to both dimensions.

The present study identified high levels of emotional distress in PLWH assisted at the Elavoco Center. In addition to gender, factors such as schooling, monthly salary and daily access to food and potable water were strongly implicated in this phenomenon. Although we have not determined the presence of clinical syndromes such as major depression or generalized anxiety, the relevance of the clinical symptoms underscores a significant level of emotional suffering in this population.

Public health policy making must design and implement mental health services in HIV services. The effectiveness of mental health interventions should be further investigated, namely in its implications for HIV treatment outcomes. These services should also contemplate social support, due to the interconnections between social and financial factors and emotional distress. Women are at increased risk of emotional distress, both in the form of anxiety and depression; therefore, it is imperative to enlarge the studies on women's specificities in order to propose and implement more direct measures.

This study has some limitations. Firstly, there is a lack of important biomedical data, such as the stage of infection, identification of co-infections and indicators of viral load and immune system function (e.g., CD4 count), as well as other elements of clinical history that could be helpful in determining the stage and severity of the infection. Secondly, most of the social and clinical history information was gathered directly from the participants. The assessment of the use and adherence to the medication primarily relied on patient reports, which may introduce limitations in assessing adherence. Most of the data were collected in 2020, during the COVID-19 pandemic, which could have an additional impact on emotional distress prevalence. Additionally, there may be limitations in determining the HIV infection due to the variability between clinical diagnosis and the actual contraction of the infection. The study could provide deeper insights by including a control group of individuals living under the same conditions but who are seronegative. Finally, this study was performed in a specialized center, which offers psychosocial guidance to PLWH. This fact may limit the generalization of these data, due to a more probable awareness about the emotional domains and because it only embraces those persons who have access to public health structures. The study of social stigmatization towards PLWH and its relation to emotional functioning could have been an important contributor to the comprehension of the phenomenon. In Angola, data reveals that 31% of individuals would hesitate to purchase fresh vegetables from a vendor if aware of their HIV status, while 20.9% believe it would not be feasible for HIV-positive children to attend schools alongside HIV-negative students [2]. This aspect should be addressed in future studies, focusing on the number and type of social stigmatization perceived by PLWH.

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Author Contributions

GC was responsible for the work's methodology, formal analysis, investigation, data curation and original draft preparation. APA and AWMC participated in formal analysis, investigation, and writing. BP contributed to the work's methodology, formal analysis, investigation, original draft preparation, supervision, and project administration. All authors read and approved the final manuscript.

Conflicts of interest

The authors declare no competing interests.

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