RESEARCH ARTICLE

Smoking Cessation, Quit Attempts and Predictive Factors among Vietnamese Adults in 2020

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Abstract

Objective: This study aims to describe the updated smoking cessation and quit attempt rates and associated factors among Vietnamese adults in 2020. **Methods:** Data on tobacco use among adults in Vietnam in 2020 was derived from the Provincial Global Adult Tobacco Survey. The participants in the study were people aged 15 and older. A total of 81,600 people were surveyed across 34 provinces and cities. Multi-level logistic regression was used to examine the associations between individual and province-level factors on smoking cessation and quit attempts. **Results:** The smoking cessation and quit attempt rates varied significantly across the 34 provinces. The average rates of people who quit smoking and attempted to quit were 6.3% and 37.2%, respectively. The factors associated with smoking cessation were sex, age group, region, education level, occupation, marital status, and perception of the harmful effects of smoking. Attempts to quit were significantly associated with sex, education level, marital status, perception of the harmful effects of smoking, and visiting health facilities in the past 12 months. **Conclusions:** These results may be useful in formulating future smoking cessation policies and identifying priority target groups for future interventions. However, more longitudinal and follow-up studies are needed to prove a causal relationship between these factors and future smoking cessation behaviors.

Keywords: Smoking cessation- quit attempts- multilevel analysis- Vietnam, PGATS 2020

Introduction

Tobacco use is the leading cause of death in the world (Ghebreyesus, 2019). The majority of the global burden of tobacco-related death is concentrated in low- and middle-income countries (LMICs) (Sinha et al., 2018). According to the 2015 Global Adult Tobacco Survey (GATS) results in Vietnam, approximately 45.3% of men and 1.1% of women currently smoke (Van Minh et al., 2017). Every year, approximately 40,000 people in Vietnam die as a result of tobacco-related diseases (Levy et al., 2006). In Vietnam, the estimated economic burden of smoking-related diseases is relatively high, accounting for 0.97% of the total GDP in 2011 (Hoang Anh et al., 2016).

Tobacco control is an essential component of any country's public health strategy (Schreuders et al., 2018; Goodchild and Zheng, 2019). Stopping smoking at any time lowers the risk, slows the progression of smoking-related diseases, and extends the life expectancy. If effective interventions were widely implemented in low- and middle-income countries, hundreds of millions of premature tobacco-related deaths could be avoided (Institute of Medicine (US) Committee on Cancer Control in Low- and Middle-Income Countries, 2007). As a result, smoking cessation, and tobacco addiction treatment can have a significant impact on lowering the disease burden and improving population health (Ezzati and Lopez, 2003). The WHO Framework Convention on Tobacco Control was adopted by the World Health Assembly in 2003 to strengthen policies, programs, and strategies to prevent and reduce tobacco use. Vietnam implemented the Law on Prevention of Tobacco Harms in 2013, which aims to develop and implement multi-sectoral policies toward creating smoke-free environments and lowering the prevalence of non-communicable diseases (Vietnam National Assembly, 2012). Currently in Vietnam, several measures to support smoking cessation counselling recommended by WHO have also been implemented and have shown certain effectiveness (Jiang et al., 2019; Ngo et al., 2019). Besides the impact of tobacco control

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activities introduced by the Government as a smoke-free environment, increased taxes, banned advertising, and support for smoking cessation treatment counseling, many individual factors influence a smoker's decision to change their behaviors. Previous studies have shown that smoking cessation is associated with sociodemographic factors such as older age (Li et al., 2010; Abdullah et al., 2015), a higher education level (Borland et al., 2010), less nicotine dependence (Reid et al., 2010), and perceived health as good or excellent (Abdullah et al., 2015). In addition, the attempt to quit is associated with higher monthly income (Reid et al., 2010), a higher education level (Reid et al., 2010; Myung et al., 2012), lower nicotine dependence, and perceptions of good or excellent health (Li et al., 2010).

Updating the smoking cessation rate, the percentage of smokers who have tried to quit smoking, and identifying characteristics of smokers who attempt or have succeeded in quitting smoking may aid in the development of anti-smoking policies. Several studies described smoking cessation, and quitting attempts and examined the associated factors in Vietnam (Huong et al., 2012; Kim et al., 2021). However, these studies used data from previous rounds of GATS in Vietnam in 2010 and 2015. Using the most up-to-date data on tobacco use in Vietnam, from the provincial Global Adult Tobacco Survey (PGATS, which uses the same GATS questionnaire but is conducted in each of Vietnam's 34 provinces/cities) in 2020, this study aims to describe the updated smoking cessation and quit attempt rates and associated factors among Vietnamese adults in 2020.

Materials and Methods

Research Design and Location

Data on tobacco use among adults in Vietnam in 2020 was derived from the PGATS. The PGATS 2020 was carried out in 34 out of 63 provinces and cities in Vietnam, which received financial support from the Vietnam Tobacco Control Fund (VNTCF) under the Ministry of Health in 2020. The questionnaire was similar to those used in previous GATSs (Global Tobacco Surveillance Surveys) in Vietnam, which were conducted in 2010 and 2015.

Sample Size and Participants

The sample size was chosen to estimate key variables by sex and region in each province/city. The participants in the study were people aged 15 and older. Each province/city had a sample size of 2400 people (1200 were males, 1200 were females). A total of 81,600 people were surveyed across 34 provinces and cities. A list of administrative entities was created in each province based on economic status, and then one city/town and two districts with medium and underdeveloped economic status were selected using a simple random sampling. We chose two communes at random in each city/town/ district; 600 homes were chosen at random from these communes (300 households each). In each district with a medium or underdeveloped economic status, 900 families were picked at random from three communes using the simple random sampling method. One member who was

15 years old or older in each household was chosen. If the to-be-selected member was male (or female), and the household had only one member who was 15 years old or older and fit the sex criteria, that member was chosen. If the household had more than one member who was 15 years old or older, the KISH method was applied to the selection process. If any selected household didn't have members that meet the sex criteria, the nearest household was chosen for replacement. Any participant with mental health issues or other health conditions was excluded from the sample. With a response rate of 98.2 percent, there were 80,166 completed interviews.

Measures

Smoking cessation and attempts to quit smoking were the dependent variables. Smoking cessation was measured among ever smokers. Former smokers were defined as those who ever smoked and had not smoked in the previous 30 days. The definition of an attempt to quit smoking during the last 12 months in this study was based on individuals who were current smokers and had made at least one attempt to quit within the previous 12 months. Independent variables were social demographic characteristics and some other variables. The social demographic variables were sex, age group (15-24 years old, 25-44 years old, 45-64 years old, and 65+ years old), region of accommodation (urban, rural), marital status (single, widow/widower, separated, and married), and occupation (unemployed/ housekeeper/student/retiree, freelancer, knowledge workers). Other variables such as visiting health facilities in the past 12 months (No, Yes, visit and receive advice for quitting tobacco from healthcare workers); perception of harmful effects of smoking (No/Yes); and using electronic cigarettes or heated tobacco products (No/Yes) were used.

Data collection

Vietnam Tobacco Control Fund (VNTCF) of the Ministry of Health was the coordinating unit for this survey. VNTCF supported 34 provinces and cities in conducting the research. VNTCF cooperated with the Hanoi University of Public Health in terms of technical support, and field supervision during the implementation of the survey in 34 provinces and cities. All of the interviews were conducted in Vietnamese and using Galaxy tablets or smartphones for data collection. Data were transferred to the research headquarters for quality management, data monitoring, and data cleansing using REDCap.

Data analysis

The frequency distribution of the categorical variables was determined using descriptive analysis and weight was used. Weighting was performed step by step process using a weighting manual. Three steps can be described in brief as follows: create the base weight based on the product of each stage's well-documented selection probability, adjust for the household non-responsive and individual non-response, and produce post-stratification adjustment to balance sample selection. As this study obtained data from 34 provinces across the country,

multilevel analysis was appropriate to examine the associations between individual and province-level factors on smoking cessation and quit attempts (Nezlek, 2008). The independent variables were selected for the model using the Bayesian Model Averaging method, which is a statistical method for selecting important predictors in a regression model. It accounts for model uncertainty by assigning prior probabilities to each model, updating them using Bayesian inference based on the observed data, and obtaining posterior probabilities for each model. The method then estimates the average effect size of each predictor across all models, allowing the identification of the most important predictors while accounting for model uncertainty. In addition, variables that have been proven related to smoking cessation and quit attempts in previous studies or documents were also considered to be included in the model.

Research Ethics

The Ethics Committee of Hanoi University of Public Health approved this study under Decision No.318/2020/YTCC-HD3 dated July 30, 2020.

Results

According to Table 1, 49.1% of participants were males, while 50.9% were females. The majority of participants (42.9%) were between the ages of 25 and 44 and came from rural areas (63.9%). People with a secondary school education made up the largest proportion (31.3%), followed by those with a primary school education or lower (27.4%). Only 15.4% of

those who took part had tertiary education. Nearly 60% of study participants worked as freelancers, while 4% were unemployed. The majority of the participants were married (73.9%).

Table 2 shows the demographic characteristics of participants by smoking status. The percentage of current smokers was 21.7% (43.0% among males, 1.7% among females), and that of former smokers was 6.3% (10.7% among males, 1.2% among females). The rate of smoking cessation was the highest in the group over 65 years old (11.5%), and lowest in the youngest age group 15-24 years old (2.6%). Regarding occupation, the unemployed had the highest smoking cessation rate (11.8%) compared to housekeepers/students/retirees, freelancers, and knowledge workers. 7.1% of participants who were married were former smokers, the highest percentage compared to the single or divorced/separated/widow group.

Figure 1A depicts the variation in smoking cessation rates across Vietnam's provinces. The smoking cessation rates ranged from 7.74% in Lai Chau province (northwest Vietnam) to 51.60% in Hanoi (the capital of Vietnam). The rates of attempts to quit described in Figure 1B ranged from 16.29% in Lai Chau province to 63.76% in Nam Dinh province (a province in the southern part of the Red River Delta region of northern Vietnam, located near Hanoi).

Table 3 shows the factors associated with smoking cessation, identified through multilevel logistic regression analysis, including sex (female: OR=3.10, 95%CI: 2.62-3.67), age group (45-64: OR=1.84, 95%CI: 1.46-2.31; 65+: OR=2.83, 95%CI: 2.21-3.65), region (urban area: OR=1.22, 95%CI: 1.21-1.33), an education level
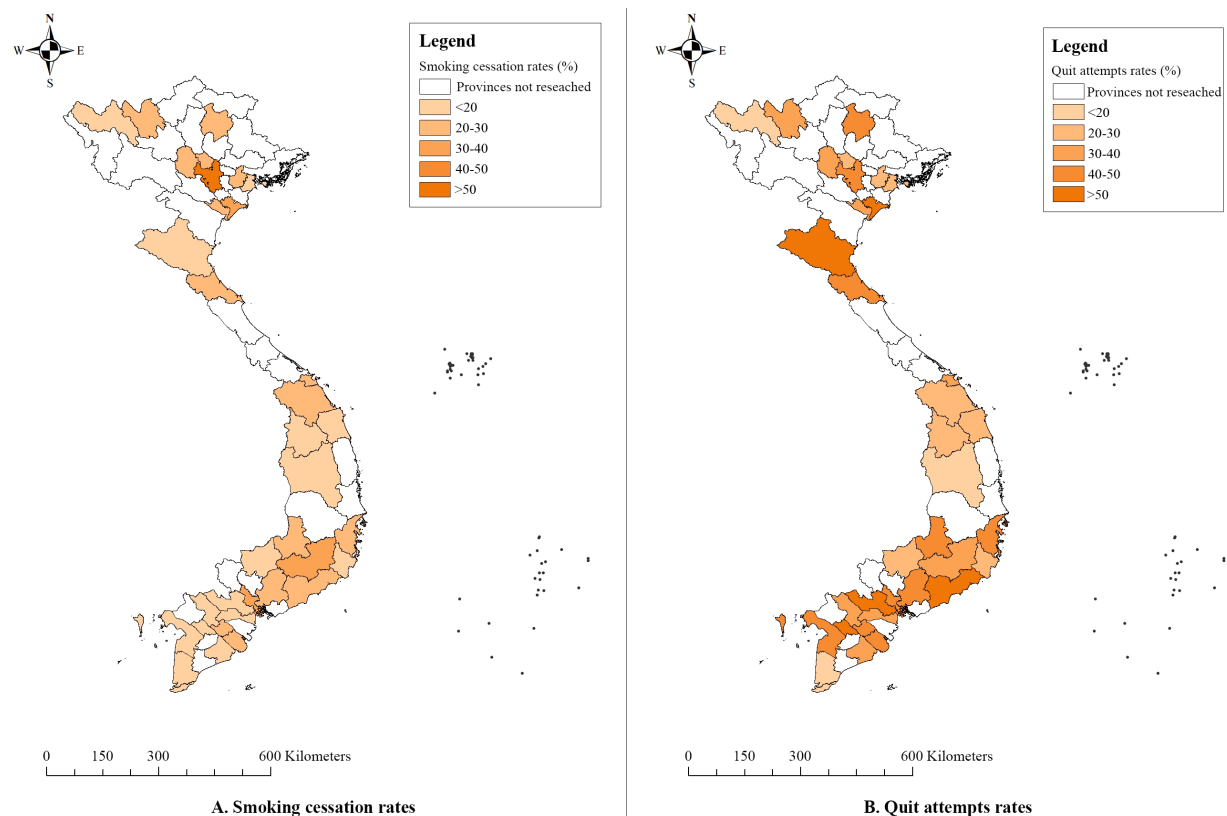

Figure 1. Smoking Cessation Rates and Attempts to Quit Rates in 34 Provinces/Cities

Table 1. Demographic Characteristics of the Participants

Characteristic	Weighted		Unweighted number of adults
	Percentage (95% CI)	Number of adults (thousand)	
Total	100	71,356	80,166
Sex			
Male	49.1 (48.6-49.7)	35,056	40,071
Female	50.9 (50.3-51.4)	36,300	40,095
Age group (year)			
15-24	18.4 (17.6-19.2)	13,113	9,478
25-44	42.9 (42.1-43.6)	30,582	32,356
45-64	28.8 (28.0-29.6)	20,514	31,078
65+	10 (9.4-10.6)	7,119	7,224
Region of accommodation			
Rural area	63.9 (54.2-72.5)	45,569	59,736
Urban area	36.1 (27.5-45.8)	25,786	20,430
Education level			
Primary education or lower	27.4 (24.9-30.0)	19,489	25,696
Secondary school education	31.3 (30.1-32.6)	22,308	25,683
High school education	25.9 (24.3-27.7)	18,456	17,747
Tertiary education	15.4 (13.8-17.1)	10,945	10,840
Occupation			
Unemployed	4 (3.6-4.3)	2,821	3,292
Housekeeper/Student/Retiree	22.5 (21.3-23.7)	16,018	15,978
Freelancer	59.4 (57.6-61.2)	42,366	50,482
Knowledge workers	14.1 (13.1-15.2)	10,072	10,330
Marital status			
Single	21.3 (19.8-22.8)	15,128	11,486
Married	73.9 (72.4-75.4)	52,598	64,449
Divorced/ separated/ widow	4.8 (4.3-5.3)	3,426	4,044

Note: CI, confidence interval; Knowledge worker, civil servants, non-state-owned organization employees; Freelancer, workers who are not employed in state organizations or non-state-owned organizations; Unemployed, not currently in work, incapable to work.

(Secondary school education: OR=1.27, 95%CI=1.15-1.40; High school education: OR=1.34, 95%CI=1.19-1.50; Tertiary education: OR=1.75, 95%CI=1.50-2.04), occupation (Freelancers: OR=0.58, 95%CI=0.49-0.69; Knowledge workers: OR=0.67, 95%CI=0.55-0.82), marital status (Married: OR=1.50, 95%CI=1.26-1.78); and Perception of harmful effects of smoking (Yes: OR=1.23, 95%CI=1.13-1.34).

Table 4 illustrates the results from multilevel logistic regression for attempts to quit among current smokers. Attempts to quit were significantly associated with sex (female: OR=0.49, 95%CI=0.40-0.60), an education level (Secondary school education: OR=1.11, 95%CI=1.01-1.22; High school education: OR=1.28, 95%CI=1.13-1.42; Tertiary education: OR=1.33, 95%CI=1.13-1.55), marital status (Married: OR=1.15, 95%CI=1.01-1.32), perception of harmful effects of smoking (Yes: OR=1.53, 95%CI=1.41-1.67), visiting health facilities in past 12 months (Yes: OR=1.68, 95%CI=1.50-1.88; visit and receive advice for quitting tobacco from healthcare workers: OR=1.89, 95%CI=1.71-2.08).

Discussion

According to our findings, the average proportion of people who have quit smoking in 34 provinces was 6.3% (10.7% for men and 1.2% for women), while the percentage of current smokers was 21.7% (43.0% for men and 1.7% for women). The average attempt rate to quitting smoking was 37.2% throughout the 34 provinces (40.9% for men and 25.1% for women). When comparing the findings of this study to previous studies, it appears that the attempt to quit smoking among men was lower than the 2010 Vietnam GATS data reported in Le et al. study (Huong et al., 2012). However, in contrast, the rate of attempts to quit smoking was higher among men compared to the 2015 GATS data reported in the study by Kim et al. in 2021 (Kim et al., 2021). It's important to note that these differences could be due to dissimilar in the sampling methods and sample sizes used in each study. PGATS 2020 data only represented the participating provinces/cities, and as the result, was unable to be put under comparison with the results of GATS 2010 and GATS 2015. Despite these differences, the low success rate of smoking cessation efforts in Vietnam is a common theme across

Table 2. Demographic Characteristics of Participants by Smoking Status

Characteristic	Weighted		
	Non-smokers (%)	Former smokers (%)	Current smokers (%)
Total	72	6.3	21.7
Sex			
Male	46.3	10.7	43
Female	97.1	1.2	1.7
Age group (year)			
15-24	84.4	2.6	13
25-44	71.8	4.7	23.5
45-64	65	9.3	25.7
65+	70.3	11.5	18.3
Region of accommodation			
Rural area	72.3	5.5	22.2
Urban area	71.4	7.9	20.7
Education level			
Primary education or lower	68.5	6	25.5
Secondary school education	70.4	6.7	22.9
High school education	73.7	6	20.3
Tertiary education	78.8	6.6	14.6
Occupation			
Unemployed	64.3	11.8	23.9
Housekeeper/Student/Retiree	90.2	4.5	5.3
Freelancer	64.4	7	28.6
Knowledge workers	77.3	5	17.7
Marital status			
Single	77.7	4	18.3
Married	69.7	7.1	23.2
Divorced/ separated/ widow	81.3	4.9	13.8

Knowledge worker: civil servants, non-state-owned organization employees; Freelancer, workers who are not employed in state organizations or non-state-owned organizations; Unemployed, not currently in work, incapable to work.

the studies. This suggests that tobacco cessation services in the country have not been well implemented, leaving many smokers without the support they require to quit smoking. In this study, the smoking cessation rates varied significantly across the 34 provinces. Lai Chau was the province with the lowest smoking cessation rate. Lai Chau province is one of Vietnam's most sparsely populated areas. While these rates were relatively high in big cities such as Ho Chi Minh City, especially in Hanoi, this rate was 51.6%. Similarly, the average attempt rate to quitting smoking varied by province. This can be explained by the fact that provinces' socioeconomic conditions may influence tobacco use and smoking cessation behaviors. Several studies have also found a strong link between adult smoking and socioeconomic status, especially in developing countries (Leinsalu et al., 2007; Wilkinson et al., 2009; Kim et al., 2012; Fernando et al., 2019). As a result, we used multi-level analysis in this study to identify factors related to smoking cessation status and smoking cessation efforts.

The results from the multi-level analysis show that the significant factors that predicted successful smoking cessation were sex, age, area, education level, occupation,

marital status, and perception of the harmful effects of smoking. In our study, women had a higher success rate of quitting smoking than men. A qualitative review of 190 studies demonstrated that results from trials or prospective observational studies also showed that females have more difficulty quitting smoking than males, however, results from cross-sectional studies were inconsistent (Smith et al., 2016). Successful smoking cessation rates between men and women depend on the sociocultural environment and the time and location of the study (Tsai et al., 2008; Smith et al., 2016). Our study was also a cross-sectional study, besides that, female smoking in Vietnam is not common due to cultural and social norms. Thus, these reasons may lead to lower smoking rates and higher quit rates observed among women.

Age is a factor that plays a role in smoking cessation. In our study, the older age group was significantly associated with smoking cessation. This has also been demonstrated in previous studies in some countries in Asia (Hagimoto et al., 2010; Li et al., 2010; Abdullah et al., 2015). The environment in which people live has an impact on their smoking habits as well. In our study, people who lived in urban areas were more likely to quit smoking than those

Table 3. Multilevel Logistic Regression for Smoking Cessation among Ever Smokers (Weighted n = 14,591,458)

Variables	Weighted %	Adjusted OR	95% CI	p-value
Fixed-effects				
Sex				
Male	19.9	ref		
Female	42.5	3.1	2.62-3.67	<0.001
Age group (year)				
15-24	16.8	ref		
25-44	16.6	0.9	0.72-1.13	0.382
45-64	26.6	1.84	1.46-2.31	<0.001
65+	38.3	2.83	2.21-3.65	<0.001
Region of accommodation				
Rural area	19.6	ref		
Urban area	27.5	1.22	1.21-1.33	<0.001
Education level				
Primary education or lower	18.9	ref		
Secondary school education	22.7	1.27	1.15-1.40	<0.001
High school education	22.7	1.34	1.19-1.50	<0.001
Tertiary education	31.2	1.75	1.50-2.04	<0.001
Occupation				
Unemployed	32.8	ref		
Housekeepers/students/retired	45.5	1.21	0.99-1.46	0.056
Freelancers	19.5	0.58	0.49-0.69	<0.001
Knowledge workers	21.8	0.67	0.55-0.82	<0.001
Marital status				
Single	18	ref		
Married	23.3	1.5	1.26-1.78	<0.001
Divorced/ separated/ widow	25.9	1.21	0.92-1.59	0.172
Perception of harmful effects of smoking				
No	22.4	ref		
Yes	24.7	1.23	1.13-1.34	<0.001
Random-effects		Estimate	SE	95% CI
Variation		0.23	0.02	0.23-0.32

Note: OR, odds ratio; CI, confidence interval; ref, reference group; SE, standard error; Knowledge worker, civil servants, non-state-owned organization employees; Freelancer, workers who are not employed in state organizations or non-state-owned organizations; Unemployed: not currently in work, incapable to work.

who lived in rural areas. More exposure to pro-tobacco marketing, living in a context where smoking is a societal norm, and poorer education and socioeconomic levels are all connected with rural and distant living, in addition to physical and social isolation (Passey et al., 2011; Cruz et al., 2019).

These study findings also demonstrate that smokers with lower levels of education have continuously lagged behind their higher-educated peers when it comes to quitting. The higher the level of education, the higher the rate of quitting smoking. When compared to smokers with higher education, smokers with lower education are more likely to live in areas or residences where tobacco is more available and accepted (Chuang et al., 2005; Ahern et al., 2009). Therefore, individuals are more likely to be surrounded by smokers in their families, social relationships, or workplaces, and they are more inclined

to accept smoking as normal (Christakis and Fowler, 2008). This influences their chances of attempting to quit smoking. Even if individuals try to quit, the increased exposure to smoking signals makes them more likely to relapse (Shiffman et al., 1996; Chen et al., 2001).

According to our results, unemployed smokers, students, housekeepers, and retired people had a higher chance of quitting smoking successfully. This finding was consistent with the findings of a study of eight low-and middle-income countries in 2019 (Nargis et al., 2019). This may seem illogical given that tobacco is now prohibited in several workplaces. Smoking bans in the workplace do not apply to non-employed smokers (Farrelly et al., 1999). This can be explained that even though smoking bans have been enacted in several workplaces in Vietnam, compliance is still not very strict (Ministry of Health and Hanoi University of Public Health, 2020). Lack of job, and

Table 4. Multilevel Logistic Regression for Attempts to Quit among Current Smokers (Weighted n = 11,414,823)

Variables	Weighted %	Adjusted OR	95% CI	p-value
Fixed-effects				
Sex				
Male	40.9	ref		
Female	25.1	0.49	0.40-0.60	<0.001
Age group (year)				
15-24	33.1	ref		
25-44	38.8	1.02	0.85-1.22	0.842
45-64	44	1.16	0.96-1.40	0.13
65+	42	1.16	0.92-1.46	0.207
Region of accommodation				
Rural area	39.7	ref		
Urban area	41.3	0.99	0.91-1.08	0.9
Education level				
Primary education or lower	37	ref		
Secondary school education	40	1.11	1.01-1.22	0.032
High school education	42.9	1.28	1.13-1.42	<0.001
Tertiary education	42.9	1.33	1.13-1.55	<0.001
Occupation				
Unemployed	35	ref		
Housekeepers/students/retired	45	1.29	1.01-1.64	0.043
Freelancers	39.5	1.06	0.87-1.29	0.582
Knowledge workers	43.9	1.1	0.87-1.39	0.417
Marital status				
Single	37.4	ref		
Married	41.1	1.15	1.01-1.32	0.042
Divorced/ separated/ widow	34.1	1.08	0.83-1.39	0.577
Perception of harmful effects of smoking				
No	31.1	ref		
Yes	44.1	1.53	1.41-1.67	<0.001
Visiting health facilities in the past 12 months				
No	35.4	ref		
Yes	54	1.68	1.50-1.88	<0.001
Visit and receive advice for quitting tobacco from healthcare workers	52.5	1.89	1.71-2.08	<0.001
Using electronic cigarettes or heated tobacco products				
No	40.1	ref		
Yes	44	1.05	0.81-1.35	0.723
Random-effects		Estimate	SE	95% CI
Variation		0.3	0.07	0.18-0.49

Note: OR, odds ratio; CI, confidence interval; ref, reference group; SE, standard error; Knowledge worker: civil servants, non-state-owned organization employees; Freelancer, workers who are not employed in state organizations or non-state-owned organizations; Unemployed, not currently in work, incapable to work.

consequently lack of earnings, can increase the incentive to quit among these people by reducing the affordability of all items, including cigarettes.

Smoking cessation was found to be associated with being married. Some other studies also showed a similar association (Broms et al., 2004; Cho et al., 2008). One possible explanation for the link between marriage and smoking cessation is the spouse's encouragement to quit smoking to improve future health and not negatively impact children. Furthermore, persons who are aware of tobacco's detrimental consequences are more likely to successfully quit smoking.

Sex, education level, marital status, perception of harmful effects of smoking, and visiting health facilities in the past 12 months were the factors affecting attempts to quit smoking among current smokers in this study.

With the recent appearance of combustible tobacco replacements such as e-cigarettes and heated tobacco products in Vietnam, we investigated the association between the use of these products and attempts to quit smoking. However, there was no statistically significant difference in smoking cessation attempts between non-users and users of these new types of products. Smokers with a higher level of education were more likely to have tried to quit smoking than smokers with a lower level of education (Gilman et al., 2008; Reid et al., 2010). The same was also found in the findings of our research. People with higher levels of education were more likely to have access to knowledge regarding the adverse effects of tobacco, therefore perception of the harmful effects of smoking tobacco also affects smoking cessation attempts. This association was also reported in our study and several previous studies (Costello et al., 2012). People who live with their spouses are more likely to try to quit smoking, which may also be due to their spouse's encouragement.

Time to the first cigarette in the morning is one of the indicators for evaluating the nicotine dependence of smokers (Branstetter et al., 2020). Many studies have demonstrated that low levels of nicotine dependence affect quitting intention, and quitting intention is a strong predictor of quitting attempts. Another important factor that influences current smokers' quitting efforts was visiting health facilities in the past 12 months. In our study, people who had visited a health facility in the past 12 months were more likely to attempt to quit smoking than those who did not. Moreover, those who received quit advice from healthcare workers during their visit showed even higher rates of quit attempts. This could be explained that health facilities often provide information and resources on smoking cessation, which can increase smokers' motivation and confidence to quit. Smokers who visit health facilities may be more likely to receive advice or counseling from healthcare professionals, which has been shown to increase quit attempts (CDC, 2020). Additionally, visiting health facilities may be a sign of a smoker's overall health awareness and engagement in healthcare. Smokers who are more proactive about their health and seek regular healthcare may be more likely to also prioritize quitting smoking as a way to improve their overall health. PGATS 2020 reported that 72.2% of current tobacco users received advice to quit smoking from health workers, which was the most common channel (Ministry of Health and Hanoi University of Public Health, 2020).

This research has provided some findings using a multi-level analysis approach to identify the link between smoking cessation, quit attempts, and several individual factors. This study, however, has some limitations. Firstly, because the study design was cross-sectional, we cannot prove a cause-and-effect relationship. Second, because our study only covers 34 of Vietnam's 63 provinces, the results were not representative of the entire country. In addition, data collection was carried out separately in each province, which may lead to some inaccuracies between the data of provinces.

In conclusion, this study showed that the significant factors that predicted successful smoking cessation were sex, age, area, education level, occupation, marital status, and perception of the harmful effects of smoking. Sex, education level, marital status, perception of the harmful effects of smoking, and visiting health facilities in the past 12 months were the factors affecting the attempts to quit smoking among current smokers in our study. These results may be useful in formulating future smoking cessation policies, as well as in identifying priority target groups for future interventions. To successfully promote smoking cessation in Vietnam, interventions should focus on raising knowledge of the detrimental consequences of smoking, especially among individuals with lower levels of education. It is also vital to target certain demographic groups such as men, younger age groups, and unmarried people. Moreover, access to smoking cessation services and assistance is critical in rural regions, where smoking rates are generally greater. Healthcare facilities may help with this endeavour by offering information and counselling on the benefits of quitting smoking. Further study is needed to demonstrate a causal association between the highlighted factors and smoking cessation behaviors in order to refine interventions and make them more effective.

Author Contribution Statement

TTTH, PVC, HVM, LNK, PTH, NTL, DTA, KQL, VTHL and LNM conceived and designed the study, agreed with the results, conclusions, and came up with arguments for the manuscript. TTTH, LNK, PTH, NTL, DTA, PVC, KQL, VTHL, LNM, and HVM coordinated data collection and analyzed the data. LNM, TTTH, and HVM wrote the first draft of the manuscript. All the authors made critical revisions and agreed on the final versions of the manuscript. LNM, TTTH, LNK, PTH, VVG, JKO, and HVM reviewed the final manuscript and approved it for submission, which was done by TTTH.

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Conflict of interest
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