


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

Nam Truong Nguyen ¹, Trang Nguyen,¹ Giap Van Vu,² Nga Truong,¹ Yen Pham,¹ Gloria Guevara Alvarez,³ Mari Armstrong-Hough,³ Donna Shelley³

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¹Institute of Social and Medical Studies, Ha Noi, Vietnam

²Bach Mai Hospital, Hanoi, Vietnam

³New York University, New York city, New York, USA

Correspondence to

Dr Nam Truong Nguyen;
ntrnam@isms.org.vn

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 OPCs located in Ha Noi, Vietnam.

Participants The study included 527 PLWH aged 18 and above who were smokers and were receiving treatment at HIV OPCs.

Outcome measures The study used the Centre for Epidemiology Scale for Depression 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 (prevalence ratio, PR 1.51, 95% CI 1.02 to 2.22), unmarried (PR 2.06, 95% CI 1.54 to 2.76), had a higher level of tobacco dependence (PR 1.06, 95% CI 1.01 to 1.11) and reported their health as fair or poor (PR 1.66, 95% CI 1.22 to 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 OPCs was high. Both depression and tobacco use screening and treatment should be included as part of ongoing care treatment plans at HIV OPCs.

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,

STRENGTHS AND LIMITATIONS OF THIS STUDY

- ⇒ The study used the Centre for Epidemiology Scale for Depression (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 people living with HIV (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 analysing 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 included PLWH who were receiving treatment at HIV outpatient clinics, may not represent the larger population of PLWH in Vietnam.

the growing burden of non-communicable diseases 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 such as 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 with 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 antiretroviral therapy (ART) and is associated with faster progression of the disease and a higher prevalence of other health risk behaviours, 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 (OPCs) in Ha Noi, Vietnam.

METHODS

Study design

We analysed data from baseline surveys conducted with 527 patients living with HIV who were enrolled in a randomised controlled trial that compared the effectiveness of three smoking cessation interventions among PLWH who received care from 13 HIV OPCs in Ha Noi, Vietnam. The surveys were conducted between December 2022 and June 2023. Participants were screened for tobacco use at the time of registration for a routine visit. Participants were eligible to enrol 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.

Measures

Dependent variable

The study used the eight-item Centre 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 1 day); 1=some or a little of the time (1–2 days); 2=occasionally or a moderate amount of time (3–4 days) and 3=most or all of the

time (5–7 days). Scores can range from 0 to 24. A score of ≥ 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,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 1–4, 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 3 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 (eg, living with children).

Data analysis

The data were analysed by using Stata (V.14.0). Descriptive statistics were used to summarise 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 χ^2 tests, while continuous variables were assessed using t-tests. Multivariable analysis was performed using Poisson regression³⁸ to evaluate the associations between depression and other patient characteristics. Prevalence ratios (PRs) were reported along with 95% CIs. Independent variables that had a $p < 0.2$ in the bivariate analyses were included in the logistic

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

Characteristics	Depressive symptoms						P value
	Total		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							
VND50 000 000 to <VND100 000 000	153	29.0	88	57.5	65	42.5	0.425
VND100 000 000 to <VND300 000 000	314	59.6	200	63.7	114	36.3	
VND300 000 000 to over VND500 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 antiretroviral therapy	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	

Continued

Table 1 Continued

Characteristics	Total		Depressive symptoms				P value
	n	%/mean±SD	No		Yes		
			n	%/mean±SD	n	%/mean±SD	
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

PLWH, people living with HIV.

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

Sociodemographic 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 VND100 to VND300 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 behaviour, 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 3 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 3 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 to 2.22), unmarried patients (PR 2.06, 95% CI

1.54 to 2.76), patients with higher levels of tobacco dependence (PR 1.06, 95% CI 1.01 to 1.11) and those with fair or poor health status (PR 1.66, 95% CI 1.22 to 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.

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 with the general population.^{7,9}

Depression is the most common mental health problem among PLWH.^{42, 43} 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.^{44–47}

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.^{48–50} 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.^{50,51} Concern among clinicians about exacerbating depression symptoms has hindered the treatment of tobacco use. However, there is a growing evidence that suggests that smoking cessation has beneficial effects on mental health symptoms.⁵² 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 with the general population, women without HIV⁵³ and men with HIV.^{54–56} Women are at a higher risk of depression due to a variety of factors, including genetic vulnerability, reproductive hormones, internalisation coping strategies, gender-specific roles and life stress.^{57,58} In addition, women living with HIV experience higher levels of perceived stress and HIV stigma.⁵⁴ These added stressors may consequently contribute to an increased risk of depression among women with HIV.

Consistent with other studies on PLWH,^{8, 59} 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

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 to 2.22)	0.039
Age (mean)	1.00 (0.99 to 1.02)	0.914
Marital status		
Married (ref.)	–	
Single/never married/separated/divorced	2.06 (1.54 to 2.76)	<0.001
Occupation		
Private sector (ref.)	–	
Small business/trading/services/freelance	1.08 (0.82 to 1.42)	0.583
Others	0.75 (0.50 to 1.12)	0.166
Living arrangements		
Live alone (ref.)	–	
Live with spouse/partner/children/grandchildren	0.96 (0.68 to 1.35)	0.819
Live with others	1.04 (0.75 to 1.44)	0.815
Have a chronic disease		
No (ref.)	–	
Yes	1.16 (0.94 to 1.45)	0.161
Current health status		
Good/very good/excellent (ref.)	–	
Fair/poor	1.66 (1.22 to 2.26)	0.001
Tobacco dependence (score)	1.06 (1.01 to 1.11)	0.014
Hazardous drinking		
No (ref.)	–	
Yes	0.86 (0.71 to 1.05)	0.150
Drug use		
Never (ref.)	–	
Ever	1.08 (0.78 to 1.49)	0.647
In the last 3 months	1.08 (0.76 to 1.53)	0.686
Total social support score	0.91 (0.72 to 1.15)	0.411

Bold values signify significant findings at $p < 0.05$. PLWH, people living with HIV; PR, prevalence ratio.

and maintaining a marital relationship. HIV-associated stigma may lead to social isolation and loneliness for those without meaningful relationships and social ties.⁶⁰ 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.⁶¹ 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 optimising 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 programmes may facilitate engagement in tobacco use treatment and improve health outcomes among PLWH who smoke.⁵¹

Contributors Designed the study: DS and NTN. Developed data collection tools: DS, NTN, TN, GGA, MA-H and GVV. Collected data: NT and YP. Analysed data and interpreted results: TN, NT and YP. Wrote the initial draft: NTN and DS. Contributed to subsequent drafts: DS, GGA, MA-H, TN and GVV. All authors reviewed and approved the final manuscript. NTN is responsible for the overall content as the guarantor.

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Competing interests None declared.

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Patient consent for publication Not applicable.

Ethics approval 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.

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Data availability statement Data are available on reasonable request.

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ORCID iD

Nam Truong Nguyen <http://orcid.org/0000-0002-4753-7214>

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