Factors associated with stage of behavior change and willingness to quit smoking among people living with HIV In Taiwan

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Abstract

Background: The prevalence of smoking among people living with HIV is double than general population. There is no specific guideline for smoking cessation in this population thus many of HIV-smoker receive unproven treatment that led to low adherence and high relapse.
Purpose: The aim of this study was to identify the stage of behavior change and willingness to quit smoking, and to determine their associated factors among people living with HIV.
Methods: A cross-sectional design was conducted at an HIV/AIDS hospital in southern Taiwan. of 423 people living with HIV, the mean age was 37.43 (SD=10.99) years and 97.9% were male.
Results: About 33.9% were a current smoker, 22.9% were in pre-contemplation stage, and 33.3% willing to quit smoking. Age, education, CD4 cell counts, viral load, having diabetic and hepatitis B, and exposure to smoking cessation information were associated with stage of behavior change. Smoking 2-3 times a month (aOR=9.33, 95%CI= 1.45-60.2) and having heard about smoking cessation were significant predictors for willingness to quit smoking (aOR= 3.67, 95 CI= 3.67-9.06).
Conclusion: Our findings suggest to design an intervention according to HIV-smoker stage of behavior change for successful smoking cessation. Additionally, it is important to address patients' clinical conditions including smoking frequency and exposure to information related to smoking cessation.

Keywords: HIV; readiness; smoking; smoking cessation; stage of change; willingness

Introduction

Smoking remains a major public health concern worldwide and represents an even more significant burden among people living with HIV (PLWH). A systematic review and meta-analysis demonstrated that the prevalence of smoking among PLWH is substantially higher than in the general population, driven by biological, behavioral, and structural determinants (Hoang et al., 2024). This elevated prevalence has been consistently reported across regions. A global analysis of PLWH receiving antiretroviral therapy (ART) found persistently high rates of active smoking, highlighting a widespread unmet need for cessation support (Ale et al., 2021). Consistent with global findings, earlier meta-analytic evidence also confirmed high smoking prevalence among HIV-positive populations (Lindayani et al., 2019).

International cohort studies further corroborate these observations.

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PLWH continue to smoke at higher rates than the general population, as demonstrated in large Italian cohorts and African population studies, where nicotine dependence was common and cessation uptake remained low (De Socio et al., 2020; Egbe et al., 2019). In the United States, national data from 1999–2016 similarly showed persistently higher smoking prevalence among PLWH, suggesting entrenched behavioral patterns and insufficient cessation infrastructure (Asfar et al., 2021).

The health consequences of smoking among PLWH are profound. Recent longitudinal evidence from the STOPSHIV cohort demonstrated that smoking significantly increases the risk of cardiovascular disease, cancer, and all-cause mortality in this population (De Socio et al., 2025). These findings reinforce earlier reports indicating amplified morbidity and mortality risks among PLWH who continue to smoke. Despite these risks, cessation outcomes remain suboptimal. Even structured programs often yield limited success, with studies from Italy and the United States showing low adherence, frequent relapse, and minimal long-term abstinence following cessation interventions among PLWH (De Socio et al., 2020; Triant et al., 2020).

The Transtheoretical Model (TTM) is a widely used framework for guiding smoking cessation interventions. However, PLWH often face unique psychosocial and structural barriers that impede progression through the stages of change. A recent systematic review highlighted that stress, stigma, depression, socioeconomic instability, and substance use frequently limit readiness to quit among PLWH (Hoang et al., 2024). Other regional studies echo these findings, suggesting that many PLWH remain in early stages such as precontemplation or contemplation (Egbe et al., 2019; Mdege et al., 2021). Factors such as low socioeconomic status, limited access to cessation resources, mental health challenges, and lack of awareness of cessation services have also been linked to lower willingness to quit smoking among PLWH (Mdege et al., 2021).

Despite a growing body of literature, very few studies have examined the stage of behavior change and willingness to quit smoking specifically among HIV populations in Asia, and almost none have explored this issue in Taiwan. Smoking patterns, cultural norms, healthcare accessibility, and the structure of HIV care in Taiwan differ substantially from those in Western countries where most prior studies have been conducted. Consequently, existing evidence may not accurately capture the behavioral readiness, motivational dynamics, or sociocultural barriers experienced by Taiwanese people living with HIV. To date, no study in Taiwan has simultaneously assessed both the stage of behavior change and willingness to quit smoking, and the factors associated with these two critical outcomes remain largely unknown. The absence of such context-specific data limits the ability to design culturally adapted and readiness-based smoking cessation interventions that are responsive to the needs of HIV smokers in Taiwan. Given these gaps, the present study is necessary to identify the stage of behavior change and willingness to quit smoking and to determine their associated factors among people living with HIV in Taiwan. Such evidence is essential for informing targeted, stage-appropriate cessation strategies that can be effectively integrated into the Taiwanese HIV care system.

Materials and Methods

Study design and sample

This study was conducted using a cross-sectional design at outpatient clinic of an AIDS hospital, a university-affiliated hospital in southern Taiwan. This hospital has over 20 years of experience in caring for more than 2,281 people living with HIV. In 2018, the proportion of transmission routes, gender ratio, and age is similar to the 30,625 HIV diagnosed cases reported to the Taiwan Centers for Disease Control. The inclusion criteria for eligibility were an HIV-positive person and aged ≥ 18 years old. Pregnant women with HIV were excluded from this study. A convenience sampling was used to select a participant.

Measures

Smoking Status

Smoking status was assessed using self-reported items regarding current smoking behavior. Participants were asked whether they currently smoked, whether they had smoked previously, the number of cigarettes consumed per day, and the frequency of smoking. The frequency of smoking was operationally defined based on participants' self-reported smoking behavior and categorized into six levels to reflect the regularity of cigarette consumption. "Never" indicated that the individual did not smoke at any time during the assessment period. "More than once" referred to smoking that occurred on more than one occasion but not frequently enough to be classified under monthly or weekly patterns. "Once a month or less" described individuals who smoked once per month or less. "Two to four times a month" represented intermittent but more regular smoking within the monthly range. "Two to three times a week" referred to smoking that occurred on a weekly basis, and "four times or more a week" indicated smoking behavior occurring at least four times per week, reflecting the highest frequency category. This classification provides a standardized framework for describing smoking behavior and aligns with commonly used epidemiological measures in tobacco research.

Although smoking status was self-reported, prior research has demonstrated that self-reported smoking behavior is generally reliable and shows substantial agreement with biochemical verification in both general and HIV populations, with reported sensitivity ranging from 85% to 93% and specificity

from 85% to 97% (Gorber et al., 2009). Because single-item measures of smoking status do not form a multi-item construct, internal consistency reliability (e.g., Cronbach's alpha) is not applicable. However, self-reported smoking status has been shown to possess strong criterion validity when compared to cotinine assays (Benowitz et al., 2009).

Stage of Behavior Change (TTM Staging Algorithm)

The stage of behavior change was assessed using a structured set of items developed based on the Transtheoretical Model (TTM) of smoking cessation (Prochaska, 2002). The staging algorithm categorizes current and former smokers into five stages: precontemplation, contemplation, preparation, action, and maintenance. The algorithm used in this study was adapted from the validated staging questions by Etter and Perneger (1999), which have been widely applied in international smoking cessation research. Participants were asked: "Do you smoke right now?"; "Do you want to quit smoking within the next six months?"; "Do you want to quit smoking in the next 30 days?"; "Do you want to quit smoking now?"; "Did you smoke in the past six months?"; "Have you smoked any cigarettes in the past six months?"

The TTM staging algorithm has demonstrated strong construct validity, with stage classification correlating significantly with quit attempts, nicotine dependence, and cessation outcomes (Herzog et al., 1999; Prochaska & Velicer, 1997). Previous studies have also reported test–retest reliability coefficients ranging from 0.78 to 0.85, indicating stable classification across time (Etter & Perneger, 1999; de Vries et al., 2013). Because the staging algorithm assigns participants to mutually exclusive categories, internal consistency reliability is not applicable. The algorithm has shown good predictive validity in multiple studies, with higher-stage participants more likely to make quit attempts and achieve cessation (Spencer et al., 2002).

Willingness to Quit Smoking

Willingness to quit smoking was measured using closed-ended questions assessing prior exposure to cessation programs and readiness for referral. The items included: "Have you ever joined a smoking cessation program?"; "Have you ever heard about smoking cessation programs?"; "Are you willing to quit smoking?"; "Are you willing to be referred to a smoking cessation program now?"

These willingness items were developed based on behavioral intention principles within TTM and smoking cessation research. Although these questions are single-item or categorical indicators, which means internal consistency reliability cannot be calculated, previous research has demonstrated that single-item measures of willingness or intention to quit smoking possess good predictive validity, correlating strongly with future quit attempts and treatment engagement (Hyland et al., 2006; Borland et al., 2010). Prior studies have also reported acceptable test–retest reliability (κ = 0.72–0.84) for similar willingness items in smoking cessation trials (Etter & Sutton, 2002). Content validity is supported by their widespread use in smoking cessation research and their alignment with established constructs of readiness and referral intention.

Demographic and Clinical information

The demographic data and medical history were collected using an online standard form. Demographic data collected included date of birth, sex, education level, employment and marital status. Medical history included self-reported smoking status (current and former smoking), injecting drug use, HIV risk factors, family CVD history, diabetes status, under lowering blood pressure medication, and HIV co-infection (Hepatitis B & C).

The medical record review was performed by the researcher to extract data on ART and HIV-related information and the lipid profile including lipid-lowering agents. HIV-information included the date of HIV diagnosis, HIV risk factors, current CD4 cell count and a viral load including date of the test. ART-related information included current regimen, the used of Lopinavir/Abacavir, date of start for consuming those ART.

Procedure

This study was approved by the Institutional Review Board of the study hospital (ER-98-090). Written informed consent was obtained from respondent prior data collection. HIV-positive patients were identified by a case manager at the outpatient clinic and referred to the researcher. The researcher collected information on demographic and the self-reported medical history using an online standard form and the results of a physical examination for measured blood pressure, body weight, and height. A review of the medical records was done by the researcher to collect information on laboratory data, HIV, and ART-related information after the clinical consultation and the information was recorded in the online form.

Data Analysis

Mean and standard deviation (SD) were calculated for continuous data, and frequency was computed for categorical data. The demographic and clinical information were compared among different smoking status (never smoker, current smoker, and previous smoker), among different TTM stage of change (pre-contemplation, preparation, and action stage), and between those who were willingness vs. unwillingness toward referral to smoking cessation. Univariate and multivariate logistic regression were used to evaluate factors associated with stage of change and willingness toward referred to smoking cessation. A 5% significant level was used to be significant. IBM SPSS 23.0 (IBM Corporation, Armonk, New York, USA) was used to performed using statistical analyses.

Table 1. Bivariate association: stage of behavior changes by demographic, clinical, and smoking-related information among people living with HIV (N=423)

Variable	Pre-contemplation (n=97), %	Preparation (n=47), %	Action (n=84), %	Maintenance (n=195), %	p-value
Age (year) [mean ±SD]	31.91±9.37	31.95±7.95	41.17±11.26	39.90±10.99	<.001
Male	95 (97.9)	46 (97.9)	79 (94.0)	185 (94.9)	.453
Single	38 (82.6)	20 (83.3)	36 (94.7)	70 (87.5)	.371
High school above	46 (57.5)	21 (53.8)	41 (50.6)	75 (41.9)	.098
Employed	22 (73.3)	11 (50.0)	14 (60.9)	38 (67.8)	.420
Risk factor					
Heterosexual	11 (23.9)	4 (16.0)	5 (13.2)	13 (16.0)	.820
IDU	11 (23.9)	5 (20.0)	7 (18.4)	15 (18.5)	
MSM	24 (52.2)	15 (60.0)	25 (65.8)	49 (60.5)	
Unknown/others	24 (52.2)	1 (4.0)	1 (2.6)	4 (4.9)	
HIV exposure duration (year)	6.57±4.09	8.43±5.50	6.56±4.31	5.54±4.89	.073
Current CD4 cell counts (cells/mm3)	518.3±215.35	521.5±242.43	644.6±248.31	620.2±293.74	.001
Log current viral load (copies/ml)	4.50±3.03	4.23±3.00	3.23±0.94	3.83±2.29	.010
ART-used	71 (22.0)	41 (12.7)	64 (19.8)	147 (45.5)	.389
Duration receiving ART (year)	5.10±3.89	5.24±4.91	4.62±4.20	4.70±4.31	.923
BMI (kg/m2)	21.53±3.76	23.42±4.23	23.23±3.41	23.07±3.46	.002
HBV	3 (3.7)	5 (13.9)	11 (15.5)	27 (16.7)	.038
HCV	1 (1.4)	1 (3.0)	3 (4.4)	15 (9.7)	.063
Diabetic	0	2 (4.3)	9 (10.7)	10 (5.1)	.012
Current smoker	95 (66.4)	47 (32.9)	1 (0.7)	0	<.001
Frequency of smoking					
Once a month or less	0	5 (5.2)	3 (3.1)	70 (72.2)	<.001
2-3 times a month	0	6 (12.8)	6 (12.8)	30 (63.8)	
2-3 times a week	4 (4.8)	1 (1.2)	0	3 (3.6)	
Cigarette per day	7.09±7.06	8.41±10.58	10.68±9.91	10.97±8.30	.321
Previous attempts to quit	63 (35.4)	35 (19.7)	74 (41.6)	6 (3.2)	<.001
Ever hear about smoking cessation	56 (57.7)	41 (20.1)	55 (14.7)	127 (19.7)	.006
Total cholesterol	145.2±54.62	153.8±44.48	165.28±34.99	157.86±45.820	.035
Triglyceride	101.5±76.82	120.6±86.78	159.4±116.5	136.4±90.92	<.001

Results

Smoking status

A total of 423 people living with HIV agree to join this study. The mean age was 37.43 (SD=10.99) years, and 97.9% were male. The majority of them were single (87.3), employee (65.2%), and 59.7% of men who have sex with men (MSM). Above 33.9% of people living with HIV were current smoker, 20.1% former smoker, and 45.9% never smoke. Above 54.7% of current smoker had smoking cessation in the past 6 months. Current smoker more likely to having high education level, lower CD4 count, higher viral load.

Stage of behavior change and its associated factors

The overall distribution of the stages of behavior change was 22.9 % in pre-contemplation, 0.2 % in contemplation, 11.1 % in preparation, 19.8 % in action stages, and 46% in maintenance stage. The stage of behavior change was significantly associated with age, CD4 cell counts, viral load, hepatitis B co-infection, diabetic, and anthropometry

Table 2. Bivariate association: willingness status to smoking cessation by demographic, clinical, and smoking-related information among HIV-smoker (N=144)

Variable	Willing (n=48)	Unwilling (n=96)	p-value
Age (year) [mean ±SD]	31.75±8.00	31.24±8.15	.726
Male	47 (97.9)	89 (97.8)	.726
Single	20 (83.3)	35 (81.4)	.561
Above High school	22 (55.0)	42 (56.8)	.506
Employed	11 (50.0)	21 (75.0)	.188
Risk factor			
Heterosexual	4 (16.0)	10 (23.3)	.536
IDU	5 (20.0)	9 (20.9)	
MSM	15 (60.0)	24 (55.8)	
Unknown/others	1 (4.0)	0 (0)	
HIV-exposure duration (year)	8.43±5.50	6.5±3.89	.108
Current CD4 cell counts (cells/mm3)	520.4±239.9	527.6±218.01	.861
Log current viral load (copies/ml)	4.23±3.00	4.39±2.98	.778
HBV	5 (13.5)	3 (3.9)	.074
HCV	1 (1.5)	1 (2.9)	.558
ART-used	42 (97/7)	65 (97.0)	.662
Duration receiving ART (year)	5.24±4.91	4.89±3.54	.757
Frequency of smoking			
Once a month or less	2 (4.2)	1 (1.1)	.040
2-3 times a month	6 (12.5)	5 (5.5)	
2-3 times a week	6 (12.5)	3 (3.3)	
> 4 times a week	31 (64.6)	68 (74.7)	
Cigarette per day	8.41±2.56	7.13±7.23	.657
Previous attempts to quit	36 (75.0)	60 (65.9)	.183
Ever hear about smoking cessation	41 (85.4)	56 (61.5)	.004

measurements including BMI, total cholesterol and triglyceride (Table 1). In addition, stage of behavior change was associated with frequency of smoking, previous attempts quit, and ever hear about smoking cessation.

In the multivariable regression results (Table 3), age, higher education level, CD4 counts more than 500 cell/mm3, undetectable viral load, higher BMI, hepatitis B co-infection, higher numbers of quitting attempts, ever hear about smoking cessation, and hypertriglyceridemia were associated with the likelihood of being at a more advanced stage of behavior change ($p < 0.05$). The odds of being at the preparation stage and action stage versus the pre-contemplation stage for having diabetic (OR = 9.17, 95 % CI = 0.19-14.33 and OR=3.34, 95%CI=1.32-8.69, respectively). The same path of the odds ratio (OR) was examined by comparing respondents in the stage of action versus the stage of pre - contemplation: the odds of undetectable viral load were three times of those with detectable viral (OR = 3.11, 95 % CI = 1.35-7.15). Subject who had higher education and previous attempts to quit were more likely to be in a maintenance stage.

Willingness to quit smoking cessation and its associated factors

Among 144 of HIV- smoker, one third were willing to quit and refer to smoking cessation program and 66.7% were unwilling. We further compared demographic characteristic and clinical information between those who willing and unwilling (Table 2). Subjects who smoked more than 4 times a week and ever heard about smoking cessation were tend to be unwilling to smoking cessation. The results of the logistic regression showed that smoking 2-3 times a month (aOR=9.33, 95%CI= 1.45-60.2) and having heard about smoking cessation were significant predictors for willingness toward referred to smoking cessation (aOR= 3.67, 95 CI= 3.67-9.06) (Table 4).

Discussion

Our findings regarding the stage of change and willingness toward smoking cessation among people living with HIV (PLWH) in Taiwan showed that 22.9% of HIV-smokers were in the precontemplation stage and 66.7% were unwilling to be referred for smoking cessation. This pattern indicates relatively

Table 3. Ordered logistic regression for factors contributing to the stages of behavior change (n = 423)

Variables	Preparation (n=47) Odds Ratio (95%CI)	Action (n=84) Odds Ratio (95%CI)	Maintenance (n=195) Odds Ratio (95%CI)
Age ≥ 45 years old	.97 (.28-3.39)	.15 (.07-.36)	.21 (.09-.47)
Male	1.03 (.09-11.68)	3.01 (.57-15.92)	2.57 (.56-11.95)
High school above	1.16 (.54-2.50)	1.32 (.71-2.46)	1.88 (1.10-3.19)
CD4≥500	.75 (.37-1.53)	.40 (.21-.74)	0.41 (.25-.68)
Undetected Viral load	1.13 (.52-2.49)	3.11 (1.35-7.15)	1.16 (.91-2.87)
BMI (kg/m2) ≥25	.42 (0.17-1.05)	.32 (.15-.70)	.44 (.21-.89)
HBV	.24 (.05-1.06)	.21 (.06-.78)	.19 (.06-.66)
Diabetic	9.17 (.19-14.33)	3.34 (1.32-8.69)	7.54 (7.54-9.67)
Frequency of smoking			
2-3 times a month	2.80 (.79-9.87)	4.67 (.47-5.34)	.75 (.21-1.65)
2-3 times a week	4.67 (1.09-19.9)	5.72 (1.29-8.08)	.99 (.12-1.93)
Previous attempts to quit	.67 (.31-1.47)	.27 (.12-.58)	60.4 (24.1-51.1)
Ever hear about smoking cessation	.20 (.07-.51)	.72 (.39-1.31)	.73 (0.44-1.20)
Hypercholesterolemia	.71 (.24-2.14)	.73 (.28-1.89)	.81 (.36-1.84)
Hypertriglyceridemia	.79 (.34-1.85)	.27 (.14-.52)	.42 (.23-.74)

Note: precontemplation is reference, bold: significant with p<.05.

Table 4. Logistic regression for factors contributing willingness to quit smoking among HIV-smoker (n=143)

Variable	aOR (95% CI)	p-value
Age ≥ 45 years	1.6 (.5-6.1)	
Male	1.1 (.1-12)	.965
CD4 (Cell/mm3) ≥500	1.2 (.6-2.4)	.649
Frequency of smoking		
2-3 times a month	9.3 (1. 5-60)	.019
2-3 times a week	2.1 (.6-7.9)	.261
Ever hear about smoking cessation	3.7 (1.5-9.1)	.005

Note: Bold: p<.005

low readiness and motivation to quit compared with more recent evidence from other settings. Studies from Europe, Africa, and Latin America have reported high smoking prevalence among PLWH but generally higher levels of interest in quitting and greater proportions in more advanced motivational stages than observed in our sample (Egbe et al., 2019; Mdege et al., 2021; Teixeira et al., 2020). In addition, a recent global review highlighted that, although smoking is highly prevalent among PLWH worldwide, many express at least some interest in cessation when systematically assessed, suggesting that our findings reflect particularly low willingness to quit in this Taiwanese context (Ale et al., 2021; Hoang et al., 2024; Lindayani et al., 2020). Differences in readiness to change and willingness to quit across studies may be related to variations in tobacco control policies, cultural norms, cessation service availability, and how readiness is measured.

In Taiwan, national tobacco control policies and subsidized cessation services have been implemented for the general population through thousands of healthcare facilities and community pharmacies, but they are not specifically tailored to the needs of PLWH (De Socio et al., 2020; Triant et al., 2020). Our findings suggest that generic approaches may not sufficiently address the psychosocial and clinical complexity of smoking behavior in PLWH, as also highlighted in recent global analyses showing that male gender, substance use, mental health problems, and social marginalization strongly shape both smoking and cessation outcomes in this population (Hoang et al., 2024; Edwards et al., 2019). This underscores the need to design and implement smoking cessation strategies that are individualized according to the stage of behavior change and integrated into routine HIV care.

We also found that more than half of those who had attempted smoking cessation in the previous

six months were still smoking at the time of data collection, indicating a high relapse rate. Similar difficulties in sustaining abstinence have been reported in cohort and intervention studies, where PLWH often show high initial interest in quitting but low long-term quit rates despite receiving pharmacological or behavioral support (De Socio et al., 2020; Triant et al., 2020). Recent cohort data from Italy further demonstrate that persistent smoking in PLWH is associated with a higher risk of cardiovascular and neoplastic events and increased all-cause mortality, emphasizing the clinical consequences of failed or incomplete cessation efforts (De Socio et al., 2025). Together, these studies and our findings point to the need for more intensive, long-term, and HIV-specific cessation support, including relapse-prevention components.

In our study, older age, higher CD4 cell counts, undetectable viral load, higher body mass index, diabetes, and hypertriglyceridemia were associated with more advanced stages of behavior change. Recent epidemiological studies among PLWH have similarly shown that clinical status and comorbid conditions are closely linked to smoking patterns and cessation behavior (Ale et al., 2021; Teixeira et al., 2020). For example, PLWH with cardiovascular or metabolic comorbidities may be more strongly advised to quit and therefore more motivated to consider cessation (De Socio et al., 2025). At the same time, high levels of nicotine dependence and psychosocial stressors remain major barriers, particularly in those with heavy alcohol use or other substance use (Egbe et al., 2019; Mdege et al., 2021). Our finding that having heard about smoking cessation was associated with both more advanced stages of change and greater willingness toward cessation is consistent with recent work showing that awareness of support options and tailored provider advice are key facilitators of quitting among PLWH (Edwards et al., 2019; Triant et al., 2020).

Limitation of the study

There are some limitations of our study should be acknowledged in our study. First, smoking information relies on self-reported information that could lead to bias. Future studies need to measure nicotine dependency level for an objective measure of smoking status. Second, overrepresentation of male participants that could be affected to the less generalizability of this study. Third, we did not collect information regarding other behavioral factors, such as diet, exercise, and psychological stress, that would affect to stage of behavior change and their willingness to quit smoking.

Implication of the study

This study highlights the importance of integrating stage-based smoking cessation interventions into routine HIV care. The high prevalence of smoking and low readiness to quit among people living with HIV indicate that uniform cessation approaches are insufficient. Applying the Transtheoretical Model (TTM) enables healthcare providers to assess readiness to quit and tailor interventions according to individuals' stages of behavior change, which may improve adherence and reduce relapse. The findings also emphasize the critical role of nurses and case managers in delivering smoking cessation support. Targeted training in TTM-based counseling is needed to strengthen their capacity to assist and motivate HIV-positive smokers. At the policy level, limited reimbursement for smoking cessation services under current NHI regulations may restrict access for many individuals who need early support. Expanding coverage and implementing targeted tobacco control strategies for people living with HIV are essential to ensure equitable and effective smoking cessation support.

Conclusion

In conclusion, we applied the TTM to identify the stages of behavior change in people living with HIV. The study findings showed a higher prevalence of current smoking and a lower rate of readiness and willingness to quit smoking. We demonstrated that stage of change was highly associated with age, education level, clinical information, including CD4 cell count, viral load, and comorbidity (diabetic and hepatitis B), experience with smoking cessation, and exposure to smoking cessation information. findings suggest to design an intervention according to HIV-smoker stage of behavior change for successful smoking cessation by improving the adherence and reduce relapse rate. Considering high prevalent of smoking among people living with HIV, it's important to integrate smoking cessation program into HIV care and to assess smoking status including their willingness to quit smoking routinely in every clinical visit using the TTM "stage of change" model. Aggressive campaign of smoking cessation is warranted to spread out information widely. Furthermore, training for nurses who take care HIV-positive persons or case manager regarding smoking cessation also needed in order to be able to help, assist, and support HIV-smoker to quit. However, according to NHI policy, reimbursement of smoking cessation only provides for those with serious stage. It's underscored the needs for equality to support smokers to stop and a structured intervention at the population level, with tobacco control efforts targeted to HIV population.

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Conflicts of interest

All authors declar no conflict of interest

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