


Prevalence of Food Insecurity Among HIV-Positive Smokers in Vietnam

Tobacco Use Insights
Volume 17: 1–6
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DOI: 10.1177/1179173X241297804



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ABSTRACT

INTRODUCTION: Smoking causes disparate health outcomes among people living with HIV, who also experience higher rates of food insecurity compared to HIV-negative adults.

OBJECTIVE: Aiming to characterize household food insecurity among HIV + smokers in Vietnam, we surveyed 182 smokers undergoing HIV-care at 5 clinics in Hanoi, Vietnam.

METHODS: We estimated the proportion of food insecurity among our sample using the Household Food Insecurity Access Scale and analyzed covariates associated with food insecurity, like income, and moderators of smoking, like drug use.

RESULTS: Food insecurity was reported by 13.3% of our sample. The mean (SD) of years living with HIV was 12.8 (6.45). Moderate-to-severe food insecurity was associated with tobacco dependence [RR = 1.68 (1.27, 2.22); $P = .05$] and readiness-to-quit smoking [RR = .45 (.24, .86); $P = .002$].

CONCLUSIONS: Our findings suggest people living with HIV who smoke are vulnerable to food insecurity and face very high or high tobacco addiction. We also find evidence that food insecurity is linked to several other conditions that alone or together are barriers to quitting. Considering these findings and the increasing interest in HIV and co-existing chronic conditions like smoking and food insecurity, further research is needed to understand how food insecurity and tobacco use intersect and impact people living with HIV who experience these concomitant conditions.

KEYWORDS: food insecurity, tobacco use, HIV, Vietnam, people living with HIV

RECEIVED: May 23, 2024. **ACCEPTED:** October 20, 2024.

TYPE: Original Research Article

DECLARATION OF CONFLICTING INTERESTS: The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

FUNDING: The author(s) disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: This research was funded by a grant from the National Institutes of Health (no: 3R01CA240481-02S2).

SUPPLEMENTAL MATERIAL: Supplemental material for this article is available online.

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Introduction

People living with HIV (PWH) can experience concomitant tobacco use and food insecurity (FI)—the lack of consistent access to food of sufficient quality and/or quantity to lead a healthy life.¹ Evidence linking these conditions demonstrates that FI is associated with tobacco use; and FI, independent of tobacco use, is associated with HIV acquisition and progression, and poor health outcomes among PWH.^{1,2} Further, PWH who smoke experience excess morbidity and mortality compared with PWH who do not smoke.³ However, there is limited understanding of how these conditions (ie, HIV, tobacco use and FI) intersect.

Some evidence suggests that for PWH, FI may increase the risk of HIV progression through physiological, psychosocial, and behavioral pathways.² For instance, HIV treatment creates nutritional demands, such as higher daily protein requirements, which FI can compromise. Severe FI has been associated with

worse health-related quality of life measures, opportunistic infections, and increased hospitalizations among PWH.⁴ Also, FI is associated with poorer prognoses and lower survival rates among PWH.² The myriad of associated physical and mental health consequences of FI, which may be compounded in PWH who smoke, make it critical to develop a public health response to address these intersecting issues.

High income countries have started to study the intersection of FI and smoking. Research from the United States (US) and Canada has demonstrated that financial strain from using household funds for tobacco may contribute to FI, and that stress from FI may reinforce smoking behavior.⁵ Studies among PWH too suggest smoking may impact food insecurity status.⁶ Moreover, Kim-Mozeleski, et al, studied the association of tobacco use and FI among HIV + individuals who were seeking vocational rehabilitation services (n = 108) in the US.¹ They found that smokers at baseline reported higher levels of FI



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compared to nonsmokers, and that FI was predictive of smoking behavior. This suggests bidirectional relationships may exist across FI, HIV and tobacco use.³⁻⁵ Many low- and middle-income countries (LMIC) have a heavy burden of HIV, high rates of tobacco use and elevated rates of FI. However, there are no studies clarifying these relationships in LMICs, including Vietnam.

Investigations into household FI in Vietnam have been limited to using proxy measures like poverty rates or under-nourishment, rather than direct comprehensive measures of FI. Consequently, there are few reported measures of FI on vulnerable populations like PWH apart from the national level general population estimates. In 2021, approximately 11% of households nationally in Vietnam reported FI.⁷ Vietnam has 220 000 HIV + adults who have access to receive free anti-retroviral treatment (ART) at outpatient clinics (OPCs).⁸ A 2011 study focused on mapping ART among HIV patients in Hanoi, reported an FI rate of 5%.⁹ Conversely, tobacco use is well documented in Vietnam. Smoking rates among PWH are concentrated in men, and the estimated smoking rate for males living with HIV/AIDS is one of the highest worldwide (~60%).¹⁰

Purpose

Thus far, no study has measured FI among PWH who smoke. In response, we surveyed 182 HIV + smokers receiving HIV care at five OPCs in Hanoi, Vietnam and aimed to characterize the prevalence of FI and identify sociodemographic characteristics associated with FI among PWH.¹¹

Methods

Our study was approved by the Institutional Review Boards at New York University (no. i19-01783) and Institute of Social and Medical Studies (no. 00007993). All participants provided informed consent.

Setting

Smoking is concentrated among men, approximately 45% of the male general population use tobacco;¹² and among men living with HIV it is estimated that 60% use tobacco.¹³ In Vietnam the HIV epidemic is also higher among men, with the two major contributors to transmission being, sex among men who have sex with men, and people who inject drugs.^{8,14} Thus, there are fewer women with HIV. Taken together there are few women who have HIV and smoke in our sampling universe. PWH in Ha Noi have access to free ART as part of HIV care in Vietnam, with most PWH receiving treatment at HIV outpatient clinics (OPCs).⁸

Study Population and Data Source

This study uses visit data collected from HIV + smokers receiving care in HIV OPCs in Hanoi, Vietnam and who are

enrolled in the VQuit study— a large randomized controlled trial (RCT), which is focused on measuring the effectiveness and implementation of a multi-arm tobacco cessation intervention with two waves of data collection 10. Thus, the sample comprised of participants who completed baseline surveys at the time of their enrollment in the main VQuit RCT (November 2021 to June 2022).

Data was obtained from a quantitative survey examining FI and tobacco use from in wave 1, at baseline and after 6-months. During this wave of the study, data collection occurred at 5 out of 13 HIV clinics which were enrolled in VQuit.

Sample Size

The sample size of $n = 168$ was determined by constraints on time and budget. Based on this figure, using the PASS software.¹⁵ We calculated the expected confidence interval, half-width, assuming a prevalence of 12.5% and a sample size of $n = 182$. The resulting confidence interval half-width is approximately 4.8%.

The primary outcome of interest was the prevalence of FI among PWH who smoke. For enrolment, a nurse at each OPC screened patients for tobacco use at regularly scheduled HIV care visit. Interested current tobacco users were referred to a Research Assistant (RA) who verified eligibility. For eligible participants, the RA obtained their signed consent. Eligible participants were current smokers (cigarettes or dual waterpipe/cigarette user); aged ≥ 18 ; completed one OPC visit within the last 6-months; lived in Hanoi; and were reachable by mobile phone. The RA collected survey responses using a tablet-based electronic form.

Measures and Data Collection

FI prevalence was measured at the household level using the Household Food Insecurity Access Scale (HFIAS), a 9-question tool focused on consumption over the last 4-weeks.¹⁶ The HFIAS has been validated among PWH and has been reported to have high reliability in LMICs, including Vietnam, although it has not been validated in Vietnam.¹⁷⁻²⁰ The HFIAS score and its four FI categories were calculated as described by its developers.¹⁶ The sample was categorized as *mild-to-no FI* (HFIAS category 1 and 2) and *moderate-to-severe FI* (HFIAS Category 3 and 4). The Household Food Insecurity Access Prevalence Status Indicator was derived by dividing the total number of households categorized as *moderate-to-severe FI* ($n = 25$) by the total number of households ($n = 182$) and multiplying by 100. The HFIAS has been validated among PWH and has been reported to have high reliability in LMICs including Vietnam, although it has not been validated in Vietnam ([Supplemental Material](#)).¹⁷⁻²⁰

Socioeconomic characteristics, age and household size, were recorded as continuous variables. Income, marital status, education, and employment were recorded as categorical variables. Illicit drug use in the past 3-months was reported as “yes or no”.

Tobacco dependence was assessed using the 6-question Fagerstrom scale (very high, high, medium, low, or very low level).²¹ Readiness-to-quit was measured by asking if a participant was thinking about quitting as a categorical variable: not planning to quit, quitting in the next 30 days, quitting in the next 6-months, or trying to quit; subsequently these categories were collapsed into a binary variable, those who were trying to quit vs all others. HIV-related questions included current use of ART, collected as a binary variable, yes or no; and the year of HIV diagnosis. We used the World Health Organization's Service Availability and Readiness Assessment (SARA) tool to assess characteristics of the OPCs which included the presence or absence of nutritional rehabilitation services (eg, client education and provision of nutritional supplements).

Analysis

We conducted a cross-sectional analysis of data collected at baseline. FI levels were assessed from the HFIAS questionnaire, and tobacco dependence was assessed based on the participants' Fagerstrom scores. To test for associations between FI, social demographics, and smoking characteristics, we used the Pearson's chi-squared test of significance for categorical variables (marital status, age, years living with HIV, tobacco dependence, readiness to quit, education) and the *t*-test for continuous variables (income, drug use, household size) with a significance level of .05. We ran generalized linear regression models, with food insecurity as the dependent variable, and readiness to quit and tobacco dependence as independent variables to obtain risk ratios. For the null hypothesis it was assumed that the coefficients are equal to zero. Risk ratios (RR) and adjusted risk ratios (aRR) were calculated for readiness to quit and tobacco dependence, which were the smoking and quitting characteristics associated with food insecurity at a significance of .05 (logbin package in R).²² Adjusted risk ratios were estimated in models that included the following confounders: years living HIV, Age, and income. All data cleaning and analysis was done using R software. There was no missing data on the variables presented.

Results

We recruited 182 participants over an 8-month period starting November 2021. All participants reported taking ART. The mean (SD) years living with HIV was 12.8 (6.45) years. Most participants were male (95.1%), with a mean (SD) age of 43.4 (5.96) years; and most (95.5%) had completed at least primary schooling and one-third of them were single (33%). About two-thirds of respondents (72%) reported that their household income for the past year was 300 000 000 VND (~12 653 USD) or less. Almost half of the sample (45.6%) had high or very high levels of tobacco dependence, while over half (57.1%) reported trying to currently quit smoking (insert Table 1 here).

The mean (SD) HFIAS score was 1.74 (3.70), with 25 (13.3%) of participants reporting moderate-to-severe FI. The mean (SD) HFIAS score for those who reported moderate-to-severe FI was 8.56 (5.09). Food insecurity status by tobacco

dependence (Table 2) shows that participants reporting moderate-to-severe FI had higher dependence for Fagerstrom categories, specifically, Very high (31 vs 12.1%), High (44 vs 28.7%) and Medium (4.0 vs 15.3%) compared to those participants reporting mild-to-no FI.

Recent drug use was reported by 24.2% of participants. Tobacco dependence [RR = 1.68 (1.27, 2.22); aRR = 3.14 (.97, 1.47)] and readiness-to-quit smoking [RR = .45 (.24, .86); RR = .30 (.13, .99)] were both negatively associated with moderate-to-severe FI, and were the only characteristics associated with moderate-to-severe FI (Table 3).

All five OPCs offered nutritional rehabilitation services, but none screened for FI.

Discussion

Despite the heavy burden of HIV, high rates of tobacco use and FI in LMICs, studies largely explore the prevalence FI among PWH, but none that we are aware of that specifically examined FI among PWH who smoke. In our study, 13.3% of PWH smokers reported experiencing moderate-to-severe FI.

Consistent with literature, this HIV + population, experienced higher FI rates than the general population of Hanoi.^{2-4,10} In 2021, Kim, et al, used the Food Insecurity Experience Scale (FIES) to find that FI rates among the general population (n = 9399 males and females) were 8.5% in urban areas like Hanoi and 11% nationally in Vietnam.⁷ In Vietnam, there are income and social disparities among PWH, which may explain a higher level of FI compared to the general population. Differences in prevalence across studies may also be related to the use of different tools used to assess FI (FIES vs HFIAS).

Tang, et al, (2011) (n = 99 males) examined ART use among PWH who injected drugs and were receiving HIV care at one OPC in Hanoi. Among this sample, FI was detected in 5%.⁹ Again, this study used a different tool, the United States Department of Agriculture's short form. The samples also differed; Tang, et al, included only patients who reported current drug use. Conversely, in our sample, 24% of participants reported recent drug use. Incongruent FI measurement among studies creates challenges in comparing the degree of FI within and across settings and in different populations.

Our findings suggest tobacco dependence and readiness-to-quit smoking may play a role in FI among smokers, which is consistent with evidence showing that PWH who are highly addicted to nicotine (ie, smoke more cigarettes per/day) are particularly vulnerable to FI.¹ Both a higher level of addiction and a lack of readiness-to-quit are associated with lower quit rates. Thus, FI and high tobacco dependence may negatively impact tobacco use treatment among PWH who present with both these conditions.

All OPCs in our sample offer nutritional rehabilitation focused on weight management (ie, increasing weight), which is consistent with HIV-nutrition guidelines given changes in weight that accompany ART initiation. Services do not include screening for FI, which is a notable gap in a population at risk

Table 1. Patient characteristics at baseline (n = 182).

VARIABLE	MEAN (SD) OR NUMBER (%)
HFIAS Score (0-27) whole sample	1.74 (3.70)
HFIAS Score moderate-to-severe FI*	8.56 (5.09)
Moderate-to-severe food insecurity	25 (13.3)
Age (years)	43.4 (5.96)
Male participants	173 (95.1)
Years living with HIV	12.8 (6.45)
Antiretroviral therapy use	182 (100)
Marital Status	
Single	59 (33)
Married	82 (45)
Divorced	30 (17)
Separated	6 (3)
Widowed	5 (2)
Other	0 (0)
Household size	2.76 (.599)
Yearly income (VND)	
<50 000 000	11 (6.0)
50 000 000 - < 100 000 000	108 (59.3)
100 000 000 - < 300 000 000	13 (7.1)
300 000 000 - 500 000 000 and over	50 (27.4)
Employed	172 (94.5)
Education	
No schooling	1 (.5)
Primary school (Grade 1-5)	13 (7.1)
Secondary school (Grade 6-9)	64 (35.2)
High school (Grade 10-12)	66 (36.3)
Vocational training/College	22 (12.1)
University	16 (8.8)
Recent drug use	44 (24.2)
Uses cigarettes and waterpipe	146 (80.2)
Tobacco dependence	
Very low	38 (20.9)
Low	36 (19.8)
Medium	25 (13.7)
High	56 (30.8)
Very high	27 (14.8)
Readiness to quit	104 (57.1)

Note. *This mean (SD) corresponds only to the moderate-to-severe FI respondents n = 25. The italic values are mean (SD) as opposed to the non italic values which are number (%).

for FI and in settings that are already addressing nutrition, as it relates to ART, rather than considering the broader implications of FI on health outcomes among PWH. Guidelines that promote food security in the HIV/AIDS context are needed to ensure that PWH are routinely screened for FI and that evidence-based approaches are integrated into clinical care.

Considering our calculated FI rate and the increasing focus on HIV and co-existing chronic conditions, greater understanding of the prevalence of FI among PWH who smoke and the interaction between tobacco use, HIV and FI is needed to tailor interventions to specific risk factors and demographic characteristics. Additionally, studies need to explore how care settings that treat PWH, like

Table 2. Food insecurity status by tobacco dependence (n = 182).

	MODERATE-TO-SEVERE FI (N = 25)	MILD-TO-NO FI (N = 157)	OVERALL (N = 182)
Tobacco dependence			
Very high	8 (32.0%)	19 (12.1%)	27 (14.8%)
High	11 (44.0%)	45 (28.7%)	56 (30.8%)
Medium	1 (4.0%)	24 (15.3%)	25 (13.7%)
Low	3 (12.0%)	33 (21.0%)	36 (19.8%)
Very low	2 (8.0%)	36 (22.9%)	38 (20.9%)

Table 3. Bivariate analysis of food insecurity and smoking and quitting characteristics.

	RISK RATIO/(CI)	ADJUSTED RISK RATIO/(CI)
Tobacco dependence	1.68 (1.27, 2.22)	3.14 (.97, 1.47)
Readiness to quit	.45 (.24, .86)	.30 (.13, .99)

OPCs, can adapt their operations to integrate routine FI screening. Studies indicate that providing PWH with practical and culturally relevant food and nutrition support may improve health behavior and health outcomes.²³

Limitations

Our study had several limitations. The sample size being dictated by time and budget constraints is a limitation when it comes to detecting the smallest effect with some public health significance. Additionally, the sample size was too small to estimate stratified or conditional effects of dependence and readiness to quit across levels of confounding variables with sufficient precision. Our sample was made up of PWH receiving treatment at OPCs and was not a representative sample of PWH. However, most people who are diagnosed with HIV in Vietnam receive care and treatment from HIV OPCs, therefore the characteristics of our sample of PWH may provide a strong reflection of PWH in Vietnam. However, PWH who have been receiving HIV care OPCs in Vietnam have specific socioeconomic characteristics that may impact their food insecurity status. This study took place during the COVID-19 pandemic, which led the Government of Vietnam to distribute both food (eg, rice) and money to many Vietnamese households that may have included our respondents. This support may have helped to stabilize food consumption and impact both the status and estimates of food insecurity, however, we did not ask about this support in our study. Further, FI was reported by the participant and is therefore susceptible to self-reporting bias. FI is susceptible to temporal patterns that may change at different timepoints, however, our study reports FI only at baseline, thus the true level of food insecurity may not have been observed. Very low smoking rates among women in Vietnam led to a largely male sample.⁹ On the other hand, strengths of this study included recruitment across five different sites and the use of a consecutive sampling approach to minimize bias, which contribute to the internal validity of the study.

Implications for Policy, Practice and/or Research

This study provides valuable insights on the important health issue of food insecurity, which, if ignored, could diminish the benefits accrued from reducing tobacco use. The evidence demonstrates that both smoking cessation and decreased food insecurity improve survival rates among PLWH. Therefore, cessation interventions that seek to improve health outcomes by addressing tobacco use must consider the interaction of food insecurity with smoking to provide comprehensive care for HIV patients who smoke. Moreover, this study provides initial evidence that in Vietnam, PWH who smoke and receive HIV treatment at OPCs experience moderate-to-severe FI. Thus, for research, this work raises awareness of FI among this population, highlights the need for further research among this population to fully untangle how these concurrent conditions intersect, both of which is critical to support the public health response to the persistent issue of tobacco use among PWH.

Recognizing the combined burdens of HIV, smoking, and food insecurity is essential for addressing health challenges in settings with high overlap of these issues. Thus, our study underscores the need for an integrated care approach that encompasses HIV treatment, adequate food and nutritional support when delivering interventions for tobacco use.

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