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Depression and associated factors among HIV-positive smokers receiving care at HIV outpatient clinics in Vietnam

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Abstract

Purpose

Assess the prevalence of depressive symptoms and associated factors among people living with HIV (PLWH) who are current smokers receiving treatment at HIV outpatient clinics (OPCs) in Ha Noi, Vietnam.

Method

We analyzed data from a cross sectional survey conducted from 12/2022 to 5/2023 with 527 smokers receiving HIV treatment at HIV outpatient clinics. The Center for Epidemiology Scale for Depression (CES-D 8) was used to assess depressive symptoms. Bivariate and multiple logistic regression analyses were used to assess the association between depressive symptoms, tobacco dependence, and other characteristics.

Results

The prevalence of depressive symptoms among smokers living with HIV was 38.3%. HIV-positive smokers who had a higher level of tobacco dependence (OR =1.09, 95% CI 1.01-1.19), and reported health as fair/poor (OR =2.39, 95% CI 1.48-3.86) were more likely to have depression symptoms compared with HIV-positive smokers who had a lower level of tobacco dependence, and self-reported their health as good/very good/excellent. HIV-positive smokers who were married were less likely to have depression symptoms compared with HIV-positive smokers who were not married (OR=0.28 95% CI 0.17-0.46).

Conclusion

Prevalence of depressive symptoms among smokers receiving HIV care at OPCs was high. Both depression and tobacco use screening and treatment should be included as part of ongoing care treatment plans at HIV OPCs.

Keywords: Depression; depressive symptoms; tobacco use; HIV; people living with HIV; Vietnam; low-and middle-income country.

Strengths and limitations of this study

This is one of the first studies to examine depression and associated factors among smokers living with HIV in Vietnam. The findings make it imperative to support HIV treatment settings to integrate screening for both tobaccos use and depression into routine care.

The study used a CES-D 8, a validated scale to screen depressive symptoms with a large sample of smokers living with HIV and receiving treatment and care at a large number of HIV outpatient clinics.

The cross-sectional design does not allow for conclusions about the direction of the associations between depression and other factors.

Participants were drawn from a sample of PLWH who were receiving treatment at HIV OPCs. This may therefore not represent the larger population of PLWH in Viet Nam.

The CES-D 8 is a screening tool rather than a diagnostic instrument, this study could only assess the prevalence of depressive symptoms among PLWH instead of the prevalence of diagnosed depression.

Introduction

HIV infection remains a major public health issue, with over 38 million people living with HIV (PLWH) globally [1]. With increased access to antiretroviral medication the HIV infection has become a manageable chronic health condition, with a lifespan comparable to that of general population [2, 3]. However, gains in life expectancy are threatened by the growing burden of noncommunicable diseases (NCDs) among PLWH [4]. This is in part due to high rates of tobacco use in this population, particularly in LMIC countries like Viet Nam where smoking prevalence among male PLWH is over 50% [4, 5]. PLWH who use tobacco are at increased risk of HIV and non-HIV related chronic diseases including cancer and cardiovascular disease compared to PLWH who do not smoke [6].

PLWH experience other risk factors for poor health including higher rates of depression compared with the general population[7-9]. Prevalence estimates for depression among PLWH range widely from 25.6% to 56.7% [6, 10-15]. Studies conducted in Viet Nam show a similarly high prevalence of depression among PLWH, ranging from 18.7% to 44% [16-21].

Depression is common among smokers, particularly among smokers living with HIV [22, 23]. The high co-occurrence of smoking and depression in this population is a major public health concern. Depression can compromise smoking cessation, negatively impacts adherence to ART, and is associated with faster progression of disease and greater risk of other health risk behaviors, including alcohol abuse and drug use and poorer health outcomes [22, 24-29].

Despite the deleterious effects of the co-occurrence of depression and tobacco use on health outcomes among PLWH, there is a lack of data on correlates of depression in this population. To begin to fill this gap in research, we conducted a cross sectional analysis of factors associated with depression among PLWH who smoke and are receiving treatment in HIV outpatient clinics in Ha Noi, Vietnam.

Methods

Study design

We conducted a cross sectional analysis of data obtained from a quantitative survey of 527 smokers living with HIV. Data were collected between 12/2022 and 5/2023. The sample is a subset of participants taking part in a randomized controlled trial that is comparing the effectiveness of three smoking cessation interventions delivered in 13 HIV OPCs in Ha Noi, Vietnam. Participants were screened for tobacco use at the time of registration for a routine visit. Participants were eligible to enroll if they were 18 years of age or over, an active patient at the OPCs, a current cigarette only or dual user (waterpipe and cigarettes), had a mobile phone, and lived in Ha Noi.

The survey was administered in person using a structured questionnaire in Vietnamese. Signed informed consent was obtained from all respondents. The institutional review boards of the Institute of Social Medical Studies and the New York University School of Medicine approved this research.

Measures

Dependent variable

The 8-item Center for Epidemiology Scale for Depression (CES-D 8) was used to assess depression symptoms[30]. Respondents were asked to rate how much of the time during the past week they experienced the following behaviors or feelings: (1) "I felt depressed"; (2) "I felt everything I did was an effort"; (3) "My sleep was restless"; (4) "I were happy"; (5) "I felt lonely"; (6) "I enjoyed life"; (7) "I felt sad"; (8) "I could not get going". Responses were coded as 0=Rarely or none of the time (less than 1 day); 1= Some or a little of the time (1-2 days); 2= Occasionally or a moderate amount of time (3-4 days); 3= Most or all of the time (5-7 days). These responses resulted in scores ranging from 0 to 24. A score of ≥ 9 identifies people with clinically significant depressive symptoms[31].

Independent variables

Health status was measured using a self-rated health question asking respondents to assess their health status including 1 = Poor, 2=Fair, 3 = Good, 4 = Very Good, 5 = "Excellent [32].

Social support was assessed using the Multidimensional Scale of Perceived Social Support Scale (MPSS)[33], which aggregates three types of social support significant other, family and friends. Respondents were asked to rate 12 social support statements. Responses ranged from 1 "Strongly disagree" to 4 "Strongly agree". Mean scores were calculated for each of the three social support categories.

Tobacco dependence was assessed using the Fagerstrom Test for Nicotine Dependence which includes six items that evaluate the quantity of cigarette consumption, the compulsion to use, and dependence[34]. Measured levels of tobacco dependence ranged from 'Very low dependence' score 0-2 to 'Very high dependence' score 8-10.

Alcohol use was assessed using the Alcohol Use Disorder Identification Test–Consumption (AUDIT–C)[35]. Past 30-day drug use was captured by using a yes/no question. HIV characteristics include years living with HIV and duration of ART use. A history of any chronic disease (e.g., hypertension, diabetes) was obtained from medical charts. Sociodemographic variables included sex, age, marital status, educational status, household income, occupation, and living arrangement (e.g., living with children)

Data analysis

Data were analyzed using Stata (version 14.0). Descriptive statistics were used to summarize PLWH characteristics and prevalence of depression. The dependent variable was defined as "having depressive symptom – Yes/No" with the cutoff point score of CES-D8 >=9. Independent variables having a p-value < 0.2 in the bivariate analyses were included in the logistic regression model. We conducted bivariate tests using a significance level of a = 0.05. Categorical variables were assessed via chi-square tests and continuous variables were assessed using t-tests. Multivariable analysis using logistic regression was used to assess the associations between depression and other patient characteristics. Odds ratios are reported with 95% confidence intervals.

Patient and public involvement

No patients or members of the public were involved in the design, conduct, reporting, and dissemination of the study.

Results

A total of 527 PLWH current cigarette smokers who completed baseline surveys were included in the study; 48.6% were cigarette smoker only and 51.4% were dual users (smoking both cigarettes and waterpipe), 95.8% were male and 4.2% were female. This low prevalence of female smokers was consistent with the national data on cigarettes smoking by sex in which only 1.1% female smoked cigarettes[36]; the average PLWH age was 44.3 (±7.0); 53.9% PLWH were married and 46.1% were single, separated, divorced, or widowed; 45.7% had less than high school education, 36.6% had a high school education, and 17.7% had a college/university education; 63.4% worked in a small business, trading, services, or freelance, 20.5% worked in the private sector; 29% had an annual household income less than 100 VND millions 59.6% had an annual household income from 100-300 VND millions, and 10.8% had the income more than 300 VND millions (Table 1). The mean duration of HIV diagnosis was 12.5 years (±6.4). Sixty two percent of patient ever used drugs and 18.6% used drugs in the last 3 months.
The prevalence of depressive symptoms (CED-8 score >=9) was 38.3% (Table 1).

Table 1: Characteristics of PLWH

Characteristics (N=527)	**n**	**%/Mean±SD**
Gender		
Female	22	4.2
Male	505	95.8
Age (mean)	527	44.3±7.0
Marital status		
Single/Separated/Divorced/Widowed	243	46.1
Married	284	53.9
Education		
Less than high school	241	45.7
High school	193	36.6
Vocational training/College/University and above	93	17.7
Occupation		
Private sector employee	108	20.5
Small business/Trading/Services/Freelance	334	63.4

Other	85	16.1
Household income in the past 12 months		
50,000,000 - < 100,000,000	153	29.0
100,000,000 - < 300,000,000	341	59.6
>=300,000,000	57	10.8
Type of smoker		
Cigarettes only	256	48.6
Dual user	271	51.4
Duration of diagnosed with HIV (min=0, max=35)	527	12.5±6.4
Drug use		
Never used drugs	102	19.4
Ever used drugs	327	62.0
Used drugs in the last 3 months	98	18.6
Depressive symptoms		
No	325	61.7
Yes	202	38.3

In the bivariate models examining the correlation between depressive symptom and other factors (Table 2), marital status, living arrangement, level of tobacco dependence, self-reported health status, social support were significantly associated with depressive symptoms (P<0.05).

Prevalence of depressive symptoms was lower among smokers living with HIV who were married than among smokers living with HIV who were not married (23.2% vs. 56%, P < 0.001).

Prevalence of depressive symptoms was lower among smokers living with HIV who lived with a spouse and children than among those who lived alone or with other (30.9% vs. 54.5% and 57.8%, P<0.001).

Smokers living with HIV who reported fair or poor health status had a higher proportion of having depressive symptoms than smokers living with HIV who reported good, very good, or excellent health status (43.9% vs. 24.2%, P<0.001).

Smokers living with HIV with a high/very high level of tobacco dependence had a higher proportion of having depressive symptoms than smokers living with HIV with a low/very low level of tobacco dependence (46.1% vs. 29.8%, P<0.001).

Smokers living with HIV with depressive symptoms had a lower score on social support than smokers living with HIV not having depressive symptoms (5.0 vs 4.0 with P <0.001).

Results from multivariate analyses presented in table 2 show that marital status, level of tobacco dependence, self-reported health status were significantly associated with depressive symptoms.

Smokers living with HIV who were married were 72% less likely than people who were not married to have depressive symptoms (OR = 0.28, 95% CI 0.17-0.46).

Smokers living with HIV who had a higher level of tobacco dependence were more likely to have depressive symptoms than smokers living with HIV with a lower level of tobacco dependence (OR =1.09, 95% CI 1.01-1.19).

Smokers living with HIV who self-reported their health as fair/poor were 2.35 times more likely to have depression symptoms compared with smokers living with HIV who self-reported their health as good/very good/excellent (OR =2.39, 95% CI 1.48-3.86).

Table 2: Factors associated with depressive symptoms among PLWH

Characteristics	Depressive symptoms				OR (95% CI)
	No		Yes		
	n	% /Mean±SD	n	% /Mean±SD	
Gender					
Female	9	40.9	13	59.1*	Ref.
Male	316	62.6	189	37.4	0.45 (0.18-1.16)
Age (mean)	325	44.6±7.0	202	43.8±6.9	
Marital status					
Single/ Never married/Separated/Divorced	107	44.0	136	56.0	Ref.
Married	218	76.7	66	23.2***	**0.28***** (0.17-0.46)
Education					
Less than high school	151	62.7	90	37.3	
High school	113	58.6	80	41.5	
Vocational training/ College/University and above	61	65.6	32	34.4	
Occupation					
Private sector employee	71	65.7	37	34.3*	Ref.
Small business/ Trading/Services/Freelance	193	57.8	141	42.2	1.16 (0.69-1.93)
Others	61	71.8	24	28.2	0.61 (0.30-1.22)
Household income in the past 12 months					
50,000,000 - < 100,000,000	88	57.5	65	42.5	
100,000,000 - < 300,000,000	200	63.7	114	36.3	
300,000,000 and over 500,000,000	36	63.2	21	36.8	
Living arrangements					
Live alone	20	45.5	24	54.5***	Ref.
Live with spouse/partner/children /grandchildren	257	69.1	115	30.9	0.91 (0.43-1.95)
Live with others	48	43.2	63	57.8	1.05 (0.50-2.22)

**** p-value <0.001, ** p-value <0.01, *p-value <0.05*

Table 2: Factors associated with depressive symptoms among PLWH (Continued)

Factors	Depressive symptoms				OR (95% CI)
	No		Yes		
	n	% /Mean±SD	n	% /Mean±SD	
Duration of diagnosed with HIV	325	12.4±6.5	202	12.8±6.3	
Duration of ART	325	10.0±5.5	202	10.3±7.9	
Have chronic disease					
No	262	63.6	150	36.4+	Ref.
Yes	63	54.8	52	45.2	1.36 (0.85-2.18)
Current health status					
Good/Very good/Excellent	113	75.8	36	24.2***	Ref.
Fair/Poor	212	56.1	166	43.9	**2.39*** ** (1.48-3.86)
Type of smoker					
Cigarettes only	158	61.7	98	38.3	
Dual user	167	61.6	104	38.4	
Tobacco dependence level					
Very low/Low	174	70.2	74	29.8**	
Medium	41	54.7	34	45.3	
High/Very high	110	53.9	94	46.1	
Tobacco dependence (score)	325	4.0±2.6	202	5.0±2.3***	**1.09*** (1.01-1.19)
Hazardous drinking					
No	112	59.3	77	40.7	
Yes	213	63.0	125	37.0	
Drug use					
Never	73	71.6	29	28.4*	Ref.
Ever	200	61.2	127	38.8	1.16 (0.66-2.02)
In the last 3 months	52	53.1	46	46.9	1.19 (0.61-2.33)
Social support					
Family support score	325	3.2±0.5	202	3.1±0.5	
Friend support score	325	2.9±0.5	202	2.8±0.5	
Other support score	325	3.2±0.5	202	3.1±0.5*	
Total social support score (min-max: 1.33-4.33)	325	3.4±0.4	202	3.3±0.4*	0.86 (0.55-1.37)

**** p-value <0.001, ** p-value <0.01, *p-value <0.05*

Discussion

Our study found a high prevalence of depressive symptoms (38.3%) among PLWH who smoke and are receiving HIV care and treatment at OPCs in Viet Nam. This is 16 times higher than the prevalence of depression in the general population in Vietnam (2.5%) [37].

Patients with higher levels of tobacco dependence were more likely to report higher level of depressive symptoms. The literature on the direction of this relationship is inconsistent [38-40]. PLWH with depression may use nicotine to elevate their mood. Alternatively, smoking may lead to depression through changes in the brain's susceptibility to environmental stress [40, 41]. Concern among clinicians about exacerbating depression symptoms has hindered treatment of tobacco use. However, there is growing evidence that smoking cessation has beneficial effects on mental health symptoms [42]. It is critically important to develop and implement models of care that combine mental health and tobacco cessation in this population.

Consistent with other studies of PLWH, we found that depressive symptoms were less prevalent among smokers living with HIV/AIDS who reported a higher level of social support [17, 43]. Patients who were married were significantly less likely to report significant depressive symptoms compared with those who were single, separated/divorced/widowed. HIV-associated stigma may increase a sense of isolation among those without meaningful relationships and social ties. Our findings are consistent with a study by Badru et al, which suggests that social support, particularly from significant others, may reduce perceived stigma [43]. Support for PLWH is also associated with improved quality of life, reduced depression symptoms and improved ART adherence. More data is needed on effective methods for enhancing social support in the context of HIV care.

Finally, this study, consistent with previous studies [19, 21] finds self-reported poor health was associated with significant depressive symptoms. The direction of this relationship is also not clear, and may be, in part, related to concurrent tobacco use. However, the finding further highlights that optimizing quality of life and health outcomes requires addressing both mental health and tobacco use as part of routine HIV care.

There are limitations to this analysis. First**, t**he cross-sectional design does not allow for conclusions about the direction of these associations. For example, poorer health may contribute to depressive symptoms and vice versa. Second, participants were drawn from a sample of PLWH who were receiving treatment at HIV OPCs. This may therefore not represent the larger population of PLWH in Viet Nam. However, in Viet Nam, most PLWH are received ART at OPCs. Finally, the CES-D 8 is a screening tool rather than a diagnostic instrument, this study could only assess the prevalence of depressive symptoms among PLWH instead of the prevalence of diagnosed depression.

Conclusions

Based on these findings and prior literature, the high prevalence of co-occurring depression and tobacco use among PLWH and the individual and combined impact on health outcomes, makes it imperative to support HIV treatment settings to integrate screening for both tobaccos use and depression into routine care. Further focusing on enhancing social support, through additional services and programs may facilitate treatment engagement and improve health outcomes [41].

Contributors: Designed the study: DS, NN. Developed data collection tools: DS, NN, TN, GG, MA, GV. Collected data: NT, YP. Analyzed data and interpreted results: TN, NT, YP. Wrote the initial draft: NN, DS. Contributed to subsequent drafts: DS, GG, MA, TN, GV. All authors reviewed and approved the final manuscript.

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Data availability statement: available upon reasonable request.

References

1. Organization, W.H. *Factsheet. HIV and AIDS*. (online) 2023. https://www.who.int/news-room/fact-sheets/detail/hiv-aids (accessed 6/15/2023).
2. Mdege, N.D., et al., *Tobacco use among people living with HIV: analysis of data from Demographic and Health Surveys from 28 low-income and middle-income countries.* The Lancet Global Health, 2017. **5**(6): p. e578-e592.
3. Mills, E.J., et al., *Life expectancy of persons receiving combination antiretroviral therapy in low-income countries: a cohort analysis from Uganda.* Ann Intern Med, 2011. **155**(4): p. 209-16.
4. Parascandola, M., et al., *Colliding epidemics: research gaps and implementation science opportunities for tobacco use and HIV/AIDS in low-and middle-income countries.* Journal of Smoking Cessation, 2022. **2022**.
5. Nguyen, N.P.T., et al., *Prevalence of cigarette smoking and associated factors in a large sample of HIV-positive patients receiving antiretroviral therapy in Vietnam.* PloS one, 2015. **10**(2): p. e0118185.
6. Abadiga, M., *Depression and its associated factors among HIV/AIDS patients attending ART clinics at Gimbi General hospital, West Ethiopia, 2018.* BMC Res Notes, 2019. **12**(1): p. 527.
7. Ciesla, J.A. and J.E. Roberts, *Meta-analysis of the relationship between HIV infection and risk for depressive disorders.* American journal of psychiatry, 2001. **158**(5): p. 725-730.
8. Mekonen, T., H. Belete, and W. Fekadu, *Depressive symptoms among people with HIV/AIDS in Northwest Ethiopia: comparative study.* BMJ open, 2021. **11**(7): p. e048931.
9. Rabkin, J.G., *HIV and depression: 2008 review and update.* Current Hiv/aids Reports, 2008. **5**: p. 163-171.
10. Ayano, G., L. Tsegay, and M. Solomon, *Food insecurity and the risk of depression in people living with HIV/AIDS: a systematic review and meta-analysis.* AIDS Research and Therapy, 2020. **17**(1): p. 1-11.
11. Gritz, E.R., et al., *Smoking behavior in a low-income multiethnic HIV/AIDS population.* Nicotine & Tobacco Research, 2004. **6**(1): p. 71-77.
12. Brown, T. and K. Morgan, *Psychological distress and substance abuse in Jamaican youths living with HIV/AIDS.* West Indian Medical Journal, 2013. **62**(4).
13. Zhang, C., et al., *Substance Use and Psychosocial Status among People Living with HIV/AIDS Who Encountered HIV Stigma in China: Stratified Analyses by Socio-Economic Status.* PLOS ONE, 2016. **11**(11): p. e0165624.

14. Duko, B., et al., *Prevalence and associated factors of depression among patients with HIV/AIDS in Hawassa, Ethiopia, cross-sectional study.* Ann Gen Psychiatry, 2018. **17**: p. 45.
15. Olanrewaju Gt, I.B.A., *Prevalence and Correlates of Depressive Disorders among People Living with HIV/AIDS, in North Central Nigeria.* Journal of AIDS & Clinical Research, 2013. **04**(01).
16. Esposito, C.A., et al., *The prevalence of depression among men living with HIV infection in Vietnam.* Am J Public Health, 2009. **99 Suppl 2**(Suppl 2): p. S439-44.
17. Matsumoto, S., et al., *Social Support as a Key Protective Factor against Depression in HIV-Infected Patients: Report from large HIV clinics in Hanoi, Vietnam.* Sci Rep, 2017. **7**(1): p. 15489.
18. Huynh, V.N., et al., *Changes in depressive symptoms and correlates in HIV+ people at An Hoa Clinic in Ho Chi Minh City, Vietnam.* BMC Psychiatry, 2017. **17**(1): p. 35.
19. Thai, T.T., et al., *Symptoms of Depression in People Living with HIV in Ho Chi Minh City, Vietnam: Prevalence and Associated Factors.* AIDS Behav, 2018. **22**(Suppl 1): p. 76-84.
20. Green, K., et al., *Integrating palliative care into HIV outpatient clinical settings: preliminary findings from an intervention study in Vietnam.* J Pain Symptom Manage, 2010. **40**(1): p. 31-4.
21. Levintow, S.N., et al., *Prevalence and predictors of depressive symptoms among HIV-positive men who inject drugs in Vietnam.* PLoS One, 2018. **13**(1): p. e0191548.
22. Junaid, K., et al., *Substance Abuse and Mental Health Issues Among HIV/AIDS Patients.* Journal of the College of Physicians and Surgeons--Pakistan: JCPSP, 2023. **33**(3): p. 325-334.
23. Teixeira, L.S.L., et al., *Prevalence of smoking and associated factors in people living with HIV undergoing treatment.* Rev Saude Publica, 2020. **54**: p. 108.
24. Deborah Kacanek, D.L.J., Donna Spiegelman, Christine Wanke, Rita Isaac, and Ira B. Wilson, *Incident Depression Symptoms Are Associated With Poorer HAART Adherence: A Longitudinal Analysis From the Nutrition for Healthy Living Study.* Acquir Immune Defic Syndr, 2010. **53**.
25. Do, H.M., et al., *Factors associated with suboptimal adherence to antiretroviral therapy in Viet Nam: a cross-sectional study using audio computer-assisted self-interview (ACASI).* BMC Infect Dis, 2013. **13**: p. 154.
26. Meade, C.S. and K.J. Sikkema, *HIV risk behavior among adults with severe mental illness: a systematic review.* Clinical psychology review, 2005. **25**(4): p. 433-457.
27. Ryan, K., et al., *Depressive symptoms as a link between barriers to care and sexual risk behavior of HIV-infected individuals living in non-urban areas.* AIDS care, 2008. **20**(3): p. 331-336.
28. Antelman, G., et al., *Depressive symptoms increase risk of HIV disease progression and mortality among women in Tanzania.* J Acquir Immune Defic Syndr, 2007. **44**(4): p. 470-7.
29. Kingori, C., Z.T. Haile, and P. Ngatia, *Depression symptoms, social support and overall health among HIV-positive individuals in Kenya.* Int J STD AIDS, 2015. **26**(3): p. 165-72.
30. Radloff, L.S., *The CES-D scale: A self-report depression scale for research in the general population.* Applied psychological measurement, 1977. **1**(3): p. 385-401.
31. Briggs, R., et al., *Validation of the 8-item Centre for Epidemiological Studies Depression Scale in a cohort of community-dwelling older people: data from The Irish Longitudinal Study on Ageing (TILDA).* Eur Geriatr Med, 2018. **9**(1): p. 121-126.
32. Herdman, M., et al., *Development and preliminary testing of the new five-level version of EQ-5D (EQ-5D-5L).* Quality of life research, 2011. **20**(10): p. 1727-1736.
33. Zimet, G.D., et al., *The multidimensional scale of perceived social support.* Journal of personality assessment, 1988. **52**(1): p. 30-41.
34. Heatherton, T.F., et al., *The Fagerström test for nicotine dependence: a revision of the Fagerstrom Tolerance Questionnaire.* British journal of addiction, 1991. **86**(9): p. 1119-1127.

35. Bush, K., et al., *The AUDIT alcohol consumption questions (AUDIT-C): an effective brief screening test for problem drinking.* Archives of internal medicine, 1998. **158**(16): p. 1789-1795.
36. Van Minh, H., et al., *Prevalence of tobacco smoking in Vietnam: findings from the Global Adult Tobacco Survey 2015.* Int J Public Health, 2017. **62**(Suppl 1): p. 121-129.
37. Organization, W.H. *Factsheet. Mental Health in Vietnam*. (online) 2023. https://www.who.int/vietnam/health-topics/mental-health (accessed 6/15/2023).
38. Prochaska, J.J., *Smoking and mental illness—breaking the link.* New England Journal of Medicine, 2011. **365**(3): p. 196-198.
39. Leventhal, A.M. and M.J. Zvolensky, *Anxiety, depression, and cigarette smoking: A transdiagnostic vulnerability framework to understanding emotion–smoking comorbidity.* Psychological bulletin, 2015. **141**(1): p. 176.
40. Fluharty, M., et al., *The Association of Cigarette Smoking With Depression and Anxiety: A Systematic Review.* Nicotine Tob Res, 2017. **19**(1): p. 3-13.
41. Rubin, L.F., et al., *Depression as a moderator of the prospective relationship between mood and smoking.* Health Psychology, 2020. **39**(2): p. 99.
42. Taylor, G., et al., *Change in mental health after smoking cessation: systematic review and meta-analysis.* Bmj, 2014. **348**.
43. Badru, O.A. and O.E. Babalola, *Significant Others and Not Family or Friend Support Mediate Between Stigma and Discrimination Among People Living With HIV in Lagos State, Nigeria: A Cross-sectional Study.* Journal of the Association of Nurses in AIDS Care, 2023. **34**(1): p. 96-104.

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		Reporting Item	Page Number
Title and abstract			
Title	#1a	Indicate the study's design with a commonly used term in the title or the abstract	1
Abstract	#1b	Provide in the abstract an informative and balanced summary of what was done and what was found	1
Introduction			
Background / rationale	#2	Explain the scientific background and rationale for the investigation being reported	2
Objectives	#3	State specific objectives, including any prespecified hypotheses	2
Methods			
Study design	#4	Present key elements of study design early in the paper	2
Setting	#5	Describe the setting, locations, and relevant dates, including periods of	2

		recruitment, exposure, follow-up, and data collection	
Eligibility criteria	#6a	Give the eligibility criteria, and the sources and methods of selection of participants.	2
	#7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	3
Data sources / measurement	#8	For each variable of interest give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group. Give information separately for for exposed and unexposed groups if applicable.	3
Bias	#9	Describe any efforts to address potential sources of bias	3
Study size	#10	Explain how the study size was arrived at	2
Quantitative variables	#11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen, and why	3
Statistical methods	#12a	Describe all statistical methods, including those used to control for confounding	3
Statistical methods	#12b	Describe any methods used to examine subgroups and interactions	3
Statistical methods	#12c	Explain how missing data were addressed	3
Statistical methods	#12d	If applicable, describe analytical methods taking account of sampling strategy	3
Statistical methods	#12e	Describe any sensitivity analyses	3
Results			
Participants	#13a	Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed. Give information separately for for exposed and unexposed groups if applicable.	4
Participants	#13b	Give reasons for non-participation at each stage	4
Participants	#13c	Consider use of a flow diagram	4

Descriptive data	#14a	Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders. Give information separately for exposed and unexposed groups if applicable.	4
Descriptive data	#14b	Indicate number of participants with missing data for each variable of interest	4
Outcome data	#15	Report numbers of outcome events or summary measures. Give information separately for exposed and unexposed groups if applicable.	5
Main results	#16a	Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	4-7
Main results	#16b	Report category boundaries when continuous variables were categorized	4-7
Main results	#16c	If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	4-7
Other analyses	#17	Report other analyses done—e.g., analyses of subgroups and interactions, and sensitivity analyses	4-7
Discussion			
Key results	#18	Summarise key results with reference to study objectives	8
Limitations	#19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias.	8
Interpretation	#20	Give a cautious overall interpretation considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence.	8
Generalisability	#21	Discuss the generalisability (external validity) of the study results	8
Other Information			
Funding	#22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	8

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Depression and associated factors among HIV-positive smokers receiving care at HIV outpatient clinics in Vietnam: a cross-sectional analysis

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Depression and associated factors among HIV-positive smokers receiving care at HIV outpatient clinics in Vietnam: a cross-sectional analysis

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ABSTRACT

Objectives

Assess the prevalence of depressive symptoms and associated factors among people living with HIV (PLWH) who are current cigarette smokers receiving treatment at HIV outpatient clinics (OPCs) in Vietnam.

Design: A cross-sectional survey of smokers living with HIV.

Setting: 13 HIV outpatient clinics in Ha Noi, Vietnam

Participants:

A total of 527 people living with HIV aged 18 and above, who were smokers and were receiving treatment at HIV outpatient clinics, were included in the study.

Outcome measures:

The Center for Epidemiology Scale for Depression (CES-D 8) was used to assess depressive symptoms. Bivariate and Poisson regression analyses were used to assess the association between depressive symptoms, tobacco dependence, and other characteristics.

Results

The prevalence of depressive symptoms among smokers living with HIV was 38.3%. HIV-positive smokers who were female (PR=1.51, 95% CI 1.02-2.22), unmarried (PR = 2.06, 95% CI 1.54-2.76), had a higher level of tobacco dependence (PR =1.06, 95% CI 1.01-1.11), and reported their health as fair/poor (PR =1.66, 95% CI 1.22-2.26) were more likely to have depression symptoms compared with HIV-positive smokers who were male, married, had a lower level of tobacco dependence, and self-reported their health as good/very good/excellent.

Conclusion

The prevalence of depressive symptoms among smokers receiving HIV care at OPCs was high. Both depression and tobacco use screening and treatment should be included as part of ongoing care treatment plans at HIV OPCs.

Keywords: Depression; depressive symptoms; tobacco use; HIV; people living with HIV; Vietnam; low-and middle-income country.

Strengths and limitations of this study

- The study used the CES-D 8, a validated scale to screen depressive symptoms, with a large sample of smokers living with HIV and receiving treatment in HIV outpatient clinics.
- The CES-D 8 is a screening tool rather than a diagnostic instrument, therefore this study could only assess the prevalence of depressive symptoms among PLWH instead of the prevalence of diagnosed depression.
- The study employed Poisson regression (estimating Prevalence Ratios), a more robust alternative for the analysis of cross-sectional studies with binary outcomes than logistic regression (reporting Odd Ratios).
- The cross-sectional design did not allow for conclusions about the direction of the associations between depression and other factors.
- The study sample, which included PLWH who were receiving treatment at HIV OPCs, may not represent the larger population of PLWH in Vietnam.

INTRODUCTION

HIV infection remains a major public health issue, with over 38 million people living with HIV (PLWH) globally [1]. With increased access to antiretroviral medication, HIV infection has become a manageable chronic health condition, with a lifespan comparable to that of the general population [2, 3]. However, gains in life expectancy are threatened by the growing burden of non-communicable diseases (NCDs) among PLWH [4]. This is in part due to high rates of tobacco use in this population, particularly in LMIC countries like Vietnam, where smoking prevalence among male PLWH is over 50% [4, 5]. PLWH who use tobacco are at increased risk of HIV and non-HIV-related chronic diseases that include cancer and cardiovascular diseases compared to PLWH who do not smoke [6].

PLWH experience other risk factors for poor health that include higher rates of depression compared with the general population[7-9]. Prevalence estimates for depression among PLWH range widely from 25.6% to 56.7% [6, 10-15]. Studies conducted in Viet Nam show a similarly high prevalence of depression among PLWH, ranging from 18.7% to 44% [16-21].

Depression is common among smokers, particularly among smokers living with HIV [22, 23]. The high co-occurrence of smoking and depression in this population is a major public health concern. Depression can compromise smoking cessation, negatively impacts adherence to ART, and is associated with faster progression of the disease and greater risk of other health risk behaviors, including alcohol abuse and drug use and poorer health outcomes [22, 24-29].

Despite the deleterious effects of the co-occurrence of depression and tobacco use on health outcomes among PLWH, there is a lack of data on the correlates of depression in this population. To begin to fill this gap in research, we conducted a cross-sectional analysis of factors associated with depressive symptoms among PLWH who smoked and were receiving treatment in HIV outpatient clinics in Ha Noi, Vietnam.

METHODS

Study design

We conducted a cross-sectional analysis of data obtained from a quantitative survey of 527 smokers living with HIV. Data were collected between 12/2022 and 6/2023. The sample is a subset of participants taking part in a randomized controlled trial that compared the effectiveness of three smoking cessation interventions delivered in 13 HIV OPCs in Ha Noi, Vietnam. Participants were screened for tobacco use at the time of registration for a routine visit. Participants were eligible to enroll if they were 18 years of age or over, active patients at the OPCs, current cigarette-only or dual users (waterpipe and cigarettes), had a mobile phone, and lived in Ha Noi. An analysis of patients who declined to participate demonstrated no significant differences in gender, age, and smoking status compared with those who enrolled.

The survey was administered in person using a structured questionnaire in Vietnamese. Signed informed consent was obtained from all respondents. The institutional review boards of the Institute of Social Medical Studies (Decision 08/HDDD-ISMS) and the New York University School of Medicine (ID i19-01783) approved this research.

Measures

Dependent variable

The 8-item Center for Epidemiology Scale for Depression (CES-D 8) was used to assess depressive symptoms[30]. The CES-D 8 was validated and used in Vietnam[31]. In this study, the internal consistency of CES-D 8 was good with a Cronbach's alpha of 0.76.

Respondents were asked to rate how much of the time during the past week they experienced the following behaviors or feelings: (1) "I felt depressed"; (2) "I felt everything I did was an effort"; (3) "My sleep was restless"; (4) "I was happy"; (5) "I felt lonely"; (6) "I enjoyed life"; (7) "I felt sad"; (8) "I could not get going". Responses were coded as 0=Rarely or none of the time (less than 1 day); 1= Some or a little of the time (1-2 days); 2= Occasionally or a moderate amount of time (3-4 days); 3= Most or all of the time (5-7 days). These responses resulted in scores ranging from 0 to 24. A score of ≥ 9 identifies people with depressive symptoms[32].

Independent variables

Health status was measured using a self-rated health question asking respondents to assess their health status that included 1 = Poor, 2=Fair, 3 = Good, 4 = Very Good, and 5 = Excellent [33].

Social support was assessed using the Multidimensional Scale of Perceived Social Support Scale (MPSS)[34], which aggregates three types of social support which include significant other, family, and friends. Respondents were asked to rate 12 social support statements. Responses ranged from 1 "Strongly disagree" to 4 "Strongly agree". Mean scores were calculated for each of the three social support categories.

Tobacco dependence was assessed using the Fagerstrom Test for Nicotine Dependence which includes six items that evaluate the quantity of cigarette consumption, the compulsion to use, and dependence[35]. Measured levels of tobacco dependence ranged from a 'Very low dependence' score of 0-2 to a 'Very high dependence' score of 8-10.

Alcohol use was assessed using the Alcohol Use Disorder Identification Test–Consumption (AUDIT–C)[36]. The AUDIT-C is scored on a scale of 0-12 (scores of 0 reflect no alcohol use). Hazardous drinking was defined with a score of ≥4 among men and ≥3 among women[37].

Drug use was defined as the use of substances for psychotropic rather than medical purposes and was assessed with 2 questions that asked if respondents ever used and used in the past 3 months any Opium, Cocaine, Heroin, Amphetamine/Methamphetamine, Marijuana, Ecstasy, MDMA, and Ketamine.

HIV characteristics include years of living with HIV and duration of ART use. Having chronic diseases was assessed using one question that asked if the respondent has ever been diagnosed with any chronic diseases of High blood pressure, Diabetes, Cancer, and Lung diseases. Sociodemographic variables included sex, age, marital status, educational status, household income, occupation, and living arrangement (e.g., living with children).

Data analysis

Data were analyzed using Stata (version 14.0). Descriptive statistics were used to summarize PLWH characteristics and the prevalence of depressive symptoms. We conducted bivariate tests using a significance level of 0.05. Categorical variables were assessed via chi-square tests and continuous variables were assessed using t-tests. Multivariable analysis used Poison regression[38] to assess the associations between depression and other patient characteristics. Prevalence ratios (PR) were reported with 95% confidence intervals. Independent variables that had a p-value < 0.2 in the bivariate analyses were included in the logistic regression model [39]. P values < 0.05 were considered statistically significant.

Patient and public involvement

No patients or members of the public were involved in the design, conduct, reporting, and dissemination of the study.

RESULTS

Socio-demographic characteristics of the participants

A total of 527 PLWH were included in the study, of which 95.8% were male and 4.2% were female. This low prevalence of female smokers was consistent with the national data on cigarette smoking by sex in which only 1.1% of females smoked cigarettes[40]. The average PLWH's age was 44.3 (±7.0). In terms of marital status and living arrangements, 53.9% were married, 46.1% were single, separated, divorced, or widowed, and 70.6% lived with spouses/partners/children. Regarding education, employment, and income, 45.7% had less than a high school education, 63.4% worked in a small business, trading, services, or freelance, and 59.6% had an annual household income from 100-300 VND million (Table 1).

The mean durations of HIV diagnosis and ART treatment were 12.5 years (±6.4) and 10.1 years (±6.5).

In terms of health behavior, 48.6% were cigarette smokers only, 51.4% were dual users (smoking both cigarettes and waterpipe), 38.7% had a high/very high tobacco dependence level, 55% had hazardous drinking, 62% ever used drugs, and 18.6% used drugs in the last 3 months.

Regarding health status, 71.7% reported very poor or poor health status, and 21.8% had chronic diseases.

Prevalence and associated factors of depressive symptoms

The prevalence of depressive symptoms (CED-8 score >=9) was 38.3% (Table 1).

Table 1 shows the results of bivariate analyses examining the correlation between depressive symptoms and other factors. The prevalence of depressive symptoms was higher among PLWH who were female, unmarried, worked in small business/trading/services/freelance, lived alone,

reported a fair/poor health status, had higher tobacco dependence levels, used drugs in the past 3 months, had lower social support compared with those who were male, married, worked in the private sector or other, lived with spouse/partner/children or with others, reported a good/very good/excellence health status, had lower levels of tobacco dependence, never used drugs, and had higher social support.

Results from multivariate analyses presented in Table 2, show that gender, marital status, level of tobacco dependence, and self-reported health status were significantly associated with depressive symptoms.

The probability of having depressive symptoms was significantly higher among females (PR=1.51, 95% CI 1.02-2.22), patients who were unmarried (PR = 2.06, 95% CI 1.54-2.76), and those with higher levels of tobacco dependence (PR =1.06, 95% CI 1.01-1.11), those with a fair/poor health status (PR =1.66, 95% CI 1.22-2.26), compared with patients who were males, married, had a lower level of tobacco dependence, and reported their health as good/very good/excellent).

Table 1: PLWH's characteristics and bivariate analysis of factors associated with depressive symptoms

Characteristics	Total		Depressive symptoms				P value
			No		Yes		
	n	%/Mean ±SD	n	% /Mean±SD	n	% /Mean±SD	
Gender							
Female	22	4.2	9	40.9	13	59.1	0.041
Male	505	95.8	316	62.6	189	37.4	
Age (mean)	527	44.3±7.0	325	44.6±7.0	202	43.8±6.9	0.174
Marital status							
Single/ Never married/Separated/Divorced	243	46.1	107	44.0	136	56.0	<0.001
Married	284	53.9	218	76.8	66	23.2	
Education							
Less than high school	241	45.7	151	62.7	90	37.3	0.473
High school	193	36.6	113	58.6	80	41.4	
Vocational training/ College/University and above	93	17.7	61	65.6	32	34.4	
Occupation							
Private sector	108	20.5	71	65.7	37	34.3	0.038
Small business/ Trading/Services/Freelance	334	63.4	193	57.8	141	42.2	
Others	85	16.1	61	71.8	24	28.2	
Household income in the past 12 months							
50,000,000 - < 100,000,000	153	29.0	88	57.5	65	42.5	0.425
100,000,000 - < 300,000,000	314	59.6	200	63.7	114	36.3	
300,000,000 and over 500,000,000	57	10.8	36	63.2	21	36.8	

Characteristics	Total		Depressive symptoms				P value
			No		Yes		
	n	%/Mean ±SD	n	% /Mean±SD	n	% /Mean±SD	
Living arrangements							
Live alone	44	8.3	20	45.5	24	54.5	<0.001
Live with spouse/partner/children /grandchildren	372	70.6	257	69.1	115	30.9	
Live with others	111	21.1	48	43.2	63	56.8	
Duration of diagnosed with HIV	527	12.5±6.4	325	12.4±6.5	202	12.8±6.3	0.449
Duration of ART	527	10.1±6.5	325	10.0±5.5	202	10.3±7.9	0.643
Have depressive symptoms							
No	325	61.7					
Yes	202	38.3					
Have chronic disease							
No	412	78.2	262	63.6	150	36.4	0.086
Yes	115	21.8	63	54.8	52	45.2	
Current health status							
Good/Very good/Excellent	149	28.3	113	75.8	36	24.2	<0.001
Fair/Poor	378	71.7	212	56.1	166	43.9	
Type of smoker							
Cigarettes only	256	48.6	158	61.7	98	38.3	0.982
Dual user	271	51.4	167	61.6	104	38.4	
Tobacco dependence level							
Very low/Low	248	47.1	174	70.2	74	29.8	0.001
Medium	75	14.2	41	54.7	34	45.3	
High/Very high	204	38.7	110	53.9	94	46.1	
Tobacco dependence (score)	527	4.4±2.5	325	4.0±2.6	202	5.0±2.3	<0.001
Hazardous drinking							
No	237	45.0	136	57.4	101	42.6	0.067
Yes	290	55.0	189	65.2	101	34.8	
Drug use							
Never	102	19.4	73	71.6	29	28.4	0.026
Ever	327	62.1	200	61.2	127	38.8	
In the last 3 months	98	18.6	52	53.1	46	46.9	
Social support							
Family support score	527	3.2±0.5	325	3.2±0.5	202	3.1±0.5	0.100
Friend support score	527	2.9±0.6	325	2.9±0.5	202	2.8±0.5	0.211
Other support score	527	3.2±0.5	325	3.2±0.5	202	3.1±0.5	0.041
Total social support score (min-max: 1.33-4.33)	527	3.3±0.4	325	3.4±0.4	202	3.3±0.4	0.038

Table 2: Multivariate analysis of factors associated with depressive symptoms among PLWH using Poisson regression

Characteristics	**PR (95% CI)**	P value
Gender		
Male (ref.)	-	
Female	1.51 (1.02-2.22)	**0.039**
Age (mean)	1.00 (0.99-1.02)	0.914
Marital status		
Married (ref.)	-	
Single/ Never married/Separated/Divorced	2.06 (1.54-2.76)	**<0.001**
Occupation		
Private sector (ref.)	-	
Small business/ Trading/Services/Freelance	1.08 (0.82-1.42)	0.583
Others	0.75 (0.50-1.12)	0.166
Living arrangements		
Live alone (ref.)	-	
Live with spouse/partner/children /grandchildren	0.96 (0.68-1.35)	0.819
Live with others	1.04 (0.75-1.44)	0.815
Have chronic disease		
No (ref.)	-	
Yes	1.16 (0.94-1.45)	0.161
Current health status		
Good/Very good/Excellent (ref.)	-	
Fair/Poor	1.66 (1.22-2.26)	**0.001**
Tobacco dependence (score)	1.06 (1.01-1.11)	**0.014**
Hazardous drinking		
No (ref.)	-	
Yes	0.86 (0.71-1.05)	0.150
Drug use		
Never (ref.)	-	
Ever	1.08 (0.78-1.49)	0.647
In the last 3 months	1.08 (0.76-1.53)	0.686
Total social support score	0.91 (0.72-1.15)	0.411

DISCUSSION

This study found a high prevalence of depressive symptoms (38.3%) among PLWH who smoke and are receiving HIV care in OPCs in Vietnam. This is 16 times higher than previous reports of depressive symptoms in the general Vietnamese population (2.5%) [41]. Our findings are consistent with prior studies showing a high prevalence of depressive symptoms among PLWH compared with the general population [42, 43].

Depression is the most common mental health problem among PLWH [44, 45]. HIV-associated biological factors and psychosocial factors that include HIV stigma, occupational disability, financial difficulties, discrimination, isolation, and debilitation are the causes of the high prevalence of depressive symptoms in this population [46]. Perceived and experienced stigma and discrimination are associated with an increased risk of depression among PLWH [47-49].

Smokers living with HIV with higher levels of tobacco dependence were more likely to report higher levels of depressive symptoms compared with smokers living with HIV who had a lower level of tobacco dependence. The literature on the direction of this relationship is inconsistent [50-52]. PLWH with depression may use nicotine to elevate their mood. Alternatively, smoking may lead to depression through changes in the brain's susceptibility to environmental stress [52, 53]. Concern among clinicians about exacerbating depression symptoms has hindered the treatment of tobacco use. However, there is growing evidence that smoking cessation has beneficial effects on mental health symptoms [54]. It is critically important to develop and implement models of care that combine mental health and tobacco cessation in this population.

The prevalence of depressive symptoms among female smokers living with HIV was higher than that among male smokers living with HIV. This finding is consistent with previous studies that depression is more common among women with HIV compared to the general population, women without HIV [55], and men with HIV[56-58]. Genetic vulnerability, reproductive hormones, internalization coping strategies, gender-specific roles, and life stress account for the higher risk of depression among women[59, 60]. In addition to the biological vulnerabilities, women living with HIV experience higher levels of perceived stress, and higher levels of HIV stigma [56]. These increased stressors may consequently contribute to an increased risk of depression among women with HIV.

Consistent with other studies of PLWH [8, 61], this study found a higher prevalence of depressive symptoms among unmarried smokers living with HIV. Having a diagnosis of HIV, a disease that is associated with high levels of perceived stigma, may prevent PLWH from getting married and maintaining a marital relationship. HIV-associated stigma may lead to social isolation and loneliness among those without meaningful relationships and social ties [62]. Increased loneliness and isolation along with a lack of psychological and tangible support may increase the risk of depression among PLWH who are not married. Social support, particularly from significant others, may reduce perceived stigma and consequently reduce the risk of depression [63]. Support for PLWH is also associated with improved quality of life, reduced depression symptoms, and improved ART adherence. More data is needed on effective methods for enhancing social support in the context of HIV care.

Finally, this study, consistent with previous studies [19, 21] finds that self-reported poor health was associated with significant depressive symptoms. The direction of this relationship is also not clear and may be, in part related to concurrent tobacco use. However, the finding further highlights that optimizing quality of life and health outcomes requires addressing both mental health and tobacco use as part of routine HIV care.

There are limitations to this analysis. First**, t**he cross-sectional design does not allow for conclusions about the direction of these associations. For example, poorer health may contribute to depressive symptoms and vice versa. Second, participants were drawn from a sample of PLWH who were receiving treatment at HIV OPCs. This may, therefore, not represent the larger population of PLWH in Vietnam. However, in Vietnam, most PLWHs receive ART at OPCs. Finally, the CES-D 8 is a screening tool rather than a diagnostic instrument. This study, therefore, could only assess the prevalence of depressive symptoms among PLWH instead of the prevalence of diagnosed depression.

CONCLUSIONS

Based on these findings and prior literature, the high prevalence of co-occurring depression and tobacco use among PLWH and the individual and combined impact on health outcomes makes it imperative to support HIV treatment settings to integrate screening for both tobacco use and depression into routine care. Further focusing on enhancing social support through additional services and programs may facilitate treatment engagement and improve health outcomes [53].

Contributors: Designed the study: DS, NN. Developed data collection tools: DS, NN, TN, GG, MA, GV. Collected data: NT, YP. Analyzed data and interpreted results: TN, NT, YP. Wrote the initial draft: NN, DS. Contributed to subsequent drafts: DS, GG, MA, TN, GV. All authors reviewed and approved the final manuscript.

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Data availability statement: available upon reasonable request.

REFERENCES

1. World Health Organization. Factsheet. HIV and AIDS 2023 [Available from: https://www.who.int/news-room/fact-sheets/detail/hiv-aids.
2. Mdege ND, Shah S, Ayo-Yusuf OA, Hakim J, Siddiqi K. Tobacco use among people living with HIV: analysis of data from Demographic and Health Surveys from 28 low-income and middle-income countries. The Lancet Global Health. 2017;5(6):e578-e92.
3. Mills EJ, Bakanda C, Birungi J, Chan K, Ford N, Cooper CL, et al. Life expectancy of persons receiving combination antiretroviral therapy in low-income countries: a cohort analysis from Uganda. Ann Intern Med. 2011;155(4):209-16.
4. Parascandola M, Neta G, Bloch M, Gopal S. Colliding epidemics: research gaps and implementation science opportunities for tobacco use and HIV/AIDS in low-and middle-income countries. Journal of Smoking Cessation. 2022;2022.
5. Nguyen NPT, Tran BX, Hwang LY, Markham CM, Swartz MD, Phan HTT, et al. Prevalence of cigarette smoking and associated factors in a large sample of HIV-positive patients receiving antiretroviral therapy in Vietnam. PloS one. 2015;10(2):e0118185.

6. Abadiga M. Depression and its associated factors among HIV/AIDS patients attending ART clinics at Gimbi General hospital, West Ethiopia, 2018. BMC Res Notes. 2019;12(1):527.
7. Ciesla JA, Roberts JE. Meta-analysis of the relationship between HIV infection and risk for depressive disorders. American journal of psychiatry. 2001;158(5):725-30.
8. Mekonen T, Belete H, Fekadu W. Depressive symptoms among people with HIV/AIDS in Northwest Ethiopia: comparative study. BMJ Open. 2021;11(7):e048931.
9. Rabkin JG. HIV and depression: 2008 review and update. Current Hiv/aids Reports. 2008;5:163-71.
10. Ayano G, Tsegay L, Solomon M. Food insecurity and the risk of depression in people living with HIV/AIDS: a systematic review and meta-analysis. AIDS Research and Therapy. 2020;17(1):1-11.
11. Gritz ER, Vidrine DJ, Lazev AB, Amick BC, Arduino RC. Smoking behavior in a low-income multiethnic HIV/AIDS population. Nicotine & Tobacco Research. 2004;6(1):71-7.
12. Brown T, Morgan K. Psychological distress and substance abuse in Jamaican youths living with HIV/AIDS. West Indian Medical Journal. 2013;62(4).
13. Zhang C, Li X, Liu Y, Qiao S, Zhou Y, Shen Z, et al. Substance Use and Psychosocial Status among People Living with HIV/AIDS Who Encountered HIV Stigma in China: Stratified Analyses by Socio-Economic Status. PLOS ONE. 2016;11(11):e0165624.
14. Duko B, Geja E, Zewude M, Mekonen S. Prevalence and associated factors of depression among patients with HIV/AIDS in Hawassa, Ethiopia, cross-sectional study. Ann Gen Psychiatry. 2018;17:45.
15. Olanrewaju Gt IBA. Prevalence and Correlates of Depressive Disorders among People Living with HIV/AIDS, in North Central Nigeria. Journal of AIDS & Clinical Research. 2013;04(01).
16. Esposito CA, Steel Z, Gioi TM, Huyen TT, Tarantola D. The prevalence of depression among men living with HIV infection in Vietnam. Am J Public Health. 2009;99 Suppl 2(Suppl 2):S439-44.
17. Matsumoto S, Yamaoka K, Takahashi K, Tanuma J, Mizushima D, Do CD, et al. Social Support as a Key Protective Factor against Depression in HIV-Infected Patients: Report from large HIV clinics in Hanoi, Vietnam. Sci Rep. 2017;7(1):15489.
18. Huynh VN, To KG, Do DV, To QG, Nguyen MT. Changes in depressive symptoms and correlates in HIV+ people at An Hoa Clinic in Ho Chi Minh City, Vietnam. BMC Psychiatry. 2017;17(1):35.
19. Thai TT, Jones MK, Harris LM, Heard RC, Hills NK, Lindan CP. Symptoms of Depression in People Living with HIV in Ho Chi Minh City, Vietnam: Prevalence and Associated Factors. AIDS Behav. 2018;22(Suppl 1):76-84.
20. Green K, Tuan T, Hoang TV, Trang NN, Ha NT, Hung ND. Integrating palliative care into HIV outpatient clinical settings: preliminary findings from an intervention study in Vietnam. J Pain Symptom Manage. 2010;40(1):31-4.
21. Levintow SN, Pence BW, Ha TV, Minh NL, Sripaipan T, Latkin CA, et al. Prevalence and predictors of depressive symptoms among HIV-positive men who inject drugs in Vietnam. PLoS One. 2018;13(1):e0191548.
22. Junaid K, Afzal S, Daood M, Siddiqui M. Substance Abuse and Mental Health Issues Among HIV/AIDS Patients. Journal of the College of Physicians and Surgeons--Pakistan: JCPSP. 2023;33(3):325-34.
23. Teixeira LSL, Ceccato M, Carvalho WDS, Costa JO, Bonolo PF, Mendes JC, et al. Prevalence of smoking and associated factors in people living with HIV undergoing treatment. Rev Saude Publica. 2020;54:108.
24. Deborah Kacanek DLJ, Donna Spiegelman, Christine Wanke, Rita Isaac, and Ira B. Wilson. Incident Depression Symptoms Are Associated With Poorer HAART Adherence: A Longitudinal Analysis From the Nutrition for Healthy Living Study. Acquir Immune Defic Syndr. 2010;53.

25. Do HM, Dunne MP, Kato M, Pham CV, Nguyen KV. Factors associated with suboptimal adherence to antiretroviral therapy in Viet Nam: a cross-sectional study using audio computer-assisted self-interview (ACASI). BMC Infect Dis. 2013;13:154.
26. Meade CS, Sikkema KJ. HIV risk behavior among adults with severe mental illness: a systematic review. Clinical psychology review. 2005;25(4):433-57.
27. Ryan K, Forehand R, Solomon S, Miller C. Depressive symptoms as a link between barriers to care and sexual risk behavior of HIV-infected individuals living in non-urban areas. AIDS care. 2008;20(3):331-6.
28. Antelman G, Kaaya S, Wei R, Mbwambo J, Msamanga GI, Fawzi WW, et al. Depressive symptoms increase risk of HIV disease progression and mortality among women in Tanzania. J Acquir Immune Defic Syndr. 2007;44(4):470-7.
29. Kingori C, Haile ZT, Ngatia P. Depression symptoms, social support and overall health among HIV-positive individuals in Kenya. Int J STD AIDS. 2015;26(3):165-72.
30. Radloff LS. The CES-D scale: A self-report depression scale for research in the general population. Applied psychological measurement. 1977;1(3):385-401.
31. Moulis L, Le SM, Hai VV, Huong DT, Minh KP, Oanh KTH, et al. Gender, homelessness, hospitalization and methamphetamine use fuel depression among people who inject drugs: implications for innovative prevention and care strategies. Frontiers in Psychiatry. 2023;14.
32. Briggs R, Carey D, O'Halloran AM, Kenny RA, Kennelly SP. Validation of the 8-item Centre for Epidemiological Studies Depression Scale in a cohort of community-dwelling older people: data from The Irish Longitudinal Study on Ageing (TILDA). Eur Geriatr Med. 2018;9(1):121-6.
33. Herdman M, Gudex C, Lloyd A, Janssen M, Kind P, Parkin D, et al. Development and preliminary testing of the new five-level version of EQ-5D (EQ-5D-5L). Quality of life research. 2011;20(10):1727-36.
34. Zimet GD, Dahlem NW, Zimet SG, Farley GK. The multidimensional scale of perceived social support. Journal of personality assessment. 1988;52(1):30-41.
35. Heatherton TF, Kozlowski LT, Frecker RC, Fagerstrom KO. The Fagerström test for nicotine dependence: a revision of the Fagerstrom Tolerance Questionnaire. British journal of addiction. 1991;86(9):1119-27.
36. Bush K, Kivlahan DR, McDonell MB, Fihn SD, Bradley KA. The AUDIT alcohol consumption questions (AUDIT-C): an effective brief screening test for problem drinking. Archives of internal medicine. 1998;158(16):1789-95.
37. Bradley KA, DeBenedetti AF, Volk RJ, Williams EC, Frank D, Kivlahan DR. AUDIT-C as a brief screen for alcohol misuse in primary care. Alcohol Clin Exp Res. 2007;31(7):1208-17.
38. Barros AJ, Hirakata VN. Alternatives for logistic regression in cross-sectional studies: an empirical comparison of models that directly estimate the prevalence ratio. BMC Med Res Methodol. 2003;3:21.
39. Vittinghoff E, Shiboski S, Glidden D, McCulloch C. Regression Methods in Biostatistics: Linear, Logistic, Survival and Repeated Measures Models. New York: Springer; 2011.
40. Van Minh H, Giang KB, Ngoc NB, Hai PT, Huyen DT, Khue LN, et al. Prevalence of tobacco smoking in Vietnam: findings from the Global Adult Tobacco Survey 2015. Int J Public Health. 2017;62(Suppl 1):121-9.
41. World Health Organization. Factsheet. Mental Health in Vietnam [Available from: https://www.who.int/vietnam/health-topics/mental-health.
42. Jeffrey A. Ciesla MAJER, Ph.D. Meta-Analysis of the Relationship Between HIV Infection and Risk for Depressive Disorders. Am J Psychiatry. 2001.
43. Rabkin JG. HIV and Depression: 2008 Review and Update. 2008.
44. Adams C, Zacharia S, Masters L, Coffey C, Catalan P. Mental health problems in people living with HIV: changes in the last two decades: the London experience 1990-2014. AIDS Care. 2016;28 Suppl 1(sup1):56-9.
45. Gaynes BN, Pence BW, Eron JJ, Miller WC. Prevalence and comorbidity of psychiatric diagnoses based on reference standard in an HIV+ patient population. Psychosom Med. 2008;70(4):505-11.

46. Arseniou S, Arvaniti A, Samakouri M. HIV infection and depression. Psychiatry Clin Neurosci. 2014;68(2):96-109.
47. Tran BX, Dang AK, Truong NT, Ha GH, Nguyen HLT, Do HN, et al. Depression and Quality of Life among Patients Living with HIV/AIDS in the Era of Universal Treatment Access in Vietnam. Int J Environ Res Public Health. 2018;15(12).
48. Seid S, Abdu O, Mitiku M, Tamirat KS. Prevalence of depression and associated factors among HIV/AIDS patients attending antiretroviral therapy clinic at Dessie referral hospital, South Wollo, Ethiopia. Int J Ment Health Syst. 2020;14:55.
49. Hankebo M, Fikru C, Lemma L, Aregago G. Depression and Associated Factors among People Living with Human Immunodeficiency Virus Attending Antiretroviral Therapy in Public Health Facilities, Hosanna Town, Southern Ethiopia. Depress Res Treat. 2023;2023:7665247.
50. Prochaska JJ. Smoking and mental illness—breaking the link. New England Journal of Medicine. 2011;365(3):196-8.
51. Leventhal AM, Zvolensky MJ. Anxiety, depression, and cigarette smoking: A transdiagnostic vulnerability framework to understanding emotion–smoking comorbidity. Psychological bulletin. 2015;141(1):176.
52. Fluharty M, Taylor AE, Grabski M, Munafo MR. The Association of Cigarette Smoking With Depression and Anxiety: A Systematic Review. Nicotine Tob Res. 2017;19(1):3-13.
53. Rubin LF, Haaga DA, Pearson JL, Gunthert KC. Depression as a moderator of the prospective relationship between mood and smoking. Health Psychology. 2020;39(2):99.
54. Taylor G, McNeill A, Girling A, Farley A, Lindson-Hawley N, Aveyard P. Change in mental health after smoking cessation: systematic review and meta-analysis. Bmj. 2014;348.
55. Kessler RC. Epidemiology of women and depression. J Affect Disord. 2003;74(1):5-13.
56. Waldron EM, Burnett-Zeigler I, Wee V, Ng YW, Koenig LJ, Pederson AB, et al. Mental Health in Women Living With HIV: The Unique and Unmet Needs. J Int Assoc Provid AIDS Care. 2021;20:2325958220985665.
57. Carmo Filho A, Fakoury MK, Eyer-Silva Wde A, Neves-Motta R, Kalil RS, Ferry FR. Factors associated with a diagnosis of major depression among HIV-infected elderly patients. Rev Soc Bras Med Trop. 2013;46(3):352-4.
58. Chibanda D, Cowan F, Gibson L, Weiss HA, Lund C. Prevalence and correlates of probable common mental disorders in a population with high prevalence of HIV in Zimbabwe. BMC Psychiatry. 2016;16:55.
59. Accortt EE, Freeman MP, Allen JJ. Women and major depressive disorder: clinical perspectives on causal pathways. J Womens Health (Larchmt). 2008;17(10):1583-90.
60. Noble RE. Depression in women. Metabolism. 2005;54(5 Suppl 1):49-52.
61. Bhatia MS, Munjal S. Prevalence of Depression in People Living with HIV/AIDS Undergoing ART and Factors Associated with it. J Clin Diagn Res. 2014;8(10):WC01-4.
62. Lichtenstein B, Laska MK, Clair JM. Chronic sorrow in the HIV-positive patient: issues of race, gender, and social support. AIDS Patient Care STDS. 2002;16(1):27-38.
63. Badru OA, Babalola OE. Significant Others and Not Family or Friend Support Mediate Between Stigma and Discrimination Among People Living With HIV in Lagos State, Nigeria: A Cross-sectional Study. Journal of the Association of Nurses in AIDS Care. 2023;34(1):96-104.

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		Reporting Item	Page Number
Title and abstract			
Title	#1a	Indicate the study's design with a commonly used term in the title or the abstract	1
Abstract	#1b	Provide in the abstract an informative and balanced summary of what was done and what was found	1
Introduction			
Background / rationale	#2	Explain the scientific background and rationale for the investigation being reported	2
Objectives	#3	State specific objectives, including any prespecified hypotheses	2
Methods			
Study design	#4	Present key elements of study design early in the paper	2
Setting	#5	Describe the setting, locations, and relevant dates, including periods of	2

		recruitment, exposure, follow-up, and data collection	
Eligibility criteria	#6a	Give the eligibility criteria, and the sources and methods of selection of participants.	2
	#7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	3
Data sources / measurement	#8	For each variable of interest give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group. Give information separately for for exposed and unexposed groups if applicable.	3
Bias	#9	Describe any efforts to address potential sources of bias	3
Study size	#10	Explain how the study size was arrived at	2
Quantitative variables	#11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen, and why	3
Statistical methods	#12a	Describe all statistical methods, including those used to control for confounding	3
Statistical methods	#12b	Describe any methods used to examine subgroups and interactions	3
Statistical methods	#12c	Explain how missing data were addressed	3
Statistical methods	#12d	If applicable, describe analytical methods taking account of sampling strategy	3
Statistical methods	#12e	Describe any sensitivity analyses	3
Results			
Participants	#13a	Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed. Give information separately for for exposed and unexposed groups if applicable.	4
Participants	#13b	Give reasons for non-participation at each stage	4
Participants	#13c	Consider use of a flow diagram	4

Descriptive data	#14a	Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders. Give information separately for exposed and unexposed groups if applicable.	4
Descriptive data	#14b	Indicate number of participants with missing data for each variable of interest	4
Outcome data	#15	Report numbers of outcome events or summary measures. Give information separately for exposed and unexposed groups if applicable.	5
Main results	#16a	Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	4-7
Main results	#16b	Report category boundaries when continuous variables were categorized	4-7
Main results	#16c	If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	4-7
Other analyses	#17	Report other analyses done—e.g., analyses of subgroups and interactions, and sensitivity analyses	4-7
Discussion			
Key results	#18	Summarise key results with reference to study objectives	8
Limitations	#19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias.	8
Interpretation	#20	Give a cautious overall interpretation considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence.	8
Generalisability	#21	Discuss the generalisability (external validity) of the study results	8
Other Information			
Funding	#22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	8

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Depression and associated factors among HIV-positive smokers receiving care at HIV outpatient clinics in Vietnam: a cross-sectional analysis

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ABSTRACT

Objectives

To assess the prevalence of depressive symptoms and associated factors among people living with HIV (PLWH) who were current cigarette smokers and receiving treatment at HIV outpatient clinics (OPCs) in Vietnam.

Design

A cross-sectional survey of smokers living with HIV.

Setting

The study was carried out in 13 HIV outpatient clinics located in Ha Noi, Vietnam.

Participants

The study included 527 people living with HIV aged 18 and above who were smokers and were receiving treatment at HIV outpatient clinics.

Outcome measures

The study used the Center for Epidemiology Scale for Depression (CES-D 8) to assess depressive symptoms. The associations between depressive symptoms, tobacco dependence, and other characteristics were explored using Bivariate and Poisson regression analyses.

Results

The prevalence of depressive symptoms among smokers living with HIV was 38.3%. HIV-positive smokers who were female (PR=1.51, 95% CI 1.02-2.22), unmarried (PR = 2.06, 95% CI 1.54-2.76), had a higher level of tobacco dependence (PR =1.06, 95% CI 1.01-1.11), and reported their health as fair or poor (PR =1.66, 95% CI 1.22-2.26) were more likely to have depression symptoms compared with HIV-positive smokers who were male, married, had a lower level of tobacco dependence, and self-reported their health as good, very good, or excellent.

Conclusion

The prevalence of depressive symptoms among smokers receiving HIV care at HIV outpatient clinics was high. Both depression and tobacco use screening and treatment should be included as part of ongoing care treatment plans at HIV outpatient clinics.

Keywords: Depression; depressive symptoms; tobacco use; HIV; people living with HIV; Vietnam; low-and middle-income country.

Strengths and limitations of this study

- The study used the CES-D 8, a validated scale to screen depressive symptoms, and was conducted with a large sample of smokers living with HIV and receiving treatment at HIV outpatient clinics.
- Using the CES-D 8, which is a screening tool rather than a diagnostic instrument, this study could only assess the prevalence of depressive symptoms among PLWH instead of the prevalence of diagnosed depression.
- The study employed Poisson regression to estimate Prevalence Ratios, a more robust approach than logistic regression for analyzing cross-sectional studies with binary outcomes.
- The cross-sectional design did not allow for conclusions about the direction of the associations between depression and other factors.
- The study sample, which PLWH who were receiving treatment at HIV outpatient clinics, may not represent the larger population of PLWH in Vietnam.

INTRODUCTION

HIV infection remains a significant public health issue, with over 38 million people living with HIV (PLWH) globally [1]. With increased access to antiretroviral medication, HIV infection has become a manageable chronic health condition with a lifespan comparable to that of the general population [2, 3]. However, the growing burden of non-communicable diseases (NCDs) threatens gains in life expectancy among PLWH [4]. This is in part due to high rates of tobacco use in this population, particularly in LMIC countries like Vietnam, where smoking prevalence among male PLWH is over 50% [4, 5]. PLWH who use tobacco are at an increased risk of HIV and non-HIV-related chronic diseases that include cancer and cardiovascular diseases compared to PLWH who do not smoke [6].

PLWH experience other risk factors for poor health that include higher rates of depression compared with the general population [7-9]. Prevalence estimates for depression among PLWH range widely from 25.6% to 56.7% [6, 10-15]. Studies conducted in Vietnam show a similarly high prevalence of depression among PLWH, ranging from 18.7% to 44% [16-21].

Depression is common among smokers, particularly among smokers living with HIV [22, 23]. The high co-occurrence of smoking and depression in this population is a significant public health concern. Depression may contribute to lower smoking cessation rates, negatively impacts adherence to ART, and is associated with faster progression of the disease and a higher prevalence of other health risk behaviors, including alcohol abuse and drug use and poorer health outcomes [22, 24-29].

Despite the deleterious effects of the co-occurrence of depression and tobacco use on health outcomes among PLWH, there is a lack of data on the correlates of depression in this population. To begin to fill this gap in research, we conducted a cross-sectional analysis of factors associated with depressive symptoms among PLWH who smoked and were receiving treatment in HIV outpatient clinics in Ha Noi, Vietnam.

METHODS

Study design

We analyzed data from baseline surveys conducted with 527 patients living with HIV who were enrolled in a randomized controlled trial (RCT) that compared the effectiveness of three smoking cessation interventions among PLWH who received care from 13 HIV outpatient clinics in Ha Noi, Vietnam. The surveys were conducted between 12/2022 and 6/2023. Participants were screened for tobacco use at the time of registration for a routine visit. Participants were eligible to enroll if they were 18 or older, active patients at the OPCs, current cigarette-only or dual users (water pipes and cigarettes), had a mobile phone, and lived in Ha Noi. Our analysis revealed no significant differences in gender, age, and smoking status between patients who declined to participate and those who enrolled in the study.

The survey was administered in person using a structured questionnaire in Vietnamese. All participants provided written informed consent. The institutional review boards of the Institute of Social Medical Studies (Decision 08/HDDD-ISMS) and the New York University School of Medicine (ID i19-01783) approved this research.

Measures

Dependent variable

The study used the 8-item Center for Epidemiology Scale for Depression (CES-D 8) to assess depressive symptoms[30]. The CES-D 8 was previously validated in Vietnam[31]. In this study, Cronbach's alpha was 0.76, demonstrating a high level of internal consistency of the CES-D 8.

The survey asked respondents how often they experienced certain feelings in the past week. These include feeling depressed, feeling that everything they did was an effort, having restless sleep, feeling happy, feeling lonely, enjoying life, feeling sad, and having difficulty getting going. Responses were coded as 0=Rarely or none of the time (less than one day); 1= Some or a little of the time (1-2 days); 2= Occasionally or a moderate amount of time (3-4 days); 3= Most or all of the time (5-7 days). Scores can range from 0 to 24. A score of $\geq$ 9 indicates the presence of depressive symptoms. [32].

Independent variables

Health status was measured using a single question: "Would you say your health in general is excellent, very good, good, fair, or poor?" where 1 = Poor, 2= Fair, 3 = Good, 4 = Very Good, and 5 = Excellent [33].

Social support was assessed using the Multidimensional Scale of Perceived Social Support Scale (MPSS)[34], which aggregates three types of social support: significant other, family, and friends. Respondents were asked to rate 12 social support statements on a scale of 1 to 4, where 1 indicated "Strongly disagree" and 4 indicated "Strongly agree". The mean scores for each of the three social support categories were calculated.

Tobacco dependence was assessed using the Fagerstrom Test for Nicotine Dependence, which consists of six items that evaluate the quantity of cigarette consumption, the compulsion to use, and dependence[35]. The measured levels of tobacco dependence ranged from 'Very low dependence' with a score of 0-2 to 'Very high dependence' with a score of 8-10.

Alcohol use was assessed using the Alcohol Use Disorder Identification Test–Consumption (AUDIT–C)[36]. The AUDIT-C scale ranges from 0 to 12. Hazardous drinking was defined as a score of ≥4 for men and ≥3 for women [37].

Drug use was defined as the use of substances for psychotropic rather than medical purposes. The assessment of drug use was based on two questions that asked if respondents had ever used, and if they used in the past three months, any of the following substances: Opium, Cocaine, Heroin, Amphetamine/Methamphetamine, Marijuana, Ecstasy, MDMA, and Ketamine.

HIV characteristics include the number of years a person has lived with HIV and the duration of ART use. Having a chronic disease was assessed using one question that asked if the respondent has ever been diagnosed with any of the following chronic diseases: high blood pressure, diabetes, cancer, and lung disease. Sociodemographic variables include sex, age, marital status, educational status, household income, occupation, and living arrangements (e.g., living with children).

Data analysis

The data were analyzed using Stata (version 14.0). Descriptive statistics were used to summarize the characteristics of PLWH and the prevalence of depressive symptoms. Bivariate tests were conducted with a significance level of 0.05. Categorical variables were assessed via chi-square tests, while continuous variables were assessed using t-tests. Multivariable analysis was performed using Poison regression[38] to evaluate the associations between depression and other patient characteristics. Prevalence ratios (PR) were reported along with 95% confidence intervals. Independent variables that had a p-value < 0.2 in the bivariate analyses were included in the logistic regression model [39]. P values < 0.05 were considered statistically significant.

Patient and public involvement

No patients or members of the public were involved in the design, conduct, reporting, and dissemination of the study.

RESULTS

Socio-demographic characteristics of the participants

A total of 527 PLWH were included in the study, of which 95.8% were male and 4.2% were female. This low prevalence of female smokers was consistent with national data demonstrating that less than 2% of women in Vietnam smoke cigarettes [40]. The average age of PLWH was 44.3 (±7.0). In terms of marital status and living arrangements, 53.9% of participants were married, while 46.1% were single, separated, divorced, or widowed, and 70.6% lived with spouses, partners, and children. Regarding education, employment, and income, 45.7% of participants had not completed high school education, 63.4% worked in small businesses, trading, services, or freelance, and 59.6% had an annual household income from 100-300 VND million (Table 1).
The mean duration of HIV diagnosis and ART treatment was 12.5 years (±6.4) and 10.1 years (±6.5).
In terms of health behavior, 48.6% were cigarette-only smokers, while 51.4% were dual users, meaning they smoked both cigarettes and water pipes. Moreover, 38.7% had a high or very high level of tobacco dependence, 55% had hazardous drinking habits, 62% reported having ever used drugs, and 18.6% had used drugs in the last three months.
Regarding health status, 71.7% reported very poor or poor health status, and 21.8% had at least one chronic disease.

Prevalence and associated factors of depressive symptoms

The prevalence of depressive symptoms, as measured by a CED-8 score of 9 or higher, was 38.3% (Table 1).
Table 1 shows the results of bivariate analyses that examined the correlation between depressive symptoms and other patient characteristics. The prevalence of depressive symptoms was higher among PLWH who were female, unmarried, worked in small business, trading, services, and freelance, lived alone, reported fair or poor health status, had higher tobacco dependence levels, used drugs in the past three months, and reported lower levels of social support. In comparison, those who were male, married, worked in the private sector or other, lived with a spouse, partner, children, or with others, reported good, very good, or excellent health status, had lower levels of tobacco dependence, never used drugs, and had higher social support had a lower prevalence of depressive symptoms.

Table 2 presents results from multivariate analyses indicating significant associations between depressive symptoms and gender, marital status, level of tobacco dependence, and self-reported health status.

The probability of having depressive symptoms was significantly higher among females (PR=1.51, 95% CI 1.02-2.22), unmarried patients (PR = 2.06, 95% CI 1.54-2.76), patients with higher levels of tobacco dependence (PR =1.06, 95% CI 1.01-1.11), and those with fair or poor health status (PR =1.66, 95% CI 1.22-2.26), compared with patients who were males, married, had a lower level of tobacco dependence, and reported good, very good, or excellent health status.

Table 1: PLWH's characteristics and bivariate analysis of factors associated with depressive symptoms

Characteristics	Total		Depressive symptoms				P value
			No		Yes		
	n	%/Mean ±SD	n	% /Mean±SD	n	% /Mean±SD	
Gender							
Female	22	4.2	9	40.9	13	59.1	0.041
Male	505	95.8	316	62.6	189	37.4	
Age (mean)	527	44.3±7.0	325	44.6±7.0	202	43.8±6.9	0.174
Marital status							
Single/ Never married/Separated/Divorced	243	46.1	107	44.0	136	56.0	<0.001
Married	284	53.9	218	76.8	66	23.2	
Education							
Less than high school	241	45.7	151	62.7	90	37.3	0.473
High school	193	36.6	113	58.6	80	41.4	
Vocational training/ College/University and above	93	17.7	61	65.6	32	34.4	
Occupation							
Private sector	108	20.5	71	65.7	37	34.3	0.038
Small business/ Trading/Services/Freelance	334	63.4	193	57.8	141	42.2	
Others	85	16.1	61	71.8	24	28.2	

Characteristics	Total		Depressive symptoms				P value
			No		Yes		
	n	%/Mean ±SD	n	% /Mean±SD	n	% /Mean±SD	
Household income in the past 12 months							
50,000,000 - < 100,000,000	153	29.0	88	57.5	65	42.5	0.425
100,000,000 - < 300,000,000	314	59.6	200	63.7	114	36.3	
300,000,000 and over 500,000,000	57	10.8	36	63.2	21	36.8	
Living arrangements							
Live alone	44	8.3	20	45.5	24	54.5	<0.001
Live with spouse/partner/children /grandchildren	372	70.6	257	69.1	115	30.9	
Live with others	111	21.1	48	43.2	63	56.8	
Duration of diagnosed with HIV	527	12.5±6.4	325	12.4±6.5	202	12.8±6.3	0.449
Duration of ART	527	10.1±6.5	325	10.0±5.5	202	10.3±7.9	0.643
Have depressive symptoms							
No	325	61.7					
Yes	202	38.3					
Have a chronic disease							
No	412	78.2	262	63.6	150	36.4	0.086
Yes	115	21.8	63	54.8	52	45.2	
Current health status							
Good/Very good/Excellent	149	28.3	113	75.8	36	24.2	<0.001
Fair/Poor	378	71.7	212	56.1	166	43.9	
Type of smoker							
Cigarettes only	256	48.6	158	61.7	98	38.3	0.982
Dual user	271	51.4	167	61.6	104	38.4	
Tobacco dependence level							
Very low/Low	248	47.1	174	70.2	74	29.8	0.001
Medium	75	14.2	41	54.7	34	45.3	
High/Very high	204	38.7	110	53.9	94	46.1	
Tobacco dependence (score)	527	4.4±2.5	325	4.0±2.6	202	5.0±2.3	<0.001
Hazardous drinking							
No	237	45.0	136	57.4	101	42.6	0.067
Yes	290	55.0	189	65.2	101	34.8	
Drug use							
Never	102	19.4	73	71.6	29	28.4	0.026
Ever	327	62.1	200	61.2	127	38.8	
In the last 3 months	98	18.6	52	53.1	46	46.9	
Social support							
Family support score	527	3.2±0.5	325	3.2±0.5	202	3.1±0.5	0.100

Characteristics	Total		Depressive symptoms				P value
			No		Yes		
	n	%/Mean ±SD	n	% /Mean±SD	n	% /Mean±SD	
Friend support score	527	2.9±0.6	325	2.9±0.5	202	2.8±0.5	0.211
Other support score	527	3.2±0.5	325	3.2±0.5	202	3.1±0.5	0.041
Total social support score (min-max: 1.33-4.33)	527	3.3±0.4	325	3.4±0.4	202	3.3±0.4	0.038

Table 2: Multivariate analysis of factors associated with depressive symptoms among PLWH using Poisson regression

Characteristics	PR (95% CI)	P value
Gender		
Male (ref.)	-	
Female	1.51 (1.02-2.22)	**0.039**
Age (mean)	1.00 (0.99-1.02)	0.914
Marital status		
Married (ref.)	-	
Single/ Never married/Separated/Divorced	2.06 (1.54-2.76)	**<0.001**
Occupation		
Private sector (ref.)	-	
Small business/ Trading/Services/Freelance	1.08 (0.82-1.42)	0.583
Others	0.75 (0.50-1.12)	0.166
Living arrangements		
Live alone (ref.)	-	
Live with spouse/partner/children /grandchildren	0.96 (0.68-1.35)	0.819
Live with others	1.04 (0.75-1.44)	0.815
Have a chronic disease		
No (ref.)	-	
Yes	1.16 (0.94-1.45)	0.161
Current health status		
Good/Very good/Excellent (ref.)	-	
Fair/Poor	1.66 (1.22-2.26)	**0.001**
Tobacco dependence (score)	1.06 (1.01-1.11)	**0.014**
Hazardous drinking		
No (ref.)	-	

Yes	0.86 (0.71-1.05)	0.150
Drug use		
Never (ref.)	-	
Ever	1.08 (0.78-1.49)	0.647
In the last 3 months	1.08 (0.76-1.53)	0.686
Total social support score	0.91 (0.72-1.15)	0.411

DISCUSSION

This study found a high prevalence of depressive symptoms (38.3%) among PLWH who smoked and were receiving HIV care in OPCs in Vietnam. This prevalence is 16 times higher than the previously reported prevalence of depressive symptoms in the general Vietnamese population (2.5%) [41]. Our findings are consistent with prior studies showing a high prevalence of depressive symptoms among PLWH compared to the general population [42, 43].

Depression is the most common mental health problem among PLWH [44, 45]. The high prevalence of depressive symptoms in this population is attributed to HIV-associated biological factors and psychosocial factors, which include occupational disability, financial difficulties, stigma, discrimination, isolation, and debilitation [46][47-49].

We found that smokers living with HIV with higher levels of tobacco dependence were more likely to report higher levels of depressive symptoms compared with smokers living with HIV who had a lower level of tobacco dependence. The literature on the direction of this relationship is inconsistent [50-52]. PLWH with depression may use nicotine to elevate their mood. On the other hand, smoking may lead to depression through changes in the brain's susceptibility to environmental stress [52, 53]. Concern among clinicians about exacerbating depression symptoms has hindered the treatment of tobacco use. However, there is growing evidence that suggests that smoking cessation has beneficial effects on mental health symptoms [54]. It is critically important to develop and implement models of care that combine mental health and tobacco cessation for this population.

The prevalence of depressive symptoms among female smokers living with HIV was higher than that among male smokers living with HIV. This finding is consistent with previous studies that depression is more common among women with HIV compared to the general population, women without HIV [55], and men with HIV[56-58]. Women are at a higher risk of depression due to a variety of factors, including genetic vulnerability, reproductive hormones, internalization coping strategies, gender-specific roles, and life stress [59, 60]. In addition, women living with HIV experience higher levels of perceived stress and HIV stigma [56]. These added stressors may consequently contribute to an increased risk of depression among women with HIV.

Consistent with other studies on PLWH [8, 61], this study found a higher prevalence of depressive symptoms among unmarried smokers living with HIV. Having a diagnosis of HIV, a disease that is associated with high levels of perceived stigma, may prevent PLWH from entering and maintaining a marital relationship. HIV-associated stigma may lead to social isolation and loneliness for those without meaningful relationships and social ties [62]. Increased loneliness and isolation, along with a lack of psychological and tangible support, may increase the risk of depression among PLWH who are not married. Social support, particularly from significant others,

can reduce perceived stigma and consequently decrease the risk of depression and is also associated with improved quality of life, reduced symptoms of depression, and better adherence to ART [63]. More research is needed to identify effective methods for enhancing social support in the context of HIV care.

Finally, this study is consistent with previous studies [19, 21] that found an association between self-reported poor health and depressive symptoms. The direction of this relationship is also not clear and may, in part, be related to concurrent tobacco use. However, the finding further highlights that optimizing quality of life and health outcomes requires addressing both mental health and tobacco use as part of routine HIV care.

There are some limitations to this analysis. First**,** the cross-sectional design does not allow for conclusions about the direction of the associations. For example, poorer health may contribute to depressive symptoms and vice versa. Second, participants were drawn from a sample of PLWH who were receiving treatment at HIV OPCs. Therefore, this sample of PLWH may not represent the larger population of PLWH in Vietnam. However, most PLWH in Vietnam receive ART at OPCs. Lastly, the CES-D 8 is a screening tool rather than a diagnostic instrument. As a result, this study was only able to assess the prevalence of depressive symptoms among PLWH rather than the prevalence of diagnosed depression.

CONCLUSIONS

Findings from this study and prior literature indicate that there is a high prevalence of co-occurring depression and tobacco use among PLWH, which negatively impacts disease progression and health outcomes in this population. Thus, it is imperative to provide resources and training to integrate screening and effective treatment for both tobacco use and depression into routine care in HIV treatment settings. Further enhancing social support through additional services and programs may facilitate engagement in tobacco use treatment and improve health outcomes among PLWH who smoke [53].

Contributors: Designed the study: DS, NN. Developed data collection tools: DS, NN, TN, GG, MA, GV. Collected data: NT, YP. Analyzed data and interpreted results: TN, NT, YP. Wrote the initial draft: NN, DS. Contributed to subsequent drafts: DS, GG, MA, TN, GV. All authors reviewed and approved the final manuscript.

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REFERENCES

1. World Health Organization. Factsheet. HIV and AIDS 2023 [Available from: https://www.who.int/news-room/fact-sheets/detail/hiv-aids.
2. Mdege ND, Shah S, Ayo-Yusuf OA, Hakim J, Siddiqi K. Tobacco use among people living with HIV: analysis of data from Demographic and Health Surveys from 28 low-income and middle-income countries. The Lancet Global Health. 2017;5(6):e578-e92.
3. Mills EJ, Bakanda C, Birungi J, Chan K, Ford N, Cooper CL, et al. Life expectancy of persons receiving combination antiretroviral therapy in low-income countries: a cohort analysis from Uganda. Ann Intern Med. 2011;155(4):209-16.
4. Parascandola M, Neta G, Bloch M, Gopal S. Colliding epidemics: research gaps and implementation science opportunities for tobacco use and HIV/AIDS in low-and middle-income countries. Journal of Smoking Cessation. 2022;2022.
5. Nguyen NPT, Tran BX, Hwang LY, Markham CM, Swartz MD, Phan HTT, et al. Prevalence of cigarette smoking and associated factors in a large sample of HIV-positive patients receiving antiretroviral therapy in Vietnam. PloS one. 2015;10(2):e0118185.
6. Abadiga M. Depression and its associated factors among HIV/AIDS patients attending ART clinics at Gimbi General hospital, West Ethiopia, 2018. BMC Res Notes. 2019;12(1):527.
7. Ciesla JA, Roberts JE. Meta-analysis of the relationship between HIV infection and risk for depressive disorders. American journal of psychiatry. 2001;158(5):725-30.
8. Mekonen T, Belete H, Fekadu W. Depressive symptoms among people with HIV/AIDS in Northwest Ethiopia: comparative study. BMJ Open. 2021;11(7):e048931.
9. Rabkin JG. HIV and depression: 2008 review and update. Current Hiv/aids Reports. 2008;5:163-71.
10. Ayano G, Tsegay L, Solomon M. Food insecurity and the risk of depression in people living with HIV/AIDS: a systematic review and meta-analysis. AIDS Research and Therapy. 2020;17(1):1-11.
11. Gritz ER, Vidrine DJ, Lazev AB, Amick BC, Arduino RC. Smoking behavior in a low-income multiethnic HIV/AIDS population. Nicotine & Tobacco Research. 2004;6(1):71-7.
12. Brown T, Morgan K. Psychological distress and substance abuse in Jamaican youths living with HIV/AIDS. West Indian Medical Journal. 2013;62(4).
13. Zhang C, Li X, Liu Y, Qiao S, Zhou Y, Shen Z, et al. Substance Use and Psychosocial Status among People Living with HIV/AIDS Who Encountered HIV Stigma in China: Stratified Analyses by Socio-Economic Status. PLOS ONE. 2016;11(11):e0165624.
14. Duko B, Geja E, Zewude M, Mekonen S. Prevalence and associated factors of depression among patients with HIV/AIDS in Hawassa, Ethiopia, cross-sectional study. Ann Gen Psychiatry. 2018;17:45.
15. Olanrewaju Gt IBA. Prevalence and Correlates of Depressive Disorders among People Living with HIV/AIDS, in North Central Nigeria. Journal of AIDS & Clinical Research. 2013;04(01).
16. Esposito CA, Steel Z, Gioi TM, Huyen TT, Tarantola D. The prevalence of depression among men living with HIV infection in Vietnam. Am J Public Health. 2009;99 Suppl 2(Suppl 2):S439-44.
17. Matsumoto S, Yamaoka K, Takahashi K, Tanuma J, Mizushima D, Do CD, et al. Social Support as a Key Protective Factor against Depression in HIV-Infected Patients: Report from large HIV clinics in Hanoi, Vietnam. Sci Rep. 2017;7(1):15489.
18. Huynh VN, To KG, Do DV, To QG, Nguyen MT. Changes in depressive symptoms and correlates in HIV+ people at An Hoa Clinic in Ho Chi Minh City, Vietnam. BMC Psychiatry. 2017;17(1):35.
19. Thai TT, Jones MK, Harris LM, Heard RC, Hills NK, Lindan CP. Symptoms of Depression in People Living with HIV in Ho Chi Minh City, Vietnam: Prevalence and Associated Factors. AIDS Behav. 2018;22(Suppl 1):76-84.

20. Green K, Tuan T, Hoang TV, Trang NN, Ha NT, Hung ND. Integrating palliative care into HIV outpatient clinical settings: preliminary findings from an intervention study in Vietnam. J Pain Symptom Manage. 2010;40(1):31-4.
21. Levintow SN, Pence BW, Ha TV, Minh NL, Sripaipan T, Latkin CA, et al. Prevalence and predictors of depressive symptoms among HIV-positive men who inject drugs in Vietnam. PLoS One. 2018;13(1):e0191548.
22. Junaid K, Afzal S, Daood M, Siddiqui M. Substance Abuse and Mental Health Issues Among HIV/AIDS Patients. Journal of the College of Physicians and Surgeons--Pakistan: JCPSP. 2023;33(3):325-34.
23. Teixeira LSL, Ceccato M, Carvalho WDS, Costa JO, Bonolo PF, Mendes JC, et al. Prevalence of smoking and associated factors in people living with HIV undergoing treatment. Rev Saude Publica. 2020;54:108.
24. Deborah Kacanek DLJ, Donna Spiegelman, Christine Wanke, Rita Isaac, and Ira B. Wilson. Incident Depression Symptoms Are Associated With Poorer HAART Adherence: A Longitudinal Analysis From the Nutrition for Healthy Living Study. Acquir Immune Defic Syndr. 2010;53.
25. Do HM, Dunne MP, Kato M, Pham CV, Nguyen KV. Factors associated with suboptimal adherence to antiretroviral therapy in Viet Nam: a cross-sectional study using audio computer-assisted self-interview (ACASI). BMC Infect Dis. 2013;13:154.
26. Meade CS, Sikkema KJ. HIV risk behavior among adults with severe mental illness: a systematic review. Clinical psychology review. 2005;25(4):433-57.
27. Ryan K, Forehand R, Solomon S, Miller C. Depressive symptoms as a link between barriers to care and sexual risk behavior of HIV-infected individuals living in non-urban areas. AIDS care. 2008;20(3):331-6.
28. Antelman G, Kaaya S, Wei R, Mbwambo J, Msamanga GI, Fawzi WW, et al. Depressive symptoms increase risk of HIV disease progression and mortality among women in Tanzania. J Acquir Immune Defic Syndr. 2007;44(4):470-7.
29. Kingori C, Haile ZT, Ngatia P. Depression symptoms, social support and overall health among HIV-positive individuals in Kenya. Int J STD AIDS. 2015;26(3):165-72.
30. Radloff LS. The CES-D scale: A self-report depression scale for research in the general population. Applied psychological measurement. 1977;1(3):385-401.
31. Moulis L, Le SM, Hai VV, Huong DT, Minh KP, Oanh KTH, et al. Gender, homelessness, hospitalization and methamphetamine use fuel depression among people who inject drugs: implications for innovative prevention and care strategies. Frontiers in Psychiatry. 2023;14.
32. Briggs R, Carey D, O'Halloran AM, Kenny RA, Kennelly SP. Validation of the 8-item Centre for Epidemiological Studies Depression Scale in a cohort of community-dwelling older people: data from The Irish Longitudinal Study on Ageing (TILDA). Eur Geriatr Med. 2018;9(1):121-6.
33. Herdman M, Gudex C, Lloyd A, Janssen M, Kind P, Parkin D, et al. Development and preliminary testing of the new five-level version of EQ-5D (EQ-5D-5L). Quality of life research. 2011;20(10):1727-36.
34. Zimet GD, Dahlem NW, Zimet SG, Farley GK. The multidimensional scale of perceived social support. Journal of personality assessment. 1988;52(1):30-41.
35. Heatherton TF, Kozlowski LT, Frecker RC, Fagerstrom KO. The Fagerström test for nicotine dependence: a revision of the Fagerstrom Tolerance Questionnaire. British journal of addiction. 1991;86(9):1119-27.
36. Bush K, Kivlahan DR, McDonell MB, Fihn SD, Bradley KA. The AUDIT alcohol consumption questions (AUDIT-C): an effective brief screening test for problem drinking. Archives of internal medicine. 1998;158(16):1789-95.
37. Bradley KA, DeBenedetti AF, Volk RJ, Williams EC, Frank D, Kivlahan DR. AUDIT-C as a brief screen for alcohol misuse in primary care. Alcohol Clin Exp Res. 2007;31(7):1208-17.
38. Barros AJ, Hirakata VN. Alternatives for logistic regression in cross-sectional studies: an empirical comparison of models that directly estimate the prevalence ratio. BMC Med Res Methodol. 2003;3:21.

39. Vittinghoff E, Shiboski S, Glidden D, McCulloch C. Regression Methods in Biostatistics: Linear, Logistic, Survival and Repeated Measures Models. New York: Springer; 2011.
40. Van Minh H, Giang KB, Ngoc NB, Hai PT, Huyen DT, Khue LN, et al. Prevalence of tobacco smoking in Vietnam: findings from the Global Adult Tobacco Survey 2015. Int J Public Health. 2017;62(Suppl 1):121-9.
41. World Health Organization. Factsheet. Mental Health in Vietnam [Available from: https://www.who.int/vietnam/health-topics/mental-health.
42. Jeffrey A. Ciesla MAJER, Ph.D. Meta-Analysis of the Relationship Between HIV Infection and Risk for Depressive Disorders. Am J Psychiatry. 2001.
43. Rabkin JG. HIV and Depression: 2008 Review and Update. 2008.
44. Adams C, Zacharia S, Masters L, Coffey C, Catalan P. Mental health problems in people living with HIV: changes in the last two decades: the London experience 1990-2014. AIDS Care. 2016;28 Suppl 1(sup1):56-9.
45. Gaynes BN, Pence BW, Eron JJ, Miller WC. Prevalence and comorbidity of psychiatric diagnoses based on reference standard in an HIV+ patient population. Psychosom Med. 2008;70(4):505-11.
46. Arseniou S, Arvaniti A, Samakouri M. HIV infection and depression. Psychiatry Clin Neurosci. 2014;68(2):96-109.
47. Tran BX, Dang AK, Truong NT, Ha GH, Nguyen HLT, Do HN, et al. Depression and Quality of Life among Patients Living with HIV/AIDS in the Era of Universal Treatment Access in Vietnam. Int J Environ Res Public Health. 2018;15(12).
48. Seid S, Abdu O, Mitiku M, Tamirat KS. Prevalence of depression and associated factors among HIV/AIDS patients attending antiretroviral therapy clinic at Dessie referral hospital, South Wollo, Ethiopia. Int J Ment Health Syst. 2020;14:55.
49. Hankebo M, Fikru C, Lemma L, Aregago G. Depression and Associated Factors among People Living with Human Immunodeficiency Virus Attending Antiretroviral Therapy in Public Health Facilities, Hosanna Town, Southern Ethiopia. Depress Res Treat. 2023;2023:7665247.
50. Prochaska JJ. Smoking and mental illness—breaking the link. New England Journal of Medicine. 2011;365(3):196-8.
51. Leventhal AM, Zvolensky MJ. Anxiety, depression, and cigarette smoking: A transdiagnostic vulnerability framework to understanding emotion–smoking comorbidity. Psychological bulletin. 2015;141(1):176.
52. Fluharty M, Taylor AE, Grabski M, Munafo MR. The Association of Cigarette Smoking With Depression and Anxiety: A Systematic Review. Nicotine Tob Res. 2017;19(1):3-13.
53. Rubin LF, Haaga DA, Pearson JL, Gunthert KC. Depression as a moderator of the prospective relationship between mood and smoking. Health Psychology. 2020;39(2):99.
54. Taylor G, McNeill A, Girling A, Farley A, Lindson-Hawley N, Aveyard P. Change in mental health after smoking cessation: systematic review and meta-analysis. Bmj. 2014;348.
55. Kessler RC. Epidemiology of women and depression. J Affect Disord. 2003;74(1):5-13.
56. Waldron EM, Burnett-Zeigler I, Wee V, Ng YW, Koenig LJ, Pederson AB, et al. Mental Health in Women Living With HIV: The Unique and Unmet Needs. J Int Assoc Provid AIDS Care. 2021;20:2325958220985665.
57. Carmo Filho A, Fakoury MK, Eyer-Silva Wde A, Neves-Motta R, Kalil RS, Ferry FR. Factors associated with a diagnosis of major depression among HIV-infected elderly patients. Rev Soc Bras Med Trop. 2013;46(3):352-4.
58. Chibanda D, Cowan F, Gibson L, Weiss HA, Lund C. Prevalence and correlates of probable common mental disorders in a population with high prevalence of HIV in Zimbabwe. BMC Psychiatry. 2016;16:55.
59. Accortt EE, Freeman MP, Allen JJ. Women and major depressive disorder: clinical perspectives on causal pathways. J Womens Health (Larchmt). 2008;17(10):1583-90.
60. Noble RE. Depression in women. Metabolism. 2005;54(5 Suppl 1):49-52.
61. Bhatia MS, Munjal S. Prevalence of Depression in People Living with HIV/AIDS Undergoing ART and Factors Associated with it. J Clin Diagn Res. 2014;8(10):WC01-4.

62. Lichtenstein B, Laska MK, Clair JM. Chronic sorrow in the HIV-positive patient: issues of race, gender, and social support. AIDS Patient Care STDS. 2002;16(1):27-38.
63. Badru OA, Babalola OE. Significant Others and Not Family or Friend Support Mediate Between Stigma and Discrimination Among People Living With HIV in Lagos State, Nigeria: A Cross-sectional Study. Journal of the Association of Nurses in AIDS Care. 2023;34(1):96-104.

Reporting checklist for cross sectional study.

Based on the STROBE cross sectional guidelines.

Instructions to authors

Complete this checklist by entering the page numbers from your manuscript where readers will find each of the items listed below.

Your article may not currently address all the items on the checklist. Please modify your text to include the missing information. If you are certain that an item does not apply, please write "n/a" and provide a short explanation.

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In your methods section, say that you used the STROBE cross sectionalreporting guidelines, and cite them as:

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		Reporting Item	Page Number
Title and abstract			
Title	#1a	Indicate the study's design with a commonly used term in the title or the abstract	1
Abstract	#1b	Provide in the abstract an informative and balanced summary of what was done and what was found	1
Introduction			
Background / rationale	#2	Explain the scientific background and rationale for the investigation being reported	2
Objectives	#3	State specific objectives, including any prespecified hypotheses	2
Methods			
Study design	#4	Present key elements of study design early in the paper	2
Setting	#5	Describe the setting, locations, and relevant dates, including periods of	2

		recruitment, exposure, follow-up, and data collection	
Eligibility criteria	#6a	Give the eligibility criteria, and the sources and methods of selection of participants.	2
	#7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	3
Data sources / measurement	#8	For each variable of interest give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group. Give information separately for for exposed and unexposed groups if applicable.	3
Bias	#9	Describe any efforts to address potential sources of bias	3
Study size	#10	Explain how the study size was arrived at	2
Quantitative variables	#11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen, and why	3
Statistical methods	#12a	Describe all statistical methods, including those used to control for confounding	3
Statistical methods	#12b	Describe any methods used to examine subgroups and interactions	3
Statistical methods	#12c	Explain how missing data were addressed	3
Statistical methods	#12d	If applicable, describe analytical methods taking account of sampling strategy	3
Statistical methods	#12e	Describe any sensitivity analyses	3
Results			
Participants	#13a	Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed. Give information separately for for exposed and unexposed groups if applicable.	4
Participants	#13b	Give reasons for non-participation at each stage	4
Participants	#13c	Consider use of a flow diagram	4

Descriptive data	#14a	Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders. Give information separately for exposed and unexposed groups if applicable.	4
Descriptive data	#14b	Indicate number of participants with missing data for each variable of interest	4
Outcome data	#15	Report numbers of outcome events or summary measures. Give information separately for exposed and unexposed groups if applicable.	5
Main results	#16a	Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	4-7
Main results	#16b	Report category boundaries when continuous variables were categorized	4-7
Main results	#16c	If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	4-7
Other analyses	#17	Report other analyses done—e.g., analyses of subgroups and interactions, and sensitivity analyses	4-7
Discussion			
Key results	#18	Summarise key results with reference to study objectives	8
Limitations	#19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias.	8
Interpretation	#20	Give a cautious overall interpretation considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence.	8
Generalisability	#21	Discuss the generalisability (external validity) of the study results	8
Other Information			
Funding	#22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	8

This checklist was completed on 23. June 2023 using https://www.goodreports.org/, a tool made by the EQUATOR Network in collaboration with Penelope.ai