RESEARCH ARTICLE

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Smoking Cessation and Its Associated Factors among Adolescents Aged 13-15 Years Old in Vietnam: Findings from GYTS 2022

Hang Thi Minh Lai[1]*, Diep Bich Pham[1], Minh Ngoc Luu[1], Huong Thi Diem Nguyen[1], Khue Ngoc Luong[2], Hai Thi Phan[2], Anh Tu Duong[2], Linh Thuy Nguyen[2], Trang Thi Quynh Le[3], Thao Thi Thanh Nguyen[3], Giang Bao Kim[1]

Abstract

Objective: This study aims to analyze smoking cessation and its associated factors among adolescents aged 13-15 years in Vietnam. **Methods:** The present study used data from the Vietnamese Global Youth Tobacco Survey in 2022 and consisted of 454 adolescents aged 13-15 years old. Smoking cessation was defined as having not smoked in the past 30 days. A multivariable logistic regression model was conducted to identify the factors associated with smoking cessation among those adolescents. **Results:** Among the participants, 76.9% had achieved smoking cessation, and the main type of tobacco smoked was cigarettes (84.5%). Factors significantly associated with smoking cessation included peer smoking, parental smoking status, tobacco-related knowledge, and exposure to anti-smoking information. Adolescents with only one smoking parent were more likely to quit than those whose parents did not smoke (OR = 2.48, 95% CI: 1.39–4.43). Similarly, greater tobacco knowledge (OR = 2.23, 95% CI: 1.30–3.83) and exposure to anti-smoking messages from two or more sources (OR = 2.49, 95% CI: 1.05–5.92) were positively associated with cessation. In contrast, adolescents with smoking friends had a significantly lower likelihood of cessation (OR = 0.31, 95% CI: 0.14–0.69). **Conclusion:** Economic status, peer influence, parental smoking, and cognitive factors namely tobacco-related knowledge and exposure to anti-smoking information were key determinants of smoking cessation among Vietnamese adolescents, with notable gender differences. These findings suggest the need for comprehensive tobacco control programs that address these factors to more effectively reduce smoking rates among this population.

Keywords: Smoking cessation- adolescents- GYTS

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Introduction

Tobacco use remains one of the leading preventable causes of premature death worldwide. According to the World Health Organization (WHO), more than 7 million deaths annually are attributed to direct tobacco use. Over 80% of the world's 1.3 billion tobacco users live in low- and middle-income countries (LMICs), where the burden of tobacco-related diseases and deaths is significantly higher than in high-income countries [1].

Globally, tobacco use often begins during adolescence period, with over half of current smokers starting to smoke before adulthood [2, 3]. In LMICs, at least 50 million smokers started smoking before the age of 15 and they had approximately double the risk of premature death [4].

In Viet Nam, smoking is one of the top three risk factors contributing to premature death and disability [5], accounting for an estimated 75,000 deaths each year [6]. The 2014 Global Youth Tobacco Survey (GYTS) reported a 3.5% smoking prevalence among adolescents aged 13–15 (6.3% in boys and 0.9% in girls) [7]. Although the prevalence of cigarette smoking declined between 2007 and 2014, the use of other tobacco products increased, suggesting a shift in tobacco consumption patterns. These findings highlight the importance of targeted smoking prevention and cessation strategies for adolescents.

To develop effective cessation strategies, it is essential to understand the factors influencing adolescents' ability to achieve cessation. International studies have identified several key predictors of smoking cessation in youth, including not having smoking friends, low intention to smoke, greater resistance to peer pressure, older age at smoking initiation, and negative beliefs about tobacco use [8]. Additionally, a comprehensive review

*[1]School of Preventive Medicine and Public Health, Hanoi Medical University, Ha Noi, Vietnam. [2]Vietnam Tobacco Control Fund, Ministry of Health, Ha Noi, Vietnam. [3]Center for Assessment and Quality Assurance, Hanoi Medical University, Ha Noi, Vietnam. *For Correspondence: laithiminhhang@hmu.edu.vn*

identified 63 predictors of smoking cessation, including sociodemographic, psychosocial, behavioral, social, smoking-related, environmental, health-related, and genetic factors [9].

Despite increasing global attention to youth smoking cessation, evidence from Viet Nam remains limited. Most existing studies have focused on individuals aged 15 and older and their findings suggest smoking cessation is associated with age [10, 11], sex and residence [11], exposure to anti-smoking messages, awareness of tobacco's harms, and receiving advice from health professionals [12]. A notable longitudinal study in a peri-urban area of Northern Viet Nam (Chi Linh District, 2006–2013) revealed that male, older, unmarried, informal employment, and having family or friends who smoke were all associated with lower likelihood of smoking cessation. Among these, having close friends who smoked was the strongest predictor of failed quit attempts [13]. In contrast, evidence on cessation among adolescents remains limited. To address this gap, the present study examines the prevalence of smoking cessation and its associated factors among Vietnamese adolescents aged 13–15, using data from the 2022 GYTS.

Materials and Methods

Data source

The present study utilized data from the 2022 GYTS conducted in Viet Nam. This school-based cross-sectional study was designed to assess tobacco use and tobacco control measures among students aged 13-15 years old. The 2022 GYTS used the same sampling framework as the 2014 survey [14] and adjusted by the number of classes in each school and province. A total of 3,873 students aged 13–15 years completed the survey, with an overall response rate of 93.3%. For this study, we included only students who reported ever trying any smoked tobacco product (cigarettes, shisha, e-cigarettes, or others). Students who had never smoked were excluded. Based on this criterion, 454 students were eligible and included in the final analysis. The study followed standardized protocols for sampling, questionnaire design, data collection, and processing, as developed by the U.S. Centers for Disease Control and Prevention.

The final questionnaire in 2022 was based on the 2014 version, with several additional questions to better reflect the current tobacco use patterns in Vietnam. It comprised 76 questions covering seven core topics: (i) tobacco use (smoking and smokeless tobacco); (ii) exposure to tobacco smoke; (iii) smoking cessation, (iv) knowledge and attitudes toward tobacco use, (v) smoke-free environment; (vi) exposure to media on tobacco harmful effects and tobacco product advertising; (vii) tobacco-related education in schools.

Measurements

The dependent variable "smoking cessation status" was determined based on two key questions: 1) Participants were asked whether they had ever tried smoking cigarettes, shisha, and other types of cigarettes, even one or two puffs. 2) Those who answered "yes" were further asked about the number of days they had smoked in the last 30 days. Respondents who reported no smoking in the past 30 days were classified as former smokers (achieved cessation), while those who had smoked on at least one day were considered current smokers. Although this definition primarily reflects short-term abstinence, additional data on duration of cessation were collected, providing insight into longer-term quitting patterns.

Independent variables included socio-demographic characteristics (age, sex, residence, pocket money, parental education and occupation), smoking-related behaviors (type of tobacco used, duration of cessation), parental and peer smoking status, tobacco-related knowledge, and exposure to anti-smoking information.

Age was categorized as 13, 14, and 15 years old. Economic levels (weekly pocket money) were classified into four levels: none, <20.000 VND (<0.8 USD), 20.000-50.000 VND (0.8-2 USD), and >50.000 VND (>2 USD). Parental education was divided into four groups (less than primary, primary or secondary, high school or higher, and unknown), whereas parental occupation was classified into five categories (government officer, farmer, worker, free labor, and others). Parental smoking status was categorized as: neither parent smokes, only one parent smokes, both parents smoke, and unknown. Peer smoking was grouped as none, several friends, or almost/all friends.

Tobacco-related knowledge and exposure to anti-smoking information were categorized following the methodology of the Viet Nam GYTS 2014 study entitled "Knowledge and Attitudes Towards Tobacco Smoking among 13-15 Year-Old School Children" [15]. Knowledge was assessed using three questions: (1) Do you think secondhand smoke is harmful to you? (2) Do you think smoking is harmful to health? (3) Do you think smoking for only one or two years and then quitting is not harmful to health? Each question had five response options: Definitely not, probably not, probably yes, definitely yes, and Don't know. Correct answers for each question were scored as 1. The total score ranged from 0 to 3, with 3 being the highest possible score for correct answers to all three questions and 0 being the lowest score for incorrect answers to all three questions.

Exposure to anti-smoking information was measured using two questions regarding: (1) During the past 30 days, have you seen or heard any media messages on tobacco control on television, radio, Internet, panes, posters, newspapers, magazines or movies? (2) During the past 12 months, have you been taught about the dangers of tobacco use in school? Based on their responses, exposure was categorized into three levels: none, exposure to one source, and exposure to two or more sources.

Data analysis

Descriptive statistics (frequencies and percentages) were calculated for each socio-demographic factor. Collinearity was evaluated using pairwise correlations and variance inflation factors (all VIFs < 5, mean VIF=2.15), indicating no serious multicollinearity. Binary logistic regression analyses were preformed to examine the associations of quitting smoking with socio-demographic and several relevant factors among adolescents aged 13-15

years. Odds ratios (ORs) and 95%CIs were estimated by multivariable logistic regression models and adjusted for age, sex, residence area, economic level, parent education and occupation. All analyses were performed using STATA 14.0 software, and p-values<0.05 were considered statistically significant.

Ethical considerations

The 2022 GYTS was approved by the Ministry of Health, Ministry of Education and Training, and the Department of Education and Training and schools from 13 participating provinces. The study protocol was approved by the ethical committee of Hanoi Medical University. All participants were informed of the survey's purpose and assured of their voluntary participation and right to decline.

Results

Participant characteristics

A total of 454 adolescents aged 13-15 years who had previously tried smoking were included in the analysis (Table 1). The majority of adolescents were 15 years old (43.0%), followed by 14 (40.3%) and 13 years old

Table 1. Demographic Characteristics of Study Subject

Characteristics	Current smokers		Former smokers		Total	
	n=105	%	n=349	%	n=454	%
Age						
13 years old	19	18.1	56	16	75	16.5
14 years old	32	30.5	147	42.1	179	39.4
15 years old	54	51.4	146	41.8	200	44.1
Sex						
Male	72	68.6	232	66.5	304	67
Female	33	31.4	117	33.5	150	33
Economic levels (weekly pocket money spent)						
No money	19	18.1	99	28.4	118	26
<0.8 USD	31	29.5	90	25.8	121	26.7
0.8 - 2 USD	26	24.8	73	20.9	99	21.8
> 2 USD	29	27.6	87	24.9	116	25.6
Residence area						
North	56	53.3	171	49	227	50
Centre	36	34.3	119	34.1	155	34.1
South	13	12.4	59	16.9	72	15.9
Father education						
Less primary	14	13.3	47	13.5	61	13.4
Primary and secondary	34	32.4	110	31.5	144	31.7
High-school and higher	29	27.6	109	31.2	138	30.4
Unknown	28	26.7	83	23.8	111	24.4
Mother education						
Less primary	12	11.4	47	13.5	59	13
Primary and secondary	35	33.3	126	36.1	161	35.5
High-school and higher	36	34.3	105	30.1	141	31.1
Unknown	22	21	71	20.3	93	20.5
Father job						
Government officer	22	21	75	21.5	97	21.4
Farmer	8	7.6	33	9.5	41	9
Worker	20	19	42	12	62	13.7
Free labor	49	46.7	184	52.7	233	51.3
Other	6	5.7	15	4.3	21	4.6
Mother job						
Government officer	14	13.3	72	20.6	86	18.9
Farmer	10	9.5	40	11.5	50	11
Worker	26	24.8	49	14	75	16.5
Free labor	50	47.6	182	52.1	232	51.1
Other	5	4.8	6	1.7	11	2.4

(16.7%). Males were more prevalent in both current smokers (68.6%) and former smokers (66.5%). Most adolescents lived in the North (50.0%) and the Centre (34.1%). Economic levels, as indicated by weekly pocket money, were similar across groups, with most participants receiving less than 2 USD per week. Parental education was mainly at primary and secondary (fathers: 31.7% and mothers: 35.5%) and high school and higher (fathers: 30.4%, mothers: 31.1%). The most common parental occupation was free labor (fathers: 51.3%, mothers: 51.1%); followed by government officer (fathers: 21.4%, mothers: 18.9%); and workers (fathers: 13.7%, mothers: 16.5%).

Smoking cessation prevalence and patterns

Among the participants, 76.9% had successfully achieved smoking cessation (Table 2). Of these, 47.8% had stopped for more than three years, 35.1% had quit for one to three years, and 17.1% had quit within the past year. Cigarette was the most commonly smoked product (84.5%), followed by e-cigarettes (14.9%) and shisha and other forms of tobacco (0.8%). The primary reason for smoking cessation among adolescents was health protection (51.4%).

Associated factors with smoking cessation

Figures 1 and 2 illustrate the associations between smoking cessation, knowledge of tobacco harms, and exposure to anti-smoking information. Adolescents with higher knowledge scores and more exposure to

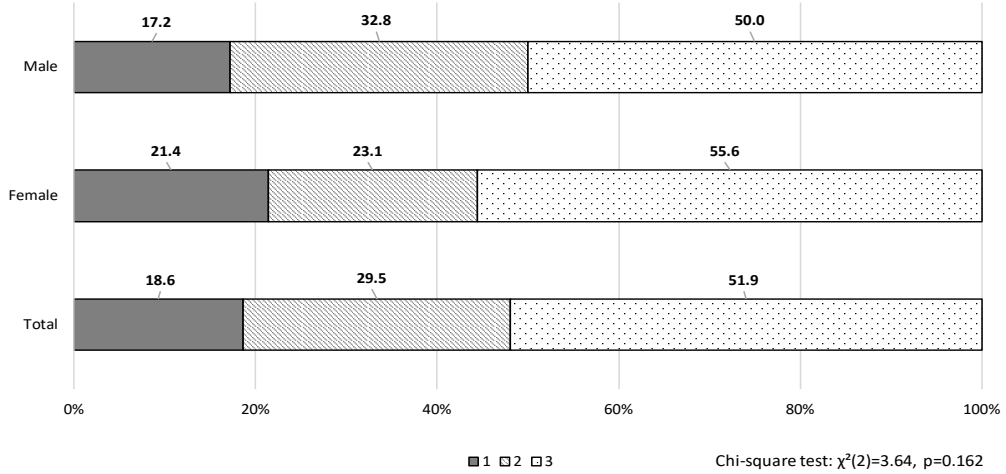

Figure 1. Proportions of Children who Achieved Smoking Cessation by Knowledge Levels on Tobacco-Smoking among Adolescents Aged 13-15 Years Old

Table 2. Description of Smoking Cessation among Adolescents Aged 13-15 Years Old in Vietnam

Characteristics	Male		Female		Total	
	n=304	%	n=150	%	n=454	%
Smoking cessation status						
No	72	23.7	33	22	105	23.1
Yes	232	76.3	117	78	349	76.9
Type of tobacco smoked in the past						
Cigarette	202	87.1	93	79.5	295	84.5
Other	30	12.9	24	20.5	54	15.5
Duration of smoking cessation*						
< 1 year	38	25.2	23	36.5	61	28.5
1-3 years	38	25.2	24	38.1	62	29
> 3 years	75	49.7	16	25.4	91	42.5
Reasons for smoking cessation*						
Protect health	81	53.6	29	46	110	51.4
Save money	3	2	1	1.6	4	1.9
Family dislikes	15	9.9	4	6.4	19	8.9
Friends dislike	2	1.3	0	0	2	0.9
Anti-smoking policy from school	1	0.7	1	1.6	2	0.9
Other	53	32.5	24	44.4	77	36

* There are some missing value

Table 3. Multivariable Analysis of the Associations between Several Related Factors and Smoking Cessation among Adolescents Aged 13-15 Years Old in Vietnam

Variables	Total (n=454)		Male (n=304)		Female (n=150)	
	Quit, n (%)	ORa (95% CI)	Quit, n (%)	ORa (95% CI)	Quit, n (%)	ORa (95% CI)
Economic level (weekly pocket money spent)						
None	99 (83.9%)	1.0	69 (87.3%)	1.0	30 (76.9%)	1.0
<0.8 USD	90 (74.4%)	0.54 (0.22-1.34)	61 (75.3%)	0.36 (0.12-1.08)	29 (72.5%)	0.55 (0.09-3.23)
0.8 - 2 USD	73 (73.7%)	0.57 (0.27-1.21)	48 (70.6%)	0.33 (0.10-1.10)	25 (80.7%)	0.93 (0.14-6.24)
> 2 USD	87 (75.0%)	0.48 (0.22-1.08)	54 (71.0%)	0.26 (0.08-0.92)*	33 (82.5%)	1.57 (0.16-15.15)
Parental smoking status						
Neither parent smokes	194 (73.2%)	1.0	140 (74.5%)	1.0	54 (70.1%)	1.0
Only one parent smokes	148 (82.7%)	2.48 (1.39-4.43)*	87 (80.6%)	2.33 (1.14-4.78)*	61 (85.9%)	4.73 (1.61-13.95)*
Both parents smoke	7 (70.0%)	1.19 (0.22-6.28)	5 (62.5%)	0.94 (0.14-6.10)	2 (100.0)	1.00 (-)
Peer smoking						
None	218 (83.2%)	1.0	143 (85.6%)	1.0	75 (78.9%)	1.0
Several friends	109 (69.4%)	0.35 (0.21-0.57)*	74 (65.5%)	0.23 (0.10-0.52)*	35 (79.5%)	0.40 (0.09-1.87)
Almost all/all friends	22 (62.9%)	0.31 (0.14-0.69)*	15 (62.5%)	0.16 (0.03-0.90)*	7 (63.6%)	0.05 (0.00-1.03)
Level of knowledge on tobacco smoking (score)						
1	65 (67.7%)	1.0	40 (60.6%)	1.0	25 (83.3%)	1.0
2	103 (75.7%)	1.58 (0.91-2.76)	76 (75.3%)	1.57 (0.40-6.18)	27 (77.1%)	0.51 (0.09-3.04)
3	181 (81.5%)	2.23 (1.30-3.83)*	116 (84.7%)	2.78 (0.87-8.82)	65 (76.5%)	1.49 (0.22-10.03)
Level of exposure to anti-smoking information						
None	18 (64.3%)	1.0	11 (57.9%)	1.0	7 (77.8%)	1.0
1 source	113 (72.4%)	1.26 (0.53-2.96)	70 (69.3%)	2.35 (0.53-2.96)	43 (78.2%)	1.48 (0.24-9.29)
2 or more sources	218 (80.7%)	2.49 (1.05-5.92)*	151 (82.1%)	3.19 (0.79-12.82)	67 (77.9%)	1.00 (-)

Statistically significant results ($p < 0.05$) are marked with (*). Reference categories are shown as OR = 1.00. Cells with (–) indicate subgroups with insufficient data to generate reliable confidence intervals

anti-smoking messages had higher cessation rates. Specifically, adolescents with the highest knowledge scores were more likely to achieve cessation (51.9%) than those with lower knowledge (18.6%). Similarly, smoking cessation rates were highest (62.5%) among those exposed to multiple anti-smoking messages, compared to those with limited (32.4%) or no exposure (5.2%). However, no statistically significant differences by sex were found for either knowledge score (χ^2=3.64, p=0.162) or exposure to anti-smoking information (χ^2=2.03, p=0.362).

Multivariable logistic regression analysis (Table 3) identified several significant factors associated with smoking cessation, including economic level, peer smoking status, tobacco-related knowledge, exposure to

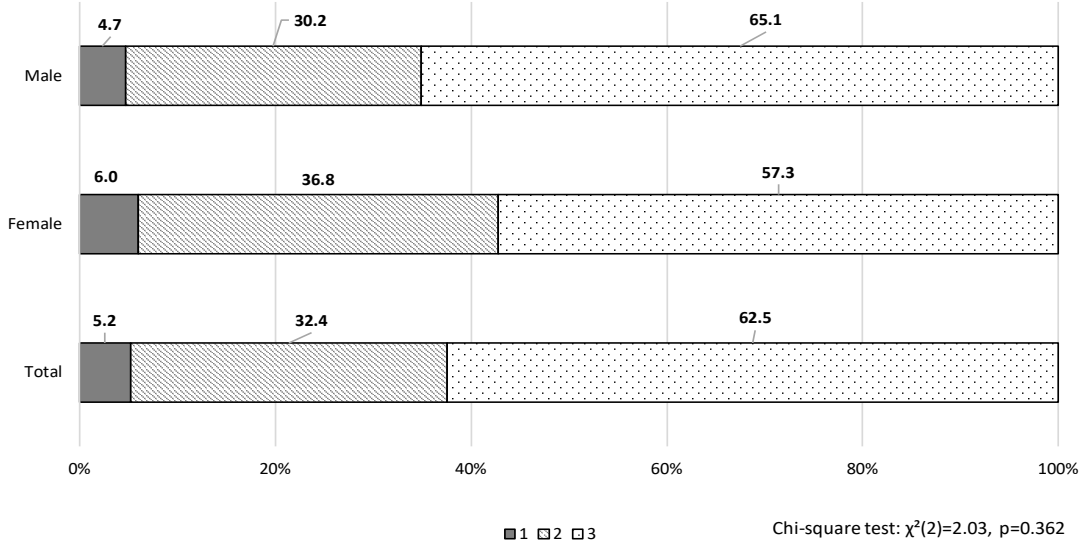

Figure 2. Proportions of Children who Achieved Smoking Cessation by Levels of Exposure to Anti-Smoking Information among Adolescents Aged 13-15 Years Old

anti-smoking information, and parental smoking status. Economic level showed a significant association with smoking cessation among males; those receiving more than 2 USD per week were less likely to quit compared to those with no pocket money (OR = 0.26, 95% CI: 0.08–0.92). The influence of peer smoking was also more pronounced among males. Those with several smoking friends were less likely to quit (OR = 0.35, 95% CI: 0.21–0.57 for both sexes; OR = 0.23, 95% CI: 0.10–0.52 for males), and this effect was even stronger for those whose friends mostly or all smoked (OR = 0.31, 95% CI: 0.14–0.69 for both sexes; OR = 0.16, 95% CI: 0.03–0.90 for males). Additionally, exposure to anti-smoking information was significantly associated with higher odds of quitting, particularly among those exposed to two or more sources (OR = 2.49, 95% CI: 1.05–5.92 for both sexes; OR = 3.19, 95% CI: 1.05–5.92 for males). However, none of these associations—including economic status, peer smoking, and exposure to anti-smoking information were statistically significant among females, indicating potential gender differences in the predictors of smoking cessation.

In contrast, adolescents with greater knowledge of tobacco harms were more likely to achieve cessation in both sexes (OR = 2.23, 95% CI: 1.30–3.83). Moreover, those with one smoking parent were significantly more likely to quit than those whose parents did not smoke (OR = 2.48, 95% CI: 1.39–4.43).

Discussion

The present study analyzed data from the 2022 Vietnamese Global Youth Tobacco Survey, including 454 adolescents aged 13-15 years old. Among them, 76.9% reported smoking cessation and cigarettes being the most common product used (84.5%). This high rate is consistent with a systematic review, which reported lifetime cessation attempt rates of 71% (range 28–84%) [16]. The younger age and non-daily smoking predominance in our sample may also contribute to this high likelihood of cessation. The result was consistent with findings from the 2014 GYTS reporting a decreased prevalence of cigarette smoking in Viet Nam [7]. However, the prevalence of all tobacco use did not decline and a slight increase in alternative products (shisha, traditional water-pipe tobacco, e-cigarette…) was observed. This underscores the need for tobacco prevention programs to address all forms of tobacco use, not only cigarettes.

The multivariable analysis identified several factors associated with smoking cessation, including economic level, peer smoking status, tobacco-related knowledge, exposure to anti-smoking information, and parental smoking status.

Economic level (pocket money) emerged as an independent predictor of smoking. Adolescents with the highest weekly pocket money were more likely to continue smoking compared to those with no pocket money. This result is consistent with several previous studies. In a large Chinese study of 12,708 adolescents, those receiving ≥200 RMB monthly had significantly higher smoking rates, with adjusted odds ratios ranging from 2.0 to 6.5 compared to those receiving <200 RMB [17]. Another study in 6 European cities in 2015 reported that adolescents in the highest pocket money level were more likely to be regular smokers than those in the lowest level (OR = 3.1; $p < 0.01$) [18]. These results suggest that greater financial freedom facilitates tobacco access, emphasizing the importance of both policy restrictions and parental monitoring.

Peer influence emerged as a major barrier to cessation. This finding is consistent with meta-analyses reporting strong dependence on friends' smoking status [19]. Our result showed that adolescents with smoking friends were less likely to quit, with a significantly decreased trend observed in the number of smoking friends (p for trend <0.001). This is strongly supported by the Indonesian GYTS 2019 analysis, which found that having smoking friends significantly reduced an adolescent's odds of intending to quit (AOR=0.48; 95% CI=0.38−0.74) [20]. The normalization of smoking within peer groups likely reinforces the behavior, making cessation more difficult.

An increased probability of quitting smoking was observed among adolescents with only one smoking parent. This finding contrasts with previous studies linking parental smoking to continued smoking among adolescents [19, 21]. However, the 2015 GYTS in Thailand found no significant association between parental smoking and children's cessation, suggesting that this relationship may vary across contexts [22]. This unexpected result of our study may be explained by alternative mechanisms. First, adolescents may stop smoking due to health concerns (the most frequently reported reason), reinforced by observing a parent's health deterioration. This is supported by Indonesian data showing that knowing the dangers of smoking from family discussions doubled the desire to quit (OR=2.1, p<0.025) [23]. Second, "deterrent effect" - witnessing the negative health consequences of parental smoking may discourage imitation. Wyszynski et al. [24] found such observations strengthen anti-smoking attitudes, which were associated with greater intentions to quit. In Vietnamese context, where family influence is strong, this deterrent effect may counteract the expected modeling effect. Nevertheless, this finding should be interpreted with caution, and further research is warranted to clarify the mechanisms and inform family-based smoking prevention strategies.

Both exposure to anti-smoking messages and greater tobacco-related knowledge were significantly associated with cessation. Adolescents with higher knowledge scores were more likely to quit (OR = 2.23), and exposure to anti-smoking information was similarly associated (OR=2.49). This aligns with prior regional studies in Jordan and India, where exposure to multiple anti-tobacco channels was positively associated with quit intentions (AOR range: 2.0–2.7) [25, 26]. Furthermore, the Indonesian GYTS 2019 analysis reported that adolescents who perceived smoking as harmful to health were 2.2 times more likely to quit (AOR=2.20; 95% CI=1.40−3.48) [20]. These results suggest that cognitive factors are powerful motivators for behavior change and should be prioritized in tobacco control strategies.

Gender differences were also evident: economic status and peer smoking significantly influenced cessation

among males but not females. This reflects findings that male adolescents are more affected by peer smoking [27]. Conversely, the GYTS data from 45 countries found female adolescents had lower odds of attempting to quit than males (AOR=0.80, 95% CI=0.74–0.87) [28], highlighting the complexity of gender-related patterns. These findings suggest that cessation interventions in Vietnam should be tailored to the distinct social contexts of males and females.

This study has notable strengths, including the use of the most recent national data (GYTS 2022), which ensures both relevance and generalizability. The application of multivariable logistic regression allowed simultaneous examination of determinants and revealed a context-specific protective effect of having only one smoking parent, informing targeted family-based strategies. Nevertheless, several limitations should be acknowledged. As a cross-sectional study, it provides only a snapshot of cessation behaviors and associated factors. Reliance on self-reported data may introduce bias, though careful design minimized this risk. Small sample size in the female subgroups resulted in wide confidence intervals, which limits precision. Finally, this study did not explore in-depth cessation processes, such as nicotine dependence level, specific psychosocial factors, and detailed exposure to all emerging tobacco products…, which highlights areas for further research.

In conclusion, this study identifies economic status, peer influence, parental smoking, and cognitive factors (knowledge and exposure to anti-smoking information) as key determinants of smoking cessation among Vietnamese adolescents, with notable gender differences. These findings underscore the need for integrated, gender-sensitive public health strategies that combine: 1) Social and Behavioral Interventions, focusing on peer-led programs and family communication campaigns to leverage the strong deterrent effect of parental awareness; and 2) Policy and Service Access, prioritizing the strict enforcement of smoke-free policies and the expansion of low-cost professional support via national quitlines and mCessation platforms. Such comprehensive approaches are essential to effectively promote and sustain smoking cessation.

Author Contribution Statement

DPB, KLN, HPT, HLTM and GKB contributed to conceptualization and methodology. HNTD, ADT, LNT, TLTQ, and TNTT contributed to investigation and project administration. HLTM and MLN performed the formal analysis. HLTM drafted the original manuscript and contributed to writing – review & editing. DPB and GKB supervised the research.

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Funding Statement

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Ethical Declaration

This study was approved by the Ethics Committee of Hanoi Medical University, with approval number 624/GCN-HDDDNCYSH-DHYHN dated May 12th, 2022.

Data Availability

All data relevant to the study are included in this manuscript.

Conflict of Interest

The authors declare no competing interests.

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