

## Knowledge, attitude and behavior of using electronic cigarettes in grades 8 and 9 students at Binh Thanh district 2023

Tran Thi Anh Thu<sup>1</sup>, Nguyen Hoang Thien Tam<sup>1</sup>, Quach Kim Ung<sup>1</sup>, Than Thi Kim Loi<sup>1</sup>, Phan Nguyen Bao Han<sup>1</sup>, Che Thi Thuy Dieu<sup>2</sup>, Nguyen Duc Thanh<sup>1</sup>, Lam Son Bao Vi<sup>3</sup>

<sup>1</sup>Binh Thanh District Medical Center

<sup>2</sup>Dong Nai General Hospital

<sup>3</sup>Pham Ngoc Thach University of Medicine

### Abstract

**Introduction:** Electronic cigarettes (E-Cigarettes) are becoming popular among young people. Secondary school students are an age group that is susceptible to infection, however, the problem has not received much attention from families and schools.

**Objectives:** (1) To determine the proportion of good knowledge, good attitude about e-cigarettes of grades 8 and 9 students in Binh Thanh district 2023 and related factors. (2) To determine the proportion of E-cigarettes use of grades 8 and 9 students in Binh Thanh district 2023 and related factors.

**Materials and Methods:** A Cross-sectional study on 758 students in grade 8 and grade 9 at 10 secondary schools in Binh Thanh district from February 2023 to October 2023. Sampling was selected by a self-completed questionnaire, including 6 main factors: personal characteristics, environmental characteristics, knowledge, attitudes, behaviors, and intervention needs to conduct assessment.

**Results:** There are 54.9% of students with good knowledge; 92.9% of students have good attitudes about E-Cigarettes. There are 16.8% of students who have used E-Cigarettes at least once. The multivariate model indicate that the factors related to students' e-cigarette use including ethnicity, academic performance, online shopping, family members/friends/teachers smoking cigarettes/e-cigarettes, and attitudes.

**Conclusion:** The prevalence of e-cigarette use among students in grades 8 and 9 was high. Interventions from the school and family are needed.

**Keywords:** E-Cigarettes, knowledge, attitude, behavior, Binh Thanh District.

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**Author contact:**

Tran Thi Anh Thu

**Email:** trananhthu1102

@gmail.com

**Phone:** 0983919053

### 1. INTRODUCTION

Electronic cigarettes (e-cigarettes) are devices that simulate the appearance and function of traditional cigarettes by utilizing an electronic apparatus with a rechargeable battery system that heats a dissolved liquid solution, producing an aerosol for inhalation. The vapor generated by these devices is designed to mimic the taste and sensation of real tobacco smoke. The demographics of tobacco users have undergone a shift towards a younger audience since the introduction of e-cigarettes to the market. As a result,

e-cigarettes have become popular among young people as a fashion statement.

In America, a national survey conducted in 2011, 2017, and 2019 revealed a significant increase in e-cigarette smoking among high school students. The rate of e-cigarette use among this age group increased from 1.5% in 2011 to 27.5% in 2019.<sup>1</sup> Similarly, in Europe, data from the Global Youth Tobacco Survey (GYTS) in 2014 and 2018 demonstrated a rapid increase in e-cigarette use among 13-15 year-olds.<sup>2</sup> In Vietnam, a study conducted in Hanoi<sup>3</sup> revealed that the rate of current e-cigarette use

among students in grades 8-12 is approximately 8.35%, with males reporting a higher usage rate of 12.39% compared to females at 4.8%.

Secondary school students are at a sensitive age where they explore and experiment with their identity and style. However, their knowledge about e-cigarettes may need to be improved due to the commercial tactics that promote their use, such as fragrance additives or promises of harmlessness from manufacturers and sellers. Although most schools in Vietnam prohibit e-cigarette use, children can still access and use them. A quick survey conducted in May 2023 of over 1,000 students in Binh Thanh district revealed that the rate of e-cigarette use was 16%, and 44% of the subjects reported having friends who use e-cigarettes. Given its social significance, this issue necessitates attention and research to analyze and evaluate the situation objectively and scientifically to create suitable intervention programs.

Most countries have implemented intervention strategies to limit e-cigarette use among adolescents, but the factors that drive this behavior have yet to be thoroughly examined. In Vietnam, there have been few studies on this topic. Therefore, this study aims to determine the proportion of grades 8 and 9 students in Binh Thanh district who possess adequate knowledge and attitudes about the harmful effects of e-cigarettes and the characteristics related to e-cigarette use prevalence. This study examines the situation objectively and scientifically to develop suitable intervention programs.

## **2. MATERIALS AND METHODS**

### **2.1. Study design**

A cross-sectional study was conducted on students in grades 8 and 9 at the Binh Thanh district, Ho Chi Minh City from 02/2023 to 10/2023. To ensure a 95% confidence interval, the type I error probability was chosen as  $\alpha=0.05$ , with an estimation error of  $d=0.5$ . The research team expected a sample loss of 5%. Consequently, the minimum research sample size required was 405 students. In this study we included 758 students.

### **2.2. Sample selection criteria**

Students in grades 8 and 9 of secondary schools in Binh Thanh district, Ho Chi Minh City, who were present at the study, had heard and knew about e-cigarettes and agreed to participate.

### **2.3. Exclusion criteria**

Subjects completed less than 80% of the information in the survey questionnaire.

### **2.4. Data collection methods and tools**

We used multistage sampling to select a sample. We chose one secondary school randomly in total 15 schools located in Binh Thanh district. At each selected school, randomly choose two classes to participate in the study.

Students would complete a questionnaire, including 6 factors: personal characteristics (8 variables), environmental characteristics (12 variables), knowledge (12 variables), attitudes (10 variables), behaviors (8 variables), and intervention needs (1 variable) to conduct assessment.

### **2.5. Variable definitions**

Good knowledge was determined when students correctly answer 9/12 knowledge questions (more than 70%). Similarly, good attitude was determined when students correctly answer 7/10 attitude questions.

The need for intervention is determined when the student has 1 of 2 needs: to be provided with additional information or receive advice/quit e-cigarette addiction.

### **2.6. Statistical analysis**

We use descriptive statistics to summarize qualitative variables by frequency and percentage. Quantitative variables are typically summarized using mean and standard deviation or median and interquartile range (if they had abnormal distribution).

To analyze the relationship between 2 binary variables, we use the  $\chi^2$  test. Poisson regression is valuable for examining the relationship between binary outcomes and nominal variables. Our data is inputted into Epidata 3.1 software before being analyzed and processed using Stata 16.0 software.

3. RESULT

**Table 1.** Population characteristics (n=758)

	Frequency	Ratio		Frequency	Ratio
<b>Gender</b>			<b>Pocket money</b>		
Male	354	46.7	Do not have	102	13.4
Female	390	51.4	< 30,000	153	20.2
Other	14	1.9	30,000 - 49,000	170	22.4
<b>Ethnic</b>			50,000 - 99,000	165	21.8
Kinh	739	97.5	> 100,000	168	22.2
Chinese	17	2,2			
Other	2	0.3	<b>Personal mobile phone connected to the internet</b>		
<b>Grade</b>			Yes	669	88.3
Grade 8	339	44.7	No	89	11.7
Grade 9	419	55.3	<b>Personal online shopping</b>		
<b>Academic performance</b>			Yes	506	66.8
Excellent	399	52.6	No	252	33.2
Good	232	30.6	<b>Time spent using the internet/day (hours)</b>	5 ± 4#	
Medium	121	16.0		4 (3 - 6)@	
Bad	6	0.8			

#mean±standard deviation; @interquartile range.

As shown in Table 1, the research sample primarily comprises students with exceptional academic performance. Female constitute the majority of the respondents. The weekly pocket money distribution is evenly distributed between 30,000 VND and over 100,000 VND. Moreover, a significant proportion of the students possess personal mobile phones that provide access to the internet. Of these, 66.8% of the students engage in online shopping.

**Table 2.** Knowledge, attitude, and behavior of using e-cigarettes (n=758)

	Frequency	Ratio
<b>Knowledge</b>		
Good	416	54.9
Not good	342	45.1
<b>Attitude</b>		
Good	704	92.9
Not good	54	7.1
<b>E-cigarettes use</b>		
Yes	127	16.8
No	631	83.2

Table 2 indicates that 54.9% of the surveyed students are well-versed with e-cigarettes. Furthermore, most of respondents exhibit a positive attitude towards e-cigarettes. The recorded prevalence of students who have tried e-cigarettes at least once is 16.8%. These findings suggest a need for further exploration and engagement with the student population regarding e-cigarettes.

**Table 3.** Features of e-cigarettes behaviour (n=127)

	<b>Frequency</b>	<b>Ratio</b>
<b>Reasons for using</b>		
Try because of my curiosity	59	46,5
My friends use e-cigarettes	25	19,7
Diverse flavors	17	13,4
My relatives use e-cigarettes	10	7,9
Less expensive than traditional cigarettes	1	0,8
Less harm to health than traditional cigarettes	1	0,8
Could be used discreetly at home or at school	1	0,8
To quit traditional smoking	2	1,6
Due to attractive advertising	2	1,6
Other reasons	9	7,1
<b>Frequency of use (times/week)</b>	3,2 ± 1,4#	
<b>Places where students often smoke</b>		
At school	11	8,7
At their own home	42	33,1
At their friend's home	15	11,8
Stalls, café shop	42	33,1
Internet shop	6	4,7
Other places	11	8,7
<b>Type of e-cigarettes</b>		
Cigalikes	60	47,2
Vape pens)	41	32,3
Other type	26	20,5

#mean±standard deviation

The main reason for using e-cigarettes is curiosity. Friends' use also leads students to use e-cigarettes. Average frequency of use is 3 times a week. Common places to smoke are at home and at stalls/ café shop. Cigalikes were most commonly type used, followed by vape pens.

**Table 4.** Relationship between e-cigarette use behavior and personal characteristics (n=758)

	E-cigarettes use			P
	Yes	No	PR (CI 95%)	
<b>Gender</b>				
Male	64 (18.1)	290 (81.9)	1	
Female	60 (15.4)	330 (84.6)	0.85 (0.62-1.17)	0.325
Other	3 (21.4)	11 (78.6)	1.19 (0.42-3.31)	0.746
<b>Ethnic</b>				
Kinh	120 (16.2)	619 (83.8)	1	
Chinese	6 (35.3)	11 (64.7)	<b>2.17 (1.12-4.22)</b>	<b>0.022</b>
Other	1 (50.0)	1 (50.0)	3.08 (0.76-12.4)	0.114
<b>Grade</b>				
Grade 8	64 (18.9)	275 (81.1)	1	
Grade 9	63 (15.0)	356 (85.0)	0.80 (0.58-1.09)	0.159
<b>Academic performance*</b>				
Excellent	26 (6.5)	373 (93.5)	<b>2.14 (1.82-2.51)</b>	<b>&lt; 0.001</b>
Good	55 (23.7)	177 (76.3)		
Medium	43 (35.5)	78 (64.5)		
Bad	3 (50.0)	3 (50.0)		
<b>Pocket money*</b>				
Do not have	17 (16.7)	85 (83.3)	<b>1.23 (1.07-1.41)</b>	<b>0.003</b>
< 30,000	15 (9.8)	138 (90.2)		
30,000 - 49,000	25 (14.7)	145 (85.3)		
50,000 - 99,000	21 (12.7)	144 (87.3)		
> 100,000	49 (29.2)	119 (70.8)		
<b>Personal mobile phone connected to the internet</b>				
Yes	114 (17.0)	555 (83.0)	1.17 (0.69-1.98)	0.564
No	13 (14.6)	76 (85.4)		
<b>Personal online shopping</b>				
Yes	108 (21.3)	398 (78.7)	<b>2.83 (1.78-4.50)</b>	<b>&lt; 0.001</b>
No	19 (7.5)	233 (92.5)		
Time spent using the internet/day			<b>1.11 (1.07-1.16)</b>	<b>&lt; 0.001</b>

\*Variables showed a trend

The data presented in Table 4 indicates no significant correlation between the use of e-cigarettes and gender, grade level, or the use of mobile phones with an internet connection. These findings

suggest that these factors do not play a role in determining the likelihood of e-cigarette use. However, further research may be necessary to draw more conclusive conclusions. Nonetheless, these results highlight the need for continued efforts to raise awareness of the potential risks associated with e-cigarette use among individuals of various ages and backgrounds.

**Table 5.** Relationship between e-cigarette use and family characteristics (n=758)

	E-cigarettes use			P
	Yes	No	PR (CI 95%)	
<b>Living together</b>				
Living with father and mother	90 (15.2)	501 (84.8)	1	
Living with a father or mother	31 (23.9)	99 (76.1)	<b>1.57 (1.09-2.25)</b>	<b>0.015</b>
Living with relatives other than parents	6 (16.7)	30 (83.3)	1.08 (0.65-1.54)	0.815
Other	0 (0)	1 (100)	-	-
<b>Relationship with father*</b>				
Good	39 (12.1)	283 (87.9)	<b>1.39 (1.12-1.74)</b>	<b>0.003</b>
Normal	71 (19.9)	286 (80.1)		
Not good	17 (21.5)	62 (78.5)		
<b>Relationship with mother*</b>				
Good	58 (12.3)	415 (87.7)	<b>1.82 (1.42-2.33)</b>	<b>&lt; 0.001</b>
Normal	61 (23.1)	203 (76.9)		
Not good	8 (38.1)	13 (61.9)		
<b>Other people to share</b>				
Yes	62 (13.7)	390 (86.3)	<b>0.79 (0.65-0.95)</b>	<b>0.007</b>
No	65 (21.2)	241 (78.8)	1	

*\*Variables showed a trend*

Table 5 shows the factors related to cohabitation that influence students' use of e-cigarettes. The group of students who have poor relationships with their parents were 1.39 times more likely to use e-cigarettes in their relationship with their father and 1.82 times more likely in their relationship with their mother. On the other hand, students who reported being able to share their feelings with people other than their parents were found to have a 21% lower rate of e-cigarette use compared to those who had no one to share with.

**Table 6.** Relationship between e-cigarette use and environmental characteristics (n=758)

	E-cigarettes use			P
	Yes	No	PR (CI 95%)	
<b>Family members smoke cigarettes</b>				
Yes	100 (22.6)	343 (77.4)	<b>1.45 (1.29-1.63)</b>	<b>&lt; 0.001</b>
No	27 (8.6)	288 (91.4)	<b>1</b>	

	E-cigarettes use			P
	Yes	No	PR (CI 95%)	
<b>Family members smoke electronic cigarettes</b>				
Yes	39 (45.4)	47 (54.6)	<b>4.12 (2.82-6.02)</b>	<b>&lt; 0.001</b>
No	88 (13.1)	584 (86.9)	1	
<b>Friends smoke cigarettes</b>				
Yes	52 (43.3)	68 (56.7)	<b>3.80 (2.80-5.16)</b>	<b>&lt; 0.001</b>
No	75 (11.8)	563 (88.2)	1	
<b>Friends smoke electronic cigarette</b>				
Yes	90 (30.6)	204 (69.4)	<b>2.19 (1.87-2.57)</b>	<b>&lt; 0.001</b>
No	37 (8.0)	427 (92.0)	1	
<b>The teacher smokes a cigarette</b>				
Yes	45 (24.5)	139 (75.5)	<b>1.61 (1.22-2.12)</b>	<b>0.001</b>
No	82 (14.3)	492 (85.7)	1	
<b>The teacher smokes an electronic cigarette</b>				
Yes	5 (50.0)	5 (50.0)	<b>4.97 (1.46-16.9)</b>	<b>0.005</b>
No	122 (16.3)	626 (83.7)	1	
<b>Access information on e-cigarettes</b>				
Yes	85 (17.1)	413 (82.9)	1.02 (0.89-1.17)	0.749
No	42 (16.2)	218 (83.8)	1	
<b>Learning/activities about e-cigarettes</b>				
Yes	80 (15.5)	437 (84.5)	0.91 (0.79-1.05)	0.167
No	47 (19.5)	194 (80.5)	1	

Table 6 shows that having family members, friends, and teachers who smoke cigarettes/e-cigarettes increases the rate of e-cigarette use among students, specifically Students who have family members who smoke cigarettes. Cigarettes have a 1.45 times higher rate of e-cigarette use ( $p < 0.001$ ). Students whose family members smoke e-cigarettes have a 4.12 times higher rate of using e-cigarettes ( $p < 0.001$ ). Students whose friends smoke cigarettes have a 3.8 times higher rate of using e-cigarettes ( $p < 0.001$ ). Students who have friends who smoke e-cigarettes have a 2.19 times higher rate of using e-cigarettes ( $p < 0.001$ ). Students whose teachers smoke cigarettes have a 1.61 times higher rate of using e-cigarettes ( $p < 0.001$ ). Students whose teachers smoke e-cigarettes have a 4.97 times higher rate of using e-cigarettes ( $p = 0.005$ ).

**Table 7.** The relationship between knowledge and attitudes with behavior and needs (n=758)

	Using e-cigarettes			Intervention needs		PR (CI 95%)
	Yes	No	PR (CI 95%)	Yes	No	
<b>Knowledge</b>						
Good	56 (13.5)	360 (86.5)	<b>0.77</b> <b>(0.63-0.95)<sup>a</sup></b>	193 (46.4)	223 (53.6)	<b>1.54</b> <b>(1.27-1.87)<sup>a</sup></b>
Not good	71 (20.8)	271 (79.2)		103 (30.1)	239 (69.9)	
<b>Attitude</b>						
Good	91 (12.9)	613 (87.1)	<b>0.19</b> <b>(0.15-0.25)<sup>a</sup></b>	287 (40.8)	417 (59.2)	<b>2.45</b> <b>(1.34-4.47)<sup>a</sup></b>
Not good	36 (66.7)	18 (33.3)		9 (16.7)	45 (83.3)	

a:  $p < 0.001$ .

The results of this study indicate that students who exhibit a favorable stance towards usage behavior, coupled with a superior level of knowledge, demonstrate notably lower percentages of 23% and 81%, respectively, compared to those who do not possess such attributes. Further, individuals with good knowledge and positive attitudes display higher intervention needs, recording 1.54 and 2.45 times more needs than their counterparts who lack these traits. These differences are statistically significant at  $p < 0.001$ .

**Table 8.** Multivariate analysis identified factors associated with e-cigarette use behavior

	PR (CI 95%)	p
<b>Ethnic</b>		
Kinh	1	
Chinese	1.83 (1.05-3.21)	<b>0.034</b>
Other	2.10 (0.42-10.4)	0.366
<b>Academic performance#</b>	1.75 (1.46-2.09)	<b>&lt; 0.001</b>
<b>Online shopping (yes/no)</b>	1.98 (1.26-3.12)	<b>0.003</b>
<b>Family members smoke cigarettes (yes/no)</b>	1.56 (1.08-2.56)	<b>0.019</b>
<b>Family members smoke electronic cigarettes (yes/no)</b>	1.45 (1.05-2.00)	<b>0.022</b>
<b>You smoke cigarettes (yes/no)</b>	1.60 (1.17-2.20)	<b>0.003</b>
<b>You smoke an electronic cigarette (yes/no)</b>	2.20 (1.52-3.20)	<b>&lt; 0.001</b>
<b>The teacher smokes a cigarette (yes/no)</b>	1.06 (0.78-1.44)	0.703
<b>The teacher smokes an electronic cigarette (yes/no)</b>	2.14 (1.04-4.40)	<b>0.039</b>
<b>Good knowledge (yes/no)</b>	0.90 (0.66-1.22)	0.494
<b>Good attitude (yes/no)</b>	0.50 (0.35-0.72)	<b>&lt; 0.001</b>

#Base- group is Excellent group

The results of Table 8 have found that ethnic characteristics, academic performance, online shopping, family members/friends/teachers smoking cigarettes/e-cigarettes, and attitudes are actual characteristics related to students' e-cigarette use behavior.

#### 4. DISCUSSION

Our data shows that 54.9% of students know about e-cigarettes well. 92.9% of students have a good attitude about e-cigarettes. We recorded that the number of students who have ever used e-cigarettes at least once is 16.8%. Similar studies to evaluate students' knowledge and attitudes about using e-cigarettes are limited. Several large-scale surveys worldwide have reported lower levels of overall e-cigarette use than the data obtained from our study. In Vietnam, there have been few official publications on the current status of e-cigarette use among adolescents. In 2019, the Global Student Health Survey (GSHS) conducted by the World Health Organization showed that the rate of current e-cigarette smoking (in the past 30 days, at least one day of tobacco use) electronic devices) among 13-17 year-old students nationwide is 2.6%, and among urban students, it is 3.4%.<sup>4</sup> Although the document forecasts a correct trend, the figure of 3.4% is much lower than reality. Data collection tools need to be more specific; data collection is carried out through the local annual report system, so the data source cannot reflect the actual situation.

After multivariate analysis, factors related to e-cigarette use behavior were recorded, including ethnicity, academic performance, online shopping, and family members/friends/teachers who smoke cigarettes/e-cigarettes, attitudes towards e-cigarettes. It is worth noting that the data did not show a statistical association between knowledge and e-cigarette use behavior. Before implementing intervention strategies, an inherent thought is to focus on providing knowledge about e-cigarettes. Meanwhile, attitude is a more critical factor in determining the behavior of using e-cigarettes among students in grades 8 and 9. Among attitude factors, we exploit attitudinal issues-self and attitude due to a lack of life skills. Our results show that the strong impact from the environment (relatives, friends, and teachers who smoke or use e-cigarettes) all promote the behavior of approaching and using e-cigarettes among students.

This is a relatively new research issue on the use of new-generation cigarettes among middle school students, and there are still many gaps in the literature in Vietnam. While analyzing the data, we evaluated the impact of personal characteristics, family characteristics, and environmental exposure characteristics on e-cigarette use behavior and also included other factors. When analyzing univariate multivariate models, relevant factors were identified to determine which factors relate to students' e-cigarette use behavior. Research results have also shown that attitude is an essential factor that needs intervention to change behavior instead of knowledge.

The group of students with good knowledge and attitudes prevails over those with poor knowledge and attitudes. However, the proportion of students who have ever used e-cigarettes at least once is very concerning, and it can be said that the use of e-cigarettes is popular among young people.

The evidence obtained in our study can be used to develop timely intervention strategies that focus on changing students' attitudes while providing the necessary skills for students to cope with the problem. Deal with advertising strategies, manipulation from friends, or influence from relatives' behavior.

##### 4.1. Limitations

Because this is a descriptive cross-sectional study, it is impossible to confirm the cause-and-effect relationship between factors and the behavior of using e-cigarettes. It cannot reflect the long-term impact of the factors that affect students' behavior. Moreover, the sample could be more representative because the research was conducted in the Binh Thanh district of Ho Chi Minh City. Besides, despite efforts to control bias due to self-reporting, in reality bias can still occur due to the sensitive nature of the research issue.

#### 5. CONCLUSIONS

The rate of e-cigarette smoking among students in grades 8 and 9 is high. More community intervention strategies are needed to improve students' attitudes, while also calling for more active attention from families and schools.

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